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Sl.No	Title of Books/Papers
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2	Extreme learning machine based classification for detecting micro-calcification in mammogram using multi scale features
3	A Survey on LLC resonant converters with synchronous rectifier for EVs
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A Review on Privacy Preserving Authentication in VANETs

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Abstract-The potential growth in Mobile ad-hoc Network triggered the Vehicular ad-hoc network (VANET) for traffic security and efficiency on roads, because once deployed they could bring a new environment to drivers. Vehicular communication in real time environment makes privacy a real challenge, which might affect the large scale deployment of VANETs. Researchers have proposed many solutions to these problems. This paper provides a detailed study on different privacy preserving authentication algorithms in vehicular communication. We start the paper with an introduction to system architecture and the requirements needed. Detailed discussion on different algorithms comes afterwards.

Keywords- Authentication , Privacy ,Vehicular ad hoc network(VANET)

INTRODUCTION

Vehicular Ad hoc Network (VANET) is considered as one of the subsets of Mobile ad hoc Network(MANET),which is an interesting topic for researches. In VANET each vehicles and it's associated blocks are treated as nodes which communicate among themselves inside the network. Thus in VANET vehicle to vehicle (V2V) and Infrastructure to vehicle communication (I2V) are present. All the vehicles become smart as On Board Units (OBU) is installed which integrate the wireless communications between vehicles, micro sensors, embedded systems. These smart vehicles can improve the driving experience by efficient exchange of messages among vehicles. Moreover, drivers could be more aware by their driving environment if messages concerning real-time traffic conditions are properly transmitted and received.

Despite these pros, [11] VANET has come with their own set of challenges, particularly in the aspect of privacy. Lack of authenticated data shared in the network leads to malicious attacks and service abuses, which leads great threat to drivers. Furthermore, as an example of Mobile Ad hoc Network (MANET), the challenges and issues faced by MANET are inherent in VANET too. Moreover, VANETs are more challenging due to their high mobility and large scale deployment. Therefore a novel mechanism to be

needed to guarantee the basic requirement of VANET such as authentication, integrity and nonrepudiation.

To enlighten the readers a system architecture and it's requirements are provided in the introduction.

II SYSTEM ARCHITECTURE AND REQUIREMENTS

The 3 main parts of a VANET system is described as follows

- 1)Trusted Authority (TA): A TA is the main trusted administration in the Vanet network. It has sufficient computational and storage resources in order to get register the vehicles. It controls the RSU unit and provide proper master keys for communication.
- 2) Road Side Units (RSU): These are infrastructures like traffic post fixed on the road side. It is not trustworthy always since attackers can easily attack and get information from this. RSU is the entity which directly communicate with vehicles.
- 3)Vehicles : These are the moving nodes in the wireless sensor network. They have a On Board Unit(OBU) as well as Tamper Proof Devices. OBU helps to communicate the vehicle with other vehicles and the RSU. TPDs helps for cryptographic operations

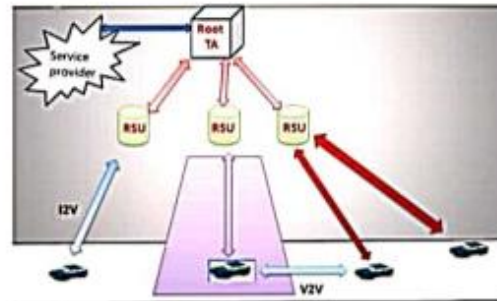


Figure 1 : A typical vanet scenario



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Extreme learning machine based classification for detecting micro-calcification in mammogram using multi scale features

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Abstract- In the human body, there are some genes that are lead to the growth of the cells .The mutation of these genes are called cancer. Breast cancer is higher in women, and which will causes largest number of cancer related deaths among women. Breast cancer rates are higher among women in many countries. To increase the results of breast cancer and survival, early diagnosis is crucial. There are two early screening plans for breast cancer: early detection and screening. Limited resource parameters with low health systems where most women are diagnosed in the late stages and should organize early diagnosis programs based on knowledge of the first signs and symptoms. Many methods are used to test women to identify cancer before all symptoms appear. Mammography is one of the methods in which an image of the breast used to detect and diagnose breast cancer tumors. Micro-calcification can be found in mammogram and it will indicate the presence of breast cancer. Preprocessing, feature extraction and classification are the three important steps to detect the micro calcification in mammogram. And there are different classifiers used for the classification of micro calcification. In this paper we analyze the performance of different classifiers and find out the best one for the classification using multi scale features.

Keywords— Extreme learning machine, Gabor filter, K Nearest Neighbor, Mammography, Speed up robust feature

I. INTRODUCTION

Mammography is the low dose X-ray to view and detect changes in the breast tissue where the breasts are compressed between two X-ray plates and it is flat so as to have a complete view of all the areas of breast. A women's breast are composed of glandular tissue and ducts. Mammogram is used to detect breast cancer in women even if there is no sign of the cancer and this type of mammography is known as screening mammography. Screening mammograms consist of more than one X-ray images, or images of each breast. Screening mammogram can be performed in all women every one to two years after the age of 40. Mammograms are also used for tumor detection which cannot be felt. By screening

mammogram it is possible to detect micro-calcification. If there is some signs are present then the breast cancer is detected by mammogram. This type of mammography is called a diagnostic mammography. [2][3].Diagnostic mammography is when the patient has additional mammography image above and beyond the routine views that are performed. One scenario is when an abnormality is seen on the screening study and the patient returns for additional views to further evaluate that finding. Another scenario is when the patient has a symptom like lump pain or nipple discharge related to their breast.

The radiation dose from the diagnostic mammography is higher and also it takes more time to perform the mammography because more breast images are used for getting the sinus view from different angles. The observer may develop a distrustful area to make a complete image for the doctors to make a decision.

Early detection of breast cancer improves the chances of women for better treatment. If the breast cancer is identified in its early stage then the survival rate can be increased. So it is necessary to do a regular screening procedure to detect breast cancer at proper time. However, studies conducted to date have not brought an advantage of regular screening mammography in women less than forty years of age or basic screening mammograms taken before the age of 40 years. And it has several disadvantages like false negative and false positive results [5][6].

False positive results occur if the mammogram shows abnormal but actually there is no cancer. The main problem of false positive result is that it will cause anxiety and other physiological distress to the affected women. And also it will leads to the further treatment procedures for the cancer and causes physical discomfort. False positive results are mostly found in women with age less than forty, women who had previous breast cancer, women who have dense breasts and

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A Survey on LLC resonant converters with synchronous rectifier for EVs

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Abstract—This paper presents a literature survey on LLC resonant converters with synchronous rectifiers for electric vehicle battery charging. The topologies are taken by the literature survey from the earliest methods. Many controlling techniques have been surveyed.

Index Terms—FHA, SR, simplified optimal trajectory control.

I. Introduction

With the development of society and the increase in the living standards it is becoming very difficult to cope up with ever increasing price of fossil fuels. Development of a nation means better quality of facilities, which again requires energy. The fact that fossil fuels aren't going to last forever has forced mankind to think of other alternatives. Major environmental problems like global warming, environmental pollution, ozone layer depletion and have raised their attention to human as they greatly affect the climatic cycle. Thus in order to reduce the emission of greenhouse gases several governments around the world have been implementing various policies and schemes. Encouraging the use of Lead free petrol and electricity are among them. Transition from conventional means of transportation to electrified vehicles is necessitated by these factors. Continuous research in battery technology has been able to put it into a frequent use and also made batteries more economic. Recently battery technologies have been under research for the applications in electric vehicle. Thereby battery charging is critical for high density power charging.

Improving charge density, efficiency and decreasing the charging time had been the goals of battery researches. Also the DC-AC converters used for battery charging have been a constant area of interest for research.

This paper presents a literature survey on LLC resonant converters, which used in electric vehicle's battery charging process. The next section gives the literature survey on various converters used for electric vehicle's battery charging and the last section gives the conclusion.

II. Literature survey

The capability of an LLC resonant converter to operate in a wide input range and smaller switching losses makes them suitable to be used with the front end AC/DC converters. Figure 1 below shows the LLC resonant converter circuit.

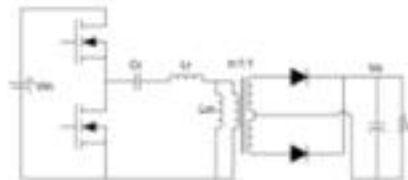


Fig1. LLC resonant converter

Most of the time it operates under normal condition, but as it has more steady voltage regulation it should always be operated in resonant condition. Complexity of the circuit and having no proper design methods limits its application. As in the conventional design for LLC resonant converters, as an alternative of just selecting 'Q' value, from the theoretical analysis of the LLC resonant circuit at the high gain and resonant frequency a relationship between the operating range and the switching losses can be acquired and using this relationship the circuit can be designed to have desired efficiency. In order to achieve minimum conduction loss both in the primary and secondary side, larger magnetizing





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A Survey On Hybrid Energy Storage System For EV With Regenerative Braking

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Abstract - A HESS is successfully being used as energy storage system instead of using batteries alone . A HESS is able to bring together the characteristics of various storage systems thus yielding a strong storage system. Studies and analysis have proved that the most efficient HESS is the combination of a battery and a super capacitor. Several HESS topologies including the power electronic converter circuits are designed, implemented and analyzed for improving the vehicle's performance. The research for better control technologies for HESS for EVs including the RBS is an area of great interest nowadays. Various control techniques and strategies are being derived and analyzed for a more improved system performance. Regenerative braking applied in electric vehicle allows recycling the braking energy, this isn't applicable in the conventional internal combustion vehicles. In regenerative braking process, the energy from the motor is fed back to the battery, as the vehicle's inertia makes the motor to operate in generating mode. Regenerative braking improves the efficiency of energy utilization and prolongs the life of the electric vehicle. This survey is conducted in order to get a detail picture of recent advancements in EVs, their energy storage systems, controlling methods and about the regenerative braking which improves the efficiency of the system.

Keywords: HESS(hybrid energy storage system), RB(regenerative braking), EV (electric vehicle)

I. INTRODUCTION

The battery technologies have limitations of accepting the charging currents which are reported to be lower compared to discharge current. Thus, the energy recovered during regenerative braking is limited. Therefore, the auxiliary system like super-capacitor coupled with battery has considerable advantages on the charge acceptance and life. The fast charging is possible with high currents and greater cycle life time as compared to batteries. But, super-capacitors have lower energy density as compared to the batteries. Battery alone as an energy storage system in EV can regenerate power around 20% of brake energy during regenerative braking.

Thus an appropriate way in fulfilling the requirement of an electric vehicle is by making use of a hybrid type of energy storage system. The hybrid energy storage system topology is shown in the figure 1.1 below.

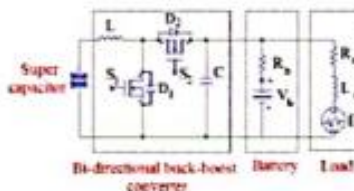


Fig. 1.1: Basic HESS for EV

In this circuit, battery is connected directly to the load and the super-capacitor is also connected to the load through a bi-directional buck-boost converter. The performance of the hybrid electric vehicles were analyzed in different environment modes of operation such as acceleration mode, cruising mode (electric vehicle in moderate speed), and regenerative braking mode [1].

The HESS for electric vehicle comprising of a battery and a super capacitor is analyzed here. A Buck converter is placed in between super capacitor and battery to control the power flow from super capacitor. A diode is placed between super capacitor and diode such that they are parallel connected and it is in reversed biased condition, preventing the flow of energy from super capacitor to load during normal mode of operation. In the circuit shown above the harvest of regenerative braking is improved by the elimination in the number of converters utilized for this purpose. The braking energy harvested is utilized to charge the battery so as to keep the battery pack from deep discharging during driving uphill and also to improve the vehicle's acceleration[2]. Without exceeding the safety limit of the battery current, the power capacity can be greater than that of the passive hybrid. Recent studies on hybrid energy sources prove that the combination of ultra-capacitors and





KY Based DC-DC Converter for Standalone Photovoltaic Water Pumping System Employing Four Switch BLDC Drive

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Abstract—Solar based water pumping system is getting a broad consideration, since solar energy is found to be the best solution for the existing conventional energy resources. Moreover solar PV (Photovoltaic) fed water pumping is favored technique within the remote regions for different applications. In this paper KY based DC-DC converter fed water pumping system with BLDC (Brushless DC motor) is proposed. Voltage ripple reduction is one of the main advantages of KY converter with a high transient response. For tracking the maximum power under various irradiation conditions P & O Perturb and Observe based MPPT (Maximum Power Point Technique) technique is employed by varying the duty ratio of KY converter. Instead of six switch VSI (Voltage Source Inverter), four switch VSI is employed, where cost saving is accomplished by decreasing the number of inverter power switches. A BLDC motor is connected to drive the centrifugal pump, since it has advantageous feature while connecting to that of PV generator.

Keywords—KY Converter, Four switch VSI, BLDC motor, MPPT

I. INTRODUCTION

SPV (Solar Photovoltaic) based projects are considered now, due to the reduction of cost of solar panels as well as the electronic devices. Water pumping using SPV received wide demand because of its vital and affordable nature of power generation. MPPT technique is employed in most of the PV based applications [1]. From the different traditional methods of MPPT, P&O MPPT is considered better, where it captures the maximum power under various conditions. Most common type of DC-DC converter used for SPV and MPPT application is the BOOST converter [2]. Conventional inductor-based boost converter produces high - voltage ripple pulsating current in output. As a result, large power losses will also have occurred. A recent study focuses on the design of a KY converter, possessing fast transient response, less voltage reduction etc [3].

The efficiency of the energy conversion in the solar energy system will be high only at certain voltage and current conditions at which the power will be a maximum. This operating point is called Maximum Power Point (MPP). In this project, the KY converter is controlled by Perturb and Observe

(P & O) algorithm to track MPP at any irradiance condition [4]. The purpose of this paper work is to develop PV array fed BLDC drive employing KY converter to boost the PV array voltage and four switches inverter for conversion of DC supply to AC supply required for BLDC motor. In the proposed BLDC drive, the number of switches in the 3-phase inverter is reduced from six to four which results in great saving in hardware cost and reducing the size of hardware. The performances of the proposed system is analyzed through the simulated results using MATLAB/Simulink environment.

II PROPOSED SYSTEM

A new PV array fed BLDC drive has been developed in order to harness renewable energy source and to reduce the load demand of EB supply. The system consists of KY Converter fed by PV array to make the DC voltage of PV panel to the desired value for inverter and four switch inverter to generate variable frequency and variable voltage AC supply.

III OPERATION OF PROPOSED SYSTEM

The block diagram of the PV fed BLDC motor drive employing KY converter for PV array MPPT and four switches inverter for BLDC motor is shown in Figure 1[5]. The KY converter will buck or boost the DC voltage output of solar panel in order to provide the required DC voltage for BLDC motor [6]. The duty cycle for PWM pulses of KY converter will be determined by P&O MPPT algorithm. P&O algorithm is also termed as hill climbing, where both the name indicates that the, providing certain perturbations, it captures the maximum power by increasing or decreasing the voltage. The four switch three phase inverter will generate the required variable voltage and variable frequency supply for BLDC motor [7][8]. The ON or OFF pulses for the power switches of inverter are determined from the signals obtained from Hall sensors. The speed feedback helps to achieve closed loop operation.



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Optimal Tuning Of PID Controller For Switched Reluctance Motor Speed Control Using Particle Swarm Optimization

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Abstract-This paper describes the Design of controllers for Switched Reluctance Motor using technique such as Particle Swarm Optimization. Conventional PID controller is nowadays used in most Engineering being acknowledged its ability to give up a superior control in power electronic system. The purpose of this work is to design a speed controller for the motor to achieve minimum time domain integral squared error. This work concentrates mainly on the design of feedback PID controller to achieve the minimum integral squared error and hence the controller parameters k_p , k_i and k_d are identified. It can be done through PSO Algorithm. The model of a converter works along with the algorithm which results with a robust feedback PID controller was developed using MATLAB/SIMULINK software.

Index Terms-Active boost converter, Switched Reluctance Motor, PID controller, Particle Swarm Optimization Algorithm

I. INTRODUCTION

Nowadays the SRM has unique features like simple structure, high efficiency, economic, controlling is flexible, and high torque at the starting in very high speed ranges [1]-[3]. Even though it has good features it has extreme multi-variable, nonlinear coupling and ripples in torque due to the special features in the SRM [4, 5]. For ideal speed control of Switched Reluctance Motor, the traditional PID controller is not enough and many scholars are carrying out researches to have efficient speed control. By using a microprocessor the four quadrant control is possible in SRM [6]. Based on fuzzy logic, a high efficient speed controlling of SRM is used, but the control of current is not done [8]. In order to have the speed control of SRM in a cascaded configuration two fuzzy controllers are used [9]. In [10], in order to obtain optimized control a new technique was introduced where fuzzy and PI

controller is used. A self-tuning technique for fuzzy and PID is used for speed controlling in SRM drive system [11].

II. MATHEMATICAL MODELLING OF SWITCHED RELUCTANCE MOTOR

The feature of poles are found in the rotor as well as the stator of SRM but field windings are present only on the stator. The rotor of SRM is made up of laminated silicon steel. The converter phase provides supply to the stator poles which is in opposite side. The converter phase current is kept on and off which is always synchronized to the rotor position. SRM always obey the principle of minimum reluctance. Initially the stator windings are got energized, this will generate magnetic field, which results in reluctance torque and thereby the rotor will have the tendency to go to position where it has minimum reluctance.

The k^{th} phase equation for SRM is given as:

$$u_k = R_k i_k + \frac{d\psi_k(\theta, i)}{dt} \quad (1)$$

Here R_k and u_k represents the resistance and voltage respectively. The ψ_k and i_k represents flux linkage and current respectively. θ corresponds to the angle position of current rotor. The $\psi(\theta, i)$ which is the flux linkage, it is a function of rotor angle position and the current and the angle position of the rotor, this can be expressed as

$$\psi(i, \theta) = L(i, \theta) i \quad (2)$$

Here $L(i, \theta)$ represents the stator phase inductance.





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A Survey On Optimal Tuning Of PID Controller For Buck-Boost converter Using Cuckoo-Search Algorithm

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Abstract- The concept of global warming has become a very big issue due to the rise in the level of consumption of energy. So the increased efficiency rate of consumption of energy is an inevitable factor in our modern society. Many applications is in need of a high efficient system. So in order to attain high efficiency, commonly dc-dc converters are being used. This paper reveals the study of various dc-dc converters and the controllers which is used to control the dc-dc converters for efficient applications. Among the different dc-dc converters, the buck-boost converter is special because it has both step-up and step-down modes. So a study of various buck-boost converters was carried out and the simplest and most efficient with fewer losses was found. A survey on various control technique that can be used for efficient control of the buck-boost converter was done. PID controller technique was deeply studied and different tuning algorithms was analyzed. These algorithms was compared with each other by considering their performance and optimization ability in limited time period.

Index Terms-Buck-boost converter, PID controller, Cuckoo-Search Algorithm

I. INTRODUCTION

We all know that the energy consumption is increasing day by day which will lead to increased level of global warming issues. It is very difficult to decrease the level of consumption, so to have a sufficient energy life the only way is to increase the efficiency of the energy consumption. Many applications require high efficient systems. In order to achieve high efficiency dc-dc converters are commonly used, among them the buck-boost converter is more suitable as it has all the three modes. The most important thing in the design of power system is to provide high quality of power and it should be always uninterrupted. Moreover while considering the complex networks and sever interconnected systems it should be capable of avoiding blackouts. The main aim of the controlling strategy is to produce and distribute power in a more economical way

and make it reliable. Even though they are taking care of all these things, the main concern is to maintain the voltage and the frequency within the allowable limits. This paper presents a review on various buck-boost converters and then control techniques for the proper working of the power converter. This paper also suggests tuning algorithm for the efficient tuning of the controller by considering their performance in accordance with the comparison with the other algorithms.

II. LITERATURE REVIEW

Different topologies were introduced for buck-boost converter in order to have an improvement in the efficiency. One of the best examples is a buck-boost converter with low voltage stress and reduced conducting components. It is different from the normal buck-boost converter.

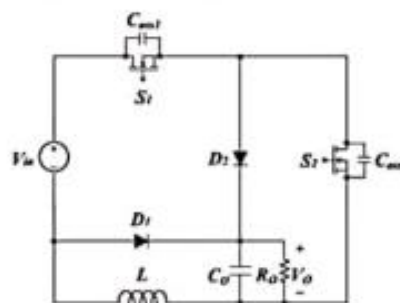


Fig.1 Converter with low voltage stress and reduced conducting components

In this introduced converter the voltage stress experienced by the semiconductors is very less when compared to the conventional. When considering the case of active and passive components in the circuit, both the normal and the proposed converters have the same number. But the conducting components are less in the proposed thereby reducing the





Soft Computing Based MPPT Controller for Solar Powered Battery Charger Under Partial Shading Conditions

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Abstract : Solar irradiations received by the PV panel is blocked by a moving or non-moving object is known as partial shading condition. The solar panel power output under partial shaded will be a maximum only if the panel voltage is maintained at the Global Maximum Power Point. The GMPP can be determined from the Power-Voltage characteristics of the partially shaded solar panel and this voltage is called optimum voltage. The battery charging may require a voltage different from the optimum voltage. Therefore, a GMPPT Global Maximum Power Point Tracking CUK converter is employed that maintains partially shaded solar panel voltage at optimum value and buck or boost the solar panel voltage to a value required for battery charging. The objective of this work is to develop solar based battery charger using CUK converter with Maximum Power Point Tracking under partial shaded condition by Grey Wolf Optimization algorithm. The simulation of the partially shaded solar panel fed CUK converter for battery charging applications is performed in MATLAB - SIMULINK. The CUK converter in the battery charging system is basically a buck-boost converter that employs a single power switch. Duty cycle of gate pulse to power switch decides the power drawn from partially shaded solar panel. Therefore, the duty cycle is determined for GMPPT using Grey Wolf Optimization algorithm which can track the GMPP very fast for fast changing irradiances. The simulation is performed for charging 5.8 AH, 48 V Lithium-Ion batteries.

Keywords — Maximum Power Point Tracking (MPPT); Partial Shading Condition (PSC); Global Maximum Power Point(GMPPT); Grey Wolf Optimization(GWO); Photovoltaic (PV)

I. INTRODUCTION

The need for non conventional and clean sources of energy is increasing throughout the world. With increasing popularity of solar systems, there is always an eminent need in making efficient the PV system. The efficiency of the energy conversion in the solar energy system will be high only at certain voltage and current conditions at which the power will be a maximum. Hence the operating point is called maximum power point. It is found non-linear for power-voltage curve of a PV panel and thereby it also

depends sunlight irradiance and temperature of the atmosphere. The variation in voltage and power due to temperature is less significant when compared to sunlight irradiance[1]. Since the sunlight irradiance is not constant throughout the day, the power output of a PV panel will also not constant. Besides, the MPP will also shift with change in sunlight irradiance and atmospheric temperature[2]. MPPT technique is to be used for achieve maximum power under different temperature and irradiance. Another major problem associated with solar power generation is handling Partial Shading Condition (PSC) due to passing clouds[3]. Under partial shading condition, the P-V characteristics has multiple power peaks (global and local maxima). The ordinary MPPT techniques are fail to search the Global Maximum Power Point under partial shading condition [4].Therefore the soft computing methods are used to determine the global power peak by deciding the best duty value for the CUK converter to remove greatest power from PV array under shading condition[5].

In this paper, the partially shaded PV panel is implemented by connecting the solar panel in series configuration and setting irradiance level of each panel at different values and connected via CUK converter for Lithium-Ion battery charging with GMPPT by using Grey Wolf Optimization (GWO) algorithm.

II. PROPOSED SYSTEM

The block diagram of PSC PV fed CUK converter based battery charging system with Grey Wolf optimization technique is presented in Figure 1. The proposed PV system consists of four PV panels in series with various irradiances to realize PSC, CUK converter and Lithium-Ion battery. In this project GWO technique is used to determine the best PWM duty for the CUK converter to track GMPP under Partial shading condition.



Wavelet Modulated Inverter for WECS using Permanent Magnet Synchronous Generator

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Abstract— In this paper, a better control techniques known as wavelet modulation is proposed at the inverter side of wind energy conversion system. Permanent magnet synchronous generator is one of the generator used for integration of wind energy into power electronic topologies due to its simple construction & it provide direct coupling & number of poles can be change easily. A back to back converter topology is the most commonly used one, consist of rectifier on rotor side and inverter on grid side. Several modulation techniques are there for the control of inverter connected to load side in a wind energy conversion system. Switching pulses for inverter is generated using dSPACE1104 controller. The overall system is modelled and performance is verified in MATLAB Simulink & in hardware and obtained Low harmonic content and magnitude of fundamental component is high as compared to conventional techniques.

Keywords—Wind energy conversion system (WECS), Total harmonic distortion (THD), Wavelet modulation (WM).

I. INTRODUCTION

As the wind power generation has been increasing day by day, it is important to design and select proper generator and converters for WECS. Various types of generators and power electronic topologies are used for integration of wind energy to grid or isolated load. Squirrel cage induction generator is a simple, small size, low cost machine having stable performance, but it is a geared turbine with fixed speed [1]. In a doubly fed induction generator stator is directly connected to grid and rotor is connected to load side using rotor side converter and grid side converter. Active and reactive power can be effectively controlled using this system [2]. But it is a geared system having brush and slip rings, hence entire cost of the system and failure rate is high [3]. Permanent Magnet Synchronous Generator (PMSG) does not have brush, slip ring and gear box [4]-[5]. It is simple in structure and can be directly connected to wind turbine. Stator of generator is connected to load using rotor side converter and load side converter [6]. Better control techniques are needed to reduce harmonic distortion in the output side of inverters.

Pulse width modulation (PWM) is the most widely used techniques for the control of inverter, by increasing switching frequency, THD decreases, however this increases the switching losses [7]. Third harmonic injection technique adds third harmonic to each phase of a three phase inverter. This technique provide inverter output voltage as sinusoidal, approximately same as that of AC supply. But it does not provide any information about the amount of third harmonics to be injected [8]. Space vector modulation and selective harmonic elimination are the alternative concepts. In space vector modulation space vector concept is used for the computation of duty cycle of the switches [9]. Opposite harmonic elimination is the technique used in selective harmonic elimination [10]. Both these are very difficult to implement [11].

In this paper a new techniques, known as Wavelet Modulation scheme is applied to inverter of a WECS. . It's a sample based techniques [12]-[15]. Wavelet is like a wave that first begin to zero and reaches to maximum amplitude and decreases to zero amplitude again. The overall system is modelled and performance is verified using simulation & hardware results.

II. PROPOSED WECS WITH WAVELET MODULATED INVERTER

The proposed system consists of a wind turbine coupled to a PMSG, a diode rectifier used at the machine side and a wavelet modulated inverter used at the load side which gives a high quality voltage at the output. Fig.1 shows the circuit diagram of proposed wind energy conversion system.

A. Wavelet Modulation Scheme [12]

Wavelet modulation is a sampling based technique can be done by creating two time instants at first. These time instants are boundaries of rectangular pulses and these are interpolated into rectangular pulses in the second step. The sampling instant



Multilayer analysis for prediction of Power tracing on Uncertain Loads

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Abstract - The techno-socio economic considerations have triggered the installation of more renewable energy sources to the grid. Most of the renewable energy systems are connected to the grid in a distributed manner. The output of the renewable energy sources like wind, solar and tidal energies are highly unpredictable in nature as the sources of energy considerably depend on natural conditions. The add effect of such these disturbances will affect the quality of the grid and is more serious in microgrids. The fluctuating demand and the uncertainty in the generation will affect the direction of the power flow from node to node. This paper focus on a multilayer machine learning procedure for identifying dissociative behaviour of a grid at various nodes, methods to effectively schedule and predict the power flow between the nodes, thus by identify the islanding.

Keywords: Microgrid, Machine learning, Renewable energy, Prediction, Power flow.

I. INTRODUCTION

A major fraction of demand response in microgrids is accommodated with distributed renewable energy sources which include photovoltaic systems, wind energy systems and fuel generators as primary sources of energy [1]. The tidal, wind and hydro power generation systems are located regionally in nature which will be affected by transmission losses before reaching the consumer [2]. Output of a wind turbine largely depends on air density, effective rotor swept area, wind speed etc and the output of a photovoltaic cell depends on effective swept area of solar radiation, the yield intensity based on the frequency spectrum, average solar radiation linked to the cell etc. These factors depend on area, region, season, atmospheric conditions, environmental factors, weather conditions etc [3]. Every stated factor is uncertain, unpredictable and unreliable to a great extent, and hence the output of such renewable energy sources is highly fluctuating or disturbing [4].

Disturbances can be classified as dependent or independent, discrete or continuous, correlated or uncorrelated, static or dynamic steady state or transient, symmetrical and unsymmetrical, independent or accumulated [5]. Continuous or unsymmetrical or accumulated false are dangerous in nature to a microgrid which creates added complications other than that of its kind. Derivations in the operation parameters will create the disturbances in the magnitude of the power as well as voltage,

Current, frequency [6].

For the economic mode of operation, most of the microgrids are operated in near loading limit and renewable energy sources are integrated to the bus nodes to meet the demand [7]. The power flow between the nodes is bilateral in nature which depends on a number of parameters suppliers generating capacity, load demand, transmission losses, economic factors, social concerns, domain priority and stability concerns. If there are more than two generating nodes, the bilateral transmissions also depend on the behaviour of adjacent nodes and state of power flows between adjacent node points [8].

Scheduling the power flow by considering the social, economic, technical and operating behaviour of the individual elements off the grid even under uncertain generating capacity and user behaviour is a complex task [9]. If the negative tracing level is beyond a certain limit, system will fall under islanding [10].

This paper has three parts; the initial section focus on the parameters affects the power tracing, the second part on the methods to identify the power tracing and the third part on the implementation and analysis of the method [11]. Identification method has two layers, the primary level focus on the production of initial values of nodes for determining the power tracing using regression and the second layer focus on determination of power flow each node point [12].

II. POWER TRACING ANALYSIS

Power load tracing is determined by taken into account of a number of factors such as social constraints, economical compulsions, technical motivations and safety concerns [13]. The contact and co-variant effect of all these factors are considered and each node point is analysed for the possible scheduling. The steps for determining the power tracing includes:

1. The nodes with the status of overloading are identified.
2. Generating nodes and magnitude of energy produced in a node is identified. If there is a scarcity of generating nodes, microgrid is connected to main grid [15].
3. If the on-grid model is not available, the possible options for load scheduling or load shedding are taken. If there is excess of energy produced from the sources, a fraction of the



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DATA ACQUISITION AND CONTROL OF MULTIPLE STATIONS USING HMI AND NI USB-6212

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Abstract:This paper deals with the computer based realtime control of process stations using PI, PID & MRAC controllers. The specific problem is system identification for level and flow stations.The transfer function of the system is obtained from the openloop testing, and based on the parameters obtained the controllers are vdeveloped. By the closed loop method the PI, PID controllers parameters are also obtained and the simulation is carried out in MATLAB . The real time implementation is done by labVIEW with the help of PC and DAQ card and both results are compared.The Model reference adaptive controller (MRAC) is also developed and implemented in realtime and the response is compared with conventional controllers PI & PID for the combined level & flow process.

Key words: MATLAB, PIController, PIDController MRAC,NIDAQ card, System Identification

I. INTRODUCTION

An automatic control is accomplished by sensing the water flow and then controlling the position of a control valve that control the flow of water through a pipe. The flow project execution is: An orifice plate is fitted in the water flow line that produces differential pressure with respect to the flow. This differential pressure converted into 4-20 mA range using a flow transmitter, then it transmits into the DAQ card. The designed controller will be generating the necessary controlling signal with respect to the flow sensor output. The controlling signal will be acquired by DAQ card. The DAQ card transfers it to the I/P converter which will transfer the electrical pulses 4-20mA into pneumatic signal 3-15psig to actuate the

control valve. On the same way the level process also is a Multi-loop Trainer set up mounted to a tank whose level has to be controlled using a feedback control loop. The level process execution is: The measured inputs to the designed PI, PID & MRAC will be provided by Level transmitter. The designed PI, PID &MRAC will be generating the necessary controlling electronic signal. This signal will be acquired by DAQ card. The DAQ card transfers it to the I / P converter which will convert the electrical pulses 4-20mA into pneumatic signal 3- 15psig to actuate the control valve. By virtual controller's implementation, we are getting the freedom of reconfiguration and flexibility of the control strategy. After that, the level and flow station combined together by DAQ and controlled by a single PC with the help of LabVIEW software implementation.

The primary aim of this paper is to implement Virtual & real-time instrumentation controllers for flow and level process station. This Virtual & real time Instrumentation using PI, PID & MRAC controllers implementation are possible by the Virtual Instrumentation software LabVIEW developed by National Instruments. We have used a Data Acquisition board (DAQ) for interfacing with the hardware and controlling by single PC. This DAQ card is product of the similar company NationalInstruments

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Recent Developments in Control of Car like Robot using MP-MPC

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Abstract: A car like robot, path tracking is a problem of practical importance in the field of robotics and autonomous vehicles. The aim is to have a mobile robot follow a given reference path autonomously. The Model Predictive Controller (MPC) is a controller which anticipates control input depending on system current states. The Prediction and Control Horizon depends on the states of the system. So, for high speed applications more storage space of the computed states may arise, which intern results to large computational time of Model Predictive Controller. To resolve this problem an Explicit Model Predictive Controller is implemented. Solicitation of MPC regulators with short on-line computationalmandate and firm sampling by varying the affliction of optimization to the off-line controller design phase is guaranteed by Multi Parametric Model Predictive Control (MP-MPC).

Keywords: Car like Robot, Explicit MPC, Predictive Control

I. INTRODUCTION

A car likerobot, path tracking is a problem of practical importance in the field of robotics and autonomous vehicles. The aim is to have a mobile robot follow a given reference path autonomously. Introduction of modern technologies such as power steering, antilock braking and traction control has helped to reduce the accentuation of the drivers. Present scenario in the world of automobile is complete automation of vehicle. To gain trust on fully automated vehicles we need promising technology which can guarantee fast and a safe journey. The same similar situation arises in the case of car like robot. While taking the system for an application the parameters such as velocity, time are of prime concerns. The increasing velocity increases the vulnerability to slip and roll over depending on the dynamics and condition of the environment. In this scenario it is necessary to design a controller that continuously takes the action on the system. The Model Predictive Controller (MPC) is a controller which anticipates control input depending on system current states. The Prediction and Control Horizon depends

on the states of the system. So, for high speed applications more storage space of the computed states may arise, which intern results to large computational time of Model Predictive Controller. To resolve this problem an Explicit Since the lateral dynamic model of the system is considered for the ease of computation the bicycle model of the system is also done. To achieve the fast and secure traction of automated vehicle, prediction is imminent. Computational complexity of conventional MPC can be overcome by using Multi Parametric Model Predictive Control successfully.

II. CLMR SYSTEM

The same similar situation as in vehicle arises in the case of car like robot .A car likerobot; path tracking is a problem of practical importance in the field of robotics and autonomous vehicles. The aim is to have a mobile robot follow a given reference path autonomously. While taking the system for an application the parameters such as velocity, time are of prime concerns. The increasing velocity increases the vulnerability to slip and roll over depending on the dynamics and condition of the environment. In this scenario it is necessary to design a controller that continuously takes the action on the system. Most important skill of a driver is his ability to simulate the vehicle in advance, before applying controls. This demands a predictive control in vehicle automation which can naturally consider constraints in calculating control action.

Model Predictive Control (MPC) is a multivariable control strategy which can naturally takeinto account physical limitation of controlled plant. It is a mathematical method which usessystem model to predict its evolution and thus can be able to compute optimal control action. In MPC at each sampling time optimal control problem often for finite horizon (usuallyformulated via Quadratic Programming (QP)) parameterized by current state measurement estimation is solved. The solution, current control actions for inputs is then applied tothe plant.MPC





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Control Analysis of Magnetic Levitation System

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Abstract- Control system possesses lot of research effort towards the control of a Magnetic Levitation System (MLS). The control of MLS has the extensive scientific interest because of the highly nonlinear and unstable features thus make the modeling and control problems very challenging. The system eliminates friction, generates high-precision positioning and lessens maintenance cost. These merits make the system a good choice for applications like high-speed trains, magnetic bearings wind tunnel levitation and vibration isolation systems, etc. Several dynamic models of the system have been proposed and for these models various control strategies have been used and comparing their performance. This paper generates the methods of control technologies implemented on the magnetic levitation system.

Index Terms- Magnetic Levitation System (MLS), Fuzzy Neural Network, Back stepping algorithm, Adaptive controller

I. INTRODUCTION

The Magnetic Levitation System is one of the most important laboratory models for understanding of control systems. Though the system is very simple and easy to understand, both classical and modern design and control strategies can be used as the control techniques. The system is method by which a ferromagnetic object is suspended without any physical support by the magnetic fields. The magnetic pressure provides an acceleration against the effects of the gravitational force. For the operation of magnetic levitation it has to be change the strength of a magnetic field by any change in the magnitude of current. If there is a need of more force, then sending more current through a coil of wires will produce greater magnitude of magnetic force.

The magnetic levitation has two basic principles. The first law is Faraday's Law, which states that if there is any alter in the magnetic field generated by

the loop of wire, tend to produce a change in voltage. The Law of Heinrich Lenz gives direction of the forces created by Faraday's law, states that "The emf induced in the circuit always acts in the direction of current flows through circuit which opposes the change in the magnetic flux ,produces the emf". The system has highly nonlinearity and instability [1]. Thus the control of the systems has a considerable scientific interest. The system reduces friction, less maintenance cost, and provides high-precision positioning [2], [3]. These advantages make magnetic levitation systems used for high-speed trains, vibration isolation systems, magnetic bearings, and wind tunnel levitation [2], [4], [5].

Plentiful control solutions are proposed for the systems, like feedback linearization techniques, which need a very accurate model, thus represent a major problem that an exact dynamic is difficult to get [2], because of the inbuilt nonlinearities and variation of the gain of the system due to variation of distance between magnet and ferromagnetic object. Other control method are based on the dynamic model is liberalized and controlled at nominal operating points. Different controllers introduced for the levitation systems are sliding mode, nonlinear, PID, back stepping, and fuzzy neural network controllers etc have been proposed, provides more accuracy and robustness against nonlinearities present in the system.

II. Control Techniques

The objective of the literature survey regarding to the design and implementation of various control system for magnetic levitation system. Different controllers are introduced for the system in order to have an improved and controlled performance.





Survey on Different Control Schemes for Distillation Columns

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Abstract: Distillation column is the widely used important parting technique in petrochemical industries, where purity of components plays an important role. Modeling of distillation column and control is considered to be an intricate task because the plant behavior is usually non linear and highly interactive. So a study of various control schemes was carried out. A survey on various control techniques that can be used for efficient control of the Distillation column was done. Several control techniques were deeply studied and analyzed. Also compared with each other, by considering their performance on the basis of parameters like settling time, overshoot etc.

Keywords: Distillation column, MIMO systems, Multi-loop controller, FMPC, LMRC

I. INTRODUCTION

Distillation columns constitute an important role in most of the petro-chemical engineering plants. It is the most vital parting or purifying technique in chemical process industries across the globe.

In industries reduction in energy consumption and enhancement in quality of products can be achieved by maintaining proper distillation control. However, both distillation column modeling and control are difficult task because the plant behavior is usually highly nonlinear, non stationary, interactive, and is subject to constraints and disturbances.

The distillation process includes a number of systems as shown in fig. 1 including a column consisting of a number of trays, a condenser, reboiler reflux drum etc. The mixture, which is to be separated from its constituents, is fed through the mid-section of the column. The separation of constituents depends on its boiling points. The column is divided into two regions the enriching section, in which concentration of gaseous components will be higher and stripping section in

which the concentration of liquid is more. Main aim of most of distillation control is to maintain the distillate composition.

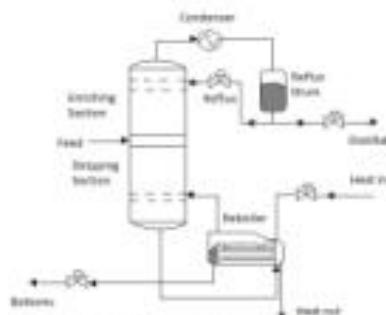


Fig. 1. Distillation Column

Between the trays, a huge amount of heat transfer occurs in the distillation column. Thus, emerges the need of suitable design and control for an energy efficient process, to get the top and the bottom products of desired quality and the whole process inside the distillation column being more economic. Various control strategies have been designed and are being used for controlling the distillation process to maintain the composition of top and the intermediate products. In this paper, modeling techniques and different effective control schemes for distillation column is discussed.

II. LITERATURE REVIEW

As the complexity of the system increases the demand for the control strategies also increases. Being a multivariable system, distillation column poses substantial effects of coupling or interaction on the control action. Interactions and the troubles caused by them are always considered while the designing of multi-variable control systems for distillation column. In industries, most of the columns are controlled by SISO controllers and normally only one single composition is routinely





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Control Schemes For a Nonlinear Conical tank System

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Abstract— Controlling of level in conical tank nonlinear process is frantic because of its shape. In most of the industries the flow and level control plays a essential role. Controlling of altitude is a difficult process conical tank because of constantly varying section with height and its nonlinearity. So study of various control schemes was carried out. A survey on various control technique that can be used for efficient control of the level in the conical system was done. Control techniques were deeply studied and analyzed. Also compared with each other, by considering their performance on the basis of parameters like settling time, overshoot etc.

Keywords: Conical tank system, Fuzzy Logic Controller, PID controller,IMC etc.

1. INTRODUCTION

In chemical industries, major assignment of controller is to defeat different conflict to create the process to stay in steady situation. In every tank system, outline plays a essential role for conniving the controllers. A conical tank system is considered since it has the following advantages like improved clearance of hard materials, simple addition, waste water treatment and absolute drainage of materials that is gelatinous liquid in industry. Based on non-linearity the controller has been selected. Non-linearity of conical tank exist due to the variation in its area. Conical tank is a tricky task to control the Level and stress for completion in real time. Conical tank is a highly nonlinear system. It is widely used in chemical plants because of its easy ejection of

materials and it has very strong structure. The nonlinearity occurs in its shape with respect to altitude of the tank system. Small surface area per unit volume is the main advantage of conical tank storage. Already several controllers are implemented to manage the nonlinearity of the non-linear conical tank.

It describes the modeling techniques and different effective control schemes for conical tank is discussed.

II. LITERATURE REVIEW

Different controllers are introduced for Conical Tank System to have an improved and controlled performance. As the complexity of the system increases the demand for the control strategies also increases. To overcome these difficulties, several researches are conducted from the time being and still going. From conventional controllers to advanced controllers, their performance on conical system is improving along with these researches.

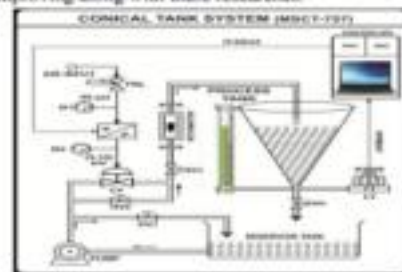


Fig 1: Block diagram of process
Liquid level process of a conical tank system is designed using Model Reference Direct Inverse





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5	KY Based DC-DC Converter for Standalone Photovoltaic Water Pumping System Employing Four Switch BLDC Drive
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Computer-Aided Detection of Breast Cancer on Mammograms

Extreme Learning Machine Neural Network Approach

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14.1 Introduction

Breast cancer is considered as a major reason of mortality among adult female. According to the National Cancer Institute Annual Report to the Nation 2017, incidence summary shows that between 1999 and 2013 the overall cancer incidence rate remained stable for women while the incidence rate continued to decrease among men. This type of cancer occurs almost entirely in women but in some rare cases men suffers from it too. There are about 20 different types of breast cancer. Most cancer occurs in the milk ducts and some in the glands.

The two types of tumors seen in women are benign and malignant. A noncancerous tumor is called benign tumor and is considered to be completely curable. A malignant tumor may invade the surrounding tissues and spread all over the body. The exact reason for breast cancer is still unknown but some of these are due to genetic abnormality and about 5–10% of cancers are inherited from parents. An X-ray imaging technique to examine human breast is called mammography. This specialized imaging technique aids in the early identification and diagnosing of breast abnormality as a screening tool. A diagnostic mammography is done for the patient who has previous abnormality and require some follow-up. A typical mammogram involves two or four views taken from different angles. A top view of breast is called cranial caudal view while a side view is called mediolateral oblique view.

Dense tissue and overlap of cancer cells with normal tissues leads to missed rate at the range of 10% in mammography. Interpretation of mammogram images is difficult because normal breast looks different for each women. It is necessary to have an advanced system between mammogram image reader and an input image to correctly identify the lesions. A computer-aided detection (CAD) system highlights the abnormal areas (mass, density, and microcalcification) on the images. [1] It will lead to a higher "recall" rate with less or no effect on positive predictive value for clinical biopsy. By





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Learning and Reflection of Technology based Collaborative MOOC design and its Evaluation, Validation and Results

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Abstract— Information and Communication Technology (ICT) making a radical change in teaching learning practices. Content knowledge assimilation using technological pedagogical knowledge (TPK) is proven effective for learner centric approach. The rise of massive open online courses (MOOCs) made possible diverse learners to upgrade their knowledge and skills hence became a solution for facilitating access to quality education. This paper presents Learning and Reflection of Technology based Collaborative designed MOOC, the work is a essence of faculty development program on "Mentoring Educators in Educational Technology" course offered by IIT Bombay (IITB). Work done is a collaborative efforts of team assigned by IITB course team, participant's Le. peer reviewers are also assigned by IITB course team for MOOC course designed by us. The MOOC designed team received guidelines from IITB course team, discussion forum, peers, social media group of peers and office hours conducted by IITB course team. The design team encouraged exploration of Technological pedagogical and Content Knowledge (TPACK) model to design learner centric MOOC. The team used the internet, social media to create connected learning experience and reflected throughout the process of development and conduction of MOOC.

Validation of the results, reflection and analysis in this paper zeniths because the MOOC course creators and reviewers have completed Foundation Program in ICT for Education and Pedagogy for Online and Blended Teaching-Learning Process FDP with a score of 80% and above conducted by IIT Bombay.

Keywords— MOOC, reflection, learner centric, Evaluation. Collaborative, social media.

I. INTRODUCTION

Massive open online courses (MOOCs) are proving to be best online learning resource for diverse learners in a wide variety of subjects [1]. However, there is scope to improve use and effectiveness of MOOCs by significant utilisation of TPACK. The Results of MOOC course design and evaluation included in this paper is actually a teamwork carried out during participation of the course "Mentoring educators in education technology" conducted by IIT Bombay. The work done is a part of course [2]. We all four team members never met till date and everyone is minimum 500 km away from other's, Hence without video conferencing and telephonic audio conversation we discussed and completed MOOC designed related tasks starting from deciding topic for MOOC, Moodle administrator (setup), Course Design Layout, Activity

Design, Moodle Gradebook setup and configurations, Survey report on Perception of Engagement, Learning and Usability, FDP design report, reviewing and compiling reflections by team members, FDP design analysis report, analysis and reflection of engagement, preparation of various components of Learner centric MOOC (LCM), MOODLE related queries, improvement/modification in content using social media and email. [3] Two members of group were engaged in various institute related activities like national board of accreditation (NBA) and national assessment and accreditation council (NAAC), still we able to complete the distributed task in time. We hosted our short duration i.e. 1 hr. course on moodlecloud.com [5]. We faced various challenges while completion of activity creation and evaluation. Our learning and reflection is consolidated in this paper.

The first part of this paper section II we analysed engagement of participants, in section III learning of participants is analysed using ISAT tool of IIT Bombay. ISAT is a tool to generate transition pattern. Users can interactively get the transition values and patterns using this tool [4][6]. In section IV perception of participants about the course is analysed. In section V our learning and reflection on collaboratively designed i.e. co-designed MOOC using social media and analysis of evaluation of MOOC explored.

II. ANALYSIS OF ENGAGEMENT

The MOODLE course on Flipping the classroom with technology was originally designed on moodlecloud platform by our team, which was reviewed by participants/peers allotted by IITB course team. The all 12 participants/peers took the course. The course involved the following activities that were to be completed by participants during the duration of the course: learning dialogues (LeDs) - 5 Nos, learning by doings (LbDs) - 4 Nos, Discussion Forum on FQ, Discussion Forum on Reflection on Learning, Reflection Quiz (RQ), Learning extension Trajectories (LxT) - 1 Video, Assimilation Quiz (AQ), Knowledge Quiz (KQ), Evaluation and Feedback/Course Exit Survey [3].

The activity completion report generated from the course reports section shows the engagement of participants in the





Machine Learning Approach for 5G Hybrid Technologies

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Abstract- The rapid evolution of mobile communication networks is due to the large increase in the number of users. But higher throughput is not the only criterion to address the fifth generation of cellular networks. It mainly focuses on the redressal of the possible issues of the networks. The mostly found issues are lesser area of coverage, non-linear signal effects and the dispersion which is found to occur during the signal pathway. This work entails on increasing the maximum limit of coverage without signal loss. Through the usage of microcells in the proposed system, maximum limit of coverage is achieved in highly populated areas. The simulations are carried out using software MATLAB 2017a and Opti-System, in which enhanced symbol error rate plot and reduced out of band emissions power performance have been improved. Finally, the conclusion and the future scope of the work has been discussed.

Keywords: Generalized Frequency Division Multiplexing (GFDM), Fifth Generation (5G), Improved ANN (IANN) Equalizer.

I INTRODUCTION

In conventional cellular systems, microcells are used to provide increased system capacity, delivery of innovative value-added services, improved coverage and performance. When compared to picocell, the microcell is normally well-built; however the characteristics are partially mentioned. The power control is used in the microcell, which limit the coverage area radius of the cell. In general, the microcell coverage range is within two kilometres wide, while standard BS coverage ranges up to 35 kilometres.

Man-made noise is created by several sources must be represented by impulsive models because it cannot be assumed to be Gaussian directly, all these are observed by Blackard et al. Consequently impulsive noise model is described as a non-Gaussian random occurrence noise with short duration and causes significant harm in the data transmission. Generally, GFDM analyzed by Ghosh. Hence impulse noise impairments pose a significant restraint on GFDM systems and cause bit or burst errors in data transmission.

Another sensitive limitation of GFDM system is carrier frequency offset (CFO). CFO in the GFDM transceiver is introduced by frequency differences analyzed by Armstrong. Hence it should be suppressed to recover reliable data in GFDM system.

One more responsive drawback of GFDM system is nonlinear distortion caused by high power amplifiers (HPA) at the transmitter, investigated by Banelli et al. The disparaging effects of nonlinear distortions are spectral-spreading of the GFDM signal and inter-modulations between subcarriers, predicted by Zhou and Kenney.

II LITERATURE SURVEY

In order to acquire optimum filter weights, LMS algorithm is used. The allowed weights are initialized to zero, and at iterations the weights are done by estimating the mean square error gradient [1]. Normalized Least Mean Squares filter (NLMS) can be employed to normalize the input power [2]. RLS algorithm utilizes the input as deterministic, whereas similar algorithm deploys the stochastic input. This may lead to high circuit complexity [3].

The use of zero forcing equalizers make use of the inverse frequency response of the transmission channel [4,5]. Zero forcing using IEEE 802.11n (MIMO) can be used in modern 5G networks for maintaining noise free transmissions.

An interleaved effective architecture utilizing adaptive lattice algorithm is used to overcome convergence problem to a greater extent[7]. A variable-step blind decision equalization is better for high-order QAM based estimation [8]. Effective safe limit of SNR switches Decision Directed mode with much reduced divergence [9,10].

Unequal noises and dispersion can be reduced by using some equalizer like MMSE and improved MLE algorithm [11]. The usage of adaptive filters with high convergence speed reduces mean square to a large extent[12,13].





A New 2-Scroll Chaos Plant with Multistability and its Circuit Realization

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Abstract— A new 2-scroll chaos plant with multistability is reported in this work. Qualitative dynamical properties of the new nonlinear plant are displayed with signal phase plots and bifurcation analysis. The new chaos dynamical plant has multistability and four saddle-type rest points, viz. a saddle rest point at the origin and three saddle-foci rest points. Also, a MultiSIM realization of the nonlinear plant with chaos oscillator with multistability is built for checking the real-world implementation of the chaos nonlinear plant with multistability.

Keywords—chaos; chaotic system; multistability; bifurcation; circuit realization.

I. INTRODUCTION

Chaotic dynamical systems are studied in several branches like population biology [1], circuits [2-4], medicine [5-6], finance [7], robotics [8], memristors [9], encryption [10], etc.

In [1], Gatabazi et al. presented an application of grey Lotka-Volterra models for the adoption of cryptocurrencies. In [2], Dong et al. discussed Hamiltonian chaotic systems with multistability and applied them for pseudo-random number generators (PRNG). In [3], Mobayen et al. presented a novel chaos system with boomerang curve of rest points and applied it for sound encryption. In [4], Vaidyanathan et al. explored the electronic circuit design for a chaos plant with axe-shaped curve of rest points. In [5], Zhao et al. presented a chaos enhanced grey wolf optimization for effective diagnosis framework for identifying paraquat-poisoned patients. In [6], Baskerville discussed the role of chaos in mitochondria and type-2 diabetic disorder. In [7], Vaidyanathan et al. dealt with a new nonlinear finance model with passivity applications. In [8], Gohari et al. explored chaotic maps for boundary surveillance with the help of quadrotor robots. In [9], Wang et al. analyzed the application of memristor systems and image encryption systems. In [10], Liu et al. applied a chaotic circuit for designing robust image encryption and compressive sensing.

A new 2-scroll chaos plant with multistability is reported in this work. Qualitative dynamical properties of the new nonlinear plant with three quadratic nonlinear terms are displayed with signal phase plots and bifurcation analysis. The new chaos dynamical plant has multistability and four saddle-type rest points, viz. a saddle rest point at the origin and three saddle-foci rest points. Also, a MultiSIM realization of the nonlinear plant with chaos oscillator with multi-stability is built for checking the real-world implementation of the chaos nonlinear plant with multi-stability.

II. A NEW CHAOS NONLINEAR PLANT WITH TWO SADDLE REST POINTS

A new three-dimensional nonlinear plant is proposed as

$$\begin{cases} \dot{z}_1 = \alpha(z_2 - z_1) + \gamma z_1 z_2 \\ \dot{z}_2 = \beta z_1 - z_2 - z_1 z_2 \\ \dot{z}_3 = 5z_1 z_2 - z_2 - z_3 \end{cases} \quad (1)$$

In Eq (1), $Z = (z_1, z_2, z_3)$ is the state and (α, β, γ) is a set of positive parameters. It is significant that the dynamical system (1) has 3 quadratic nonlinear terms in its dynamics.

The complex properties of the new three-dimensional plant (1) will be explored in this section. For MATLAB simulations, we take the parameter values as

$$\alpha = 12, \beta = 17, \gamma = 12 \quad (2)$$

The initial state of the dynamical system (1) is picked as

$$z_1(0) = 0.2, z_2(0) = 0.1, z_3(0) = 0.2 \quad (3)$$

We calculated the characteristic Lyapunov exponents for the new plant (1) for (2) and (3) and found the following:

$$\phi_1 = 2.7081, \phi_2 = 0, \phi_3 = -16.7081 \quad (4)$$





KY Based DC-DC Converter for Standalone Photovoltaic Water Pumping System Employing Four Switch BLDC Drive

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Abstract—Solar based water pumping system is getting a broad consideration, since solar energy is found to be the best solution for the existing conventional energy resources. Moreover solar PV (Photovoltaic) fed water pumping is favored technique within the remote regions for different applications. In this paper KY based DC-DC converter fed water pumping system with BLDC (Brushless DC motor) is proposed. Voltage ripple reduction is one of the main advantages of KY converter with a high transient response. For tracking the maximum power under various irradiation conditions P & O Perturb and Observe based MPPT (Maximum Power Point Technique) is employed by varying the duty ratio of KY converter. Instead of six switch VSI (Voltage Source Inverter), four switch VSI is employed, where cost saving is accomplished by decreasing the number of inverter power switches. A BLDC motor is connected to drive the centrifugal pump, since it has advantageous feature while connecting to that of PV generator.

Keywords—KY Converter, Four switch VSI, BLDC motor, MPPT

I. INTRODUCTION

SPV (Solar Photovoltaic) based projects are considered now, due to the reduction of cost of solar panels as well as the electronic devices. Water pumping using SPV received wide demand because of its vital and affordable nature of power generation. MPPT technique is employed in most of the PV based applications [1]. From the different traditional methods of MPPT, P&O MPPT is considered better, where it captures the maximum power under various conditions. Most common type of DC-DC converter used for SPV and MPPT application is the BOOST converter [2]. Conventional inductor-based boost converter produces high - voltage ripple pulsating current in output. As a result, large power losses will also have occurred. A recent study focuses on the design of a KY converter, possessing fast transient response, less voltage reduction etc [3].

The efficiency of the energy conversion in the solar energy system will be high only at certain voltage and current conditions at which the power will be a maximum. This operating point is called Maximum Power Point (MPP). In this project, the KY converter is controlled by Perturb and Observe

(P & O) algorithm to track MPP at any irradiance condition [4]. The purpose of this paper work is to develop PV array fed BLDC drive employing KY converter to boost the PV array voltage and four switches inverter for conversion of DC supply to AC supply required for BLDC motor. In the proposed BLDC drive, the number of switches in the 3-phase inverter is reduced from six to four which results in great saving in hardware cost and reducing the size of hardware. The performances of the proposed system is analyzed through the simulated results using MATLAB/Simulink environment.

II PROPOSED SYSTEM

A new PV array fed BLDC drive has been developed in order to harness renewable energy source and to reduce the load demand of EB supply. The system consists of KY Converter fed by PV array to make the DC voltage of PV panel to the desired value for inverter and four switch inverter to generate variable frequency and variable voltage AC supply.

III OPERATION OF PROPOSED SYSTEM

The block diagram of the PV fed BLDC motor drive employing KY converter for PV array MPPT and four switches inverter for BLDC motor is shown in Figure 1[5]. The KY converter will buck or boost the DC voltage output of solar panel in order to provide the required DC voltage for BLDC motor [6]. The duty cycle for PWM pulses of KY converter will be determined by P&O MPPT algorithm. P&O algorithm is also termed as hill climbing, where both the name indicates that the, providing certain perturbations, it captures the maximum power by increasing or decreasing the voltage. The four switch three phase inverter will generate the required variable voltage and variable frequency supply for BLDC motor [7][8]. The ON or OFF pulses for the power switches of inverter are determined from the signals obtained from Hall sensors. The speed feedback helps to achieve closed loop operation.



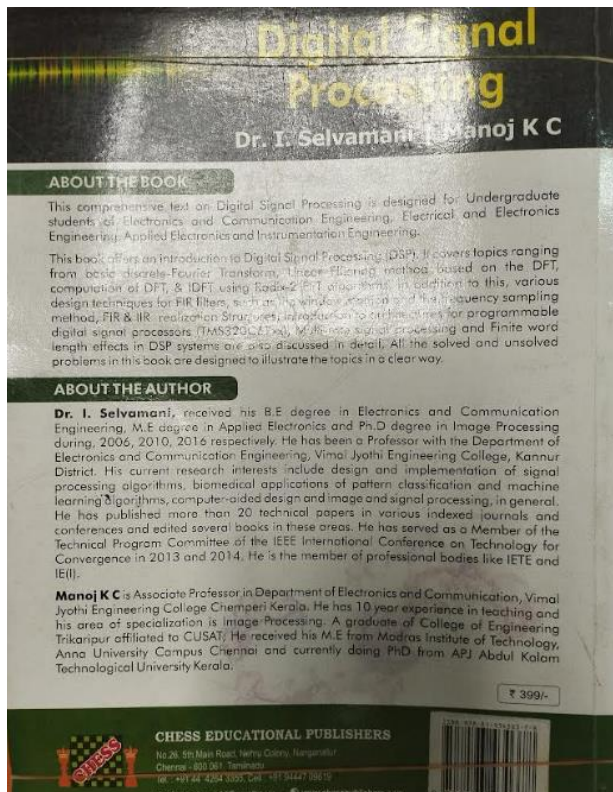
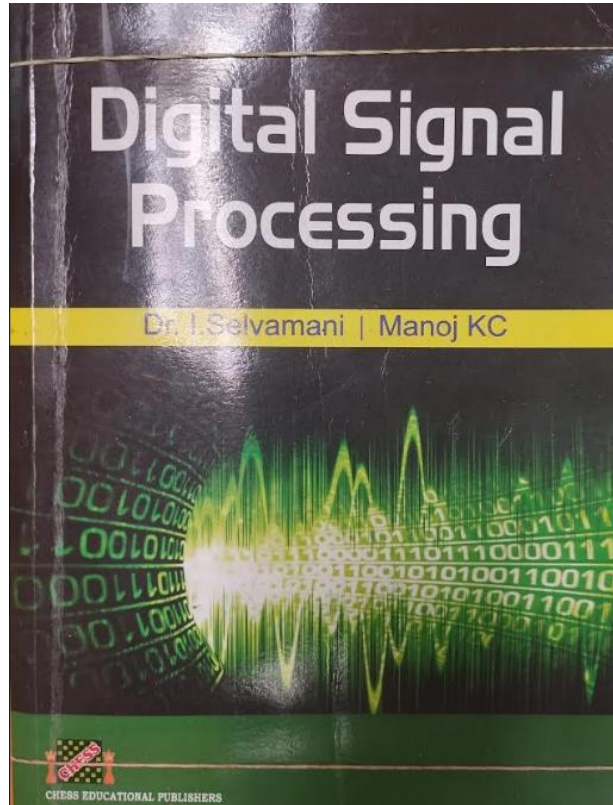
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Melanoma Classification and Birthmark Mole Detection on Clinical Images

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Abstract—According to the current data, there is a rapid growth of skin cancer. Early detection of skin cancer are almost curable. Method is described to classify objects with skin lesions as malignant or benign with a smaller number of features. The system considers the probability of occurrence of birthmark. There are chances of having doubt whether the birthmark is a cancer. Proposed system uses colour, texture, border features to detect skin cancer, birthmark mole and Classify melanoma as benign or malignant.

Keywords—skin cancer, melanoma, birthmark mole, clinical images, malignant

I. INTRODUCTION

The third most common skin cancer and one of the most malignant cancers is the malignant melanoma (MM). Melanoma often has a slow rate of early growth during which curable lesions can be detected and removed at relatively low cost, leading to a high survival rate of 95 % for five years [4].

Melanoma diffuses from one organ to another, not directly but indirectly, and has therefore been shown to be very deadly. Evidence has accurately predicted that melanoma causes the death rate of most of the individuals from skin cancer. Earlier detection and intervention of melanoma is more likely to cure [5]. Methods [4] [6] [11] [12] use dermoscope images and methods [1] [3] use non-dermoscopic images.

In recent times, there has been a rising trend for automatic detection, utilizing customary advanced cameras. This can be relevant in online and portable application as a telemedicine apparatus and furthermore as a framework that helps doctors. We proposed an automated diagnosis system for and birthmark detection and melanoma classification on dermoscopy images for efficient classification.

A. Observations

Skin cancer can arise in any parts of the body. Risk of cancer is increasing every day. People are always conscious about skin. Birthmark moles are very common in human, and most of them have one or two. Moles have the risk of becoming cancerous. Birthmark mole can

change in size, colour, and sensation having pain. There are chances of having confusion whether the birthmark is cancerous.

Our aim is to provide highly accurate classification results while keeping in mind about the various constraints. Although several works have been proposed for melanoma classification such as [1] [2] [3] [4], most of these methods does not consider the case of birthmark mole, does not concentrate on border features and took very little consideration about the incomplete borders. Our proposed scheme is a automated diagnosis system for melanoma classification and birthmark detection on dermoscopy images for efficient classification.

B. Contributions

- 1) To design an enhanced and proficient computerized framework that gives exceptionally accurate discovery and classification results.
- 2) To develop a system that incorporates incomplete lesions.

II. RELATED WORK

Here explains some of those related works for the detection that are recently proposed.

Fengying Xie et al [4] created a model for analyzing dermoscopy images to classify melanoma as either benign or malignant. Method mainly consists of 3 steps. A self-generating neural network has been used to extract lesions. Features of colour, texture and border are retrieved from lesions. Then using neural network ensemble model, lesion objects are finally classified. The system implemented new border features that can efficiently classify border abnormalities. Total of 57 features were used to classify melanoma as benign or malignant. Principal components analysis has been used to decrease the dimensions of the features.

Ioannis Giotis et al. [1] proposed a computer - aided clinical system for skin cancer, called MED - NODE. System aimed at distinguishing melanoma from cellular naevi using simple digital images of lesions and using colour scheme, texture and visual attributes. The





Soft Computing Based MPPT Controller for Solar Powered Battery Charger Under Partial Shading Conditions

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Abstract : Solar irradiations received by the PV panel is blocked by a moving or non-moving object is known as partial shading condition. The solar panel power output under partial shaded will be a maximum only if the panel voltage is maintained at the Global Maximum Power Point. The GMPP can be determined from the Power-Voltage characteristics of the partially shaded solar panel and this voltage is called optimum voltage. The battery charging may require a voltage different from the optimum voltage. Therefore, a GMPPT Global Maximum Power Point Tracking CUK converter is employed that maintains partially shaded solar panel voltage at optimum value and buck or boost the solar panel voltage to a value required for battery charging. The objective of this work is to develop solar based battery charger using CUK converter with Maximum Power Point Tracking under partial shaded condition by Grey Wolf Optimization algorithm. The simulation of the partially shaded solar panel fed CUK converter for battery charging applications is performed in MATLAB - SIMULINK. The CUK converter in the battery charging system is basically a buck-boost converter that employs a single power switch. Duty cycle of gate pulse to power switch decides the power drawn from partially shaded solar panel. Therefore, the duty cycle is determined for GMPPT using Grey Wolf Optimization algorithm which can track the GMPP very fast for fast changing irradiances. The simulation is performed for charging 5.8 AH, 48 V Lithium-Ion batteries.

Keywords — Maximum Power Point Tracking (MPPT); Partial Shading Condition (PSC); Global Maximum Power Point(GMPPT); Grey Wolf Optimization(GWO); Photovoltaic (PV)

I. INTRODUCTION

The need for non conventional and clean sources of energy is increasing throughout the world. With increasing popularity of solar systems, there is always an eminent need in making efficient the PV system. The efficiency of the energy conversion in the solar energy system will be high only at certain voltage and current conditions at which the power will be a maximum. Hence the operating point is called maximum power point. It is found non-linear for power-voltage curve of a PV panel and thereby it also

depends sunlight irradiance and temperature of the atmosphere. The variation in voltage and power due to temperature is less significant when compared to sunlight irradiance[1]. Since the sunlight irradiance is not constant throughout the day, the power output of a PV panel will also not constant. Besides, the MPP will also shift with change in sunlight irradiance and atmospheric temperature[2]. MPPT technique is to be used for achieve maximum power under different temperature and irradiance. Another major problem associated with solar power generation is handling Partial Shading Condition (PSC) due to passing clouds[3]. Under partial shading condition, the P-V characteristics has multiple power peaks (global and local maxima). The ordinary MPPT techniques are fail to search the Global Maximum Power Point under partial shading condition [4].Therefore the soft computing methods are used to determine the global power peak by deciding the best duty value for the CUK converter to remove greatest power from PV array under shading condition[5].

In this paper, the partially shaded PV panel is implemented by connecting the solar panel in series configuration and setting irradiance level of each panel at different values and connected via CUK converter for Lithium-Ion battery charging with GMPPT by using Grey Wolf Optimization (GWO) algorithm.

II. PROPOSED SYSTEM

The block diagram of PSC PV fed CUK converter based battery charging system with Grey Wolf optimization technique is presented in Figure 1. The proposed PV system consists of four PV panels in series with various irradiances to realize PSC, CUK converter and Lithium-Ion battery. In this project GWO technique is used to determine the best PWM duty for the CUK converter to track GMPP under Partial shading condition.



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LESION DETECTION USING SEGMENTED STRUCTURE OF RETINA

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Abstract—Morphology of fundus image indicates diseases like diabetic retinopathy and glaucoma. Features of the retinal images allow ophthalmologist to perform retinal disease identification. Presence of lesions in the fundus retinal image is initial sign of diabetic retinopathy. The paper proposes a method for the detection of lesions in retinopathy fundus images based on segmented structure of retina. Morphological operators extract image features and selected features are passed into the support vector machine (SVM) classifier which classifies the images into normal and abnormal classes

Keywords—Adaptive histogram equalization; Gaussian filter;fuzzy ;morphological operation;SVM classifier

I INTRODUCTION

In a Fundus image consist of retina, optic disc, macula, fovea, fundus images are taken opposite to the lens. The morphology of the retinal fundus image is an important indicator of disease like diabetic retinopathy, hypertension, glaucoma, hemorrhages like diseases [6] increases in the sugar level in blood. It increases the amount of reactive oxygen species in blood. Damages in the retinal vascular tree leads to the formation of lesion in retina. Presence of exudates in retina is the primary sign of diabetic retinopathy. Diabetic retinopathy retinal regions shown below fig 1.

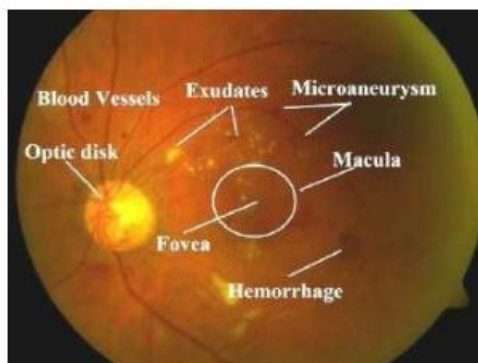


Fig 1 Main retinal regions

The most common sign of DR are red lesion and bright lesion. Microaneurms and hemorrhages are red lesion exudates and cotton wool spots are bright lesion. Presence of

lesion is early sign of diabetic retinopathy. Image processing widely used for automatic diagnosing of DR from retinal images.

Optic disk is a bright oval structure and it represents the start of the optic nerve and this is the entry point of blood vessels. Macula responsible for high resolution vision. The blood vasculature in retina is a tree like structure having high frequency component .and it has high contrast in the fundus image[9].

Diaretdb1, Drive, Stare databases are mainly used for retinal images. In DRIVE database consist of 40 colour images and captured with a Canon CR5 non-mydratiac 3CCD camera with a 45° field-of-view (FOV). Each image represented in 8 bits captured at 768 x 584 pixels and saved as JPEG format. STARE database consist of 81 retinal images taken with a Topcon TRV-50 fundus camera at 35° FOV. The image FOV and which camera used change accordance with which database used. In the acquired image consist of noises to remove noises and enhancement of the image pre-processing used after preprocessing segmentation occur grouping of pixels occur in this stage then extract particular feature using feature extraction classifier classifies the image features

II RELATED WORKS

Diabetic Retinopathy can cause the complete loss to the vision. The detection of early stage of can help the people from complete vision loss. Blood vessels supply blood and oxygen to the retina. If the oxygen supplies to the retina are not smooth, then this will create health problems [8].

DR can be classified as NPDR (Non-Proliferative diabetic retinopathy) and proliferative diabetic retinopathy. In NPDR, lesion occurs are micro aneurysms and exudates. Micro aneurysms are small, round structure and occur as red dots with sharp margins [5] in the case of proliferative DR. It is the advanced stage compare to NPDR. In this case growth of abnormal blood vessels occur and these blood vessels can grow along with retina and cause complete vision loss[9].

Hemorrhage is the blood leakage in retina. It can be occur in various sizes and various shapes. Hemorrhages can be identified mainly by its characteristics. Dark appear for



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HAND ANTHROPOMETRIC MEASUREMENTS OF SOUTH INDIAN MALE POPULATION COLLECTED USING TRACER METHOD AND ITS CORRELATION ANALYSIS WITH HEIGHT AND SHIRT SIZE

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Coimbatore, Tamil Nadu, India..

Abstract

Anthropometric dimensions are integral part of customized hand instruments which can improve safety, comfort, and efficiency. For this, it is essential to collect anthropometric data from different populations. This paper is aimed to collect a detailed hand anthropometric data of south Indian male population which can be employed for developing various hand tools and its correlation analysis. Tracer method is employed to collect the hand measurements from a convenience sample of 162 subjects and compared with direct or traditional measurement method. The mean values of height and total hand length of the south Indian male population obtained is 171.31cm and 19.275cm respectively. The highest value of Pearson correlation coefficient is 0.57 found between height and total hand length. Descriptive statistics can directly be used for design without considering the correlation for the targeted population. The scope of this work is undergone only for south Indian male population.

Keywords – Hand anthropometry, Hand, Human, South India, Male; Population, Tracer method, Correlation, Height; Shirt size.





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Sl. No	Title of Books/Papers
1	Weapon detection using ML for PPA
2	Optimum Torque - Zero d-axis Current Control of Direct Driven PMSG Based Wind Energy Conversion System
3	Review On Brain Tumor Malignancy Prediction By 3D Reconstruction
4	Preliminary Prototype and Analysis of a Customized Handle for Winding Machine using Fused Filament Fabrication
5	Text detection and script identification from images using CNN
6	Computational system for medical image authentication using watermarking
7	Brain tumor detection that uses CNN in MRI





Optimum Torque - Zero d-axis Current Control of Direct Driven PMSG Based Wind Energy Conversion System

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Abstract—For power conversion in wind energy conversion systems, fast and smooth performance is essential. Here, a control system in which optimum torque control and zero d-axis current control is combined for better performance of machine side converter in terms of maximum power point tracking. Using the control discussed, the wind energy conversion system is able to extract maximum available power from wind at varying wind speeds. The synchronous reference frame theory based control is applied to grid side converter for DC-link voltage control and better grid synchronization. As a whole, the explained control system for direct driven PMSG based WECS provides better performance in machine side and grid side, at varying wind speed conditions.

Index Terms—maximum power point tracking, optimum torque control, zero d-axis current control, synchronous reference frame theory.

I. INTRODUCTION

Environmental crisis such as global warming, and climate change, and high oil prices caused by reduced availability of fossil fuel, are the main reasons behind the fast development of renewable energy. Wind energy is an important renewable energy which is absolutely free and clean. Thus, wind energy conversion system plays a vital role in the present energy context. PMSG based wind energy conversion system have several advantages such as, they do not require additional DC supply for excitation circuit, simpler and need less maintenance because of absence of slip rings, higher power coefficient and efficiency, and are more stable and secure during normal operation when compared to WECS with DFIG and SCIG. Field oriented control (FOC) is the most commonly used and simple control technique used for successful operation of WECS. Because of the non unique nature of optimum power constant, FOC can not give exact point for optimum power. In [1], two methods of tracking of optimum power point are proposed, where fast settling occurs as tracking is got faster. Direct Torque Control (DTC) is another most used control technique [2]. But it has torque and flux ripples

associated with. This can be minimised by increasing number of voltage vectors. But this method is not suitable for reducing current ripples. In [3] a mixed sensitivity H_∞ controller for controlling active and reactive power, and reducing current ripples is discussed. But this is not suitable for varying wind speed cases, as it doesn't involve external disturbance variation in design stage. Later, sliding mode control based FOC has arrived but it was affected by limitations such as chattering and slow response [4]. Then, Reduced order Extended Kalman Filter (REKF) was introduced, in which position sensor noise of permanent magnet machine has greatly reduced. But the computational tasks involved in it was too complex. The real time implementation of this control was difficult [5]. The limitations so far was greatly reduced by using active disturbance rejection control (ADRC) where extended state observer (ESO) was introduced to reduce the too much dependency on mathematical model [6]. By considering coupling effect as a mode uncertainty, the independent control of a coupled system is possible by this method. Single loop ADRC has handled the wind speed variation successfully. Later [7] introduced multi loop ADRC to handle parameter variation in stator resistance and inductance also.

Here, a direct driven PMSG based WECS with Optimum Torque Control - Zero d-axis Current (OTC-ZDC) control as machine side converter control and Synchronous Reference Frame (SRF) control as grid side converter control is simulated and the performance of the system is studied for varying wind speed as external disturbance.

The rest of the paper is organized as follows. The methodology of WECS including detailed description of MPPT, MSC Control and GSC control is discussed in section II. The performance analysis of WECS with simulation results are discussed in section III. Section IV provides the conclusion of the paper.



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Review On Brain Tumor Malignancy Prediction By 3D Reconstruction

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Abstract—A major increase in brain tumor has been seen in recent years, and it is in the tenth position. It is sever type of cancer and influences in people of all ages. Hence, if diagnosed well at the initial stage, it will turn out to be one of the most curable types of tumors. The computer aided analysis of MRI is performed to diagnosis the tumor through the process of classifying and segmenting. From the previous years of study, the research areas are mainly concentrated on machine and deep learning for brain malignancy prediction and treatment. The two dimensional MRI images helps to detect and classify the brain cancer precisely and efficiently. Usually the MRI images are two dimensional and not give sufficient knowledge regarding the structure and exact size of the tumor can be removed, and the detection procedure has become more complex. Since two-dimensional images never offer the actual feeling of exactly how a tumor looks, diagnosis includes 3D tumor reconstruction, planning for surgery and biological studies. The survival rate shows gives us an exact picture of the number of patients who have survived after the tumor is identified. The 5-year and 10 year survival rate is approximately 36 percent and 31 percent respectively for persons with a cancerous brain or CNS tumor. For increasing the survival rate of brain tumor, 3D image reconstruction can be used and it is one of the best attractive features in virtual reality, especially because of its application in medical image processing.

Keywords— Brain cancer, MRI, Machine Learning, Deep Learning

I. INTRODUCTION

Tumors in brain contain many abnormally developing tissues which have come from uncontrolled proliferation of cells, and inside the brain the physio-logical characteristic of this tissue cannot be found. Besides the increase in brain size and the swelling due to tumor are responsible for the cause of neurological symptoms that are irregular. Primary and secondary brain tumors are the two classes of brain cancers. Tumors that start in brain itself are known as primary brain cancer. A metastatic or secondary brain tumor starts from lung, breast, colon or skin and then gradually moves on to the brain and it is highly severe and life threatening.

The WHO has classified the tumor onto 120 classifications depend on the kind and location of the tumor cell, creates many complication in diagnosis process. Based on the occurrence of cells a name is given to tumors and they are numbered ranging from I-IV. This number is known as the grade and it shows the vast expansion of cells and its spread. This is an important knowledge for care planning and outcome prediction.

from multiple angles, a scan shows computerized representations of the brain and spinal cord and it helps the doctor to identify the difference between cancerous and non-cancerous tissue. MRI can produce transparent and accurate pictures of a brain cancer in three dimensions.

MR images are familiar types of imaging techniques for non-invasive in tumor research. A collection of cross-sectional images of the brain is obtained by MRI. That is, a series of 2D parallel cross-sectional images can be viewed as anatomical descriptions of the 3D tumor. The reconstruction of 3D images in the form of 2D projected slices results in information loss and incorrect interpretation. 2D images do not reliably portray the nuances of human anatomy and it is often difficult for radiologist to express their interpretations to a doctor who may have trouble imagining the 3D anatomy. Therefore, from a series of 2D parallel cross sectional images of the tumor, there is a need for 3D tumor reconstruction. 3D visualization provides a clearer understanding of the tumor's topology and form, and allows its geometrical characteristics to be calculated. The data extracted is useful in tumor staging, surgical preparation, and biological research. Therefore, in biomedical 3D visualization, how to recreate a trustworthy surface from the sequential parallel 2D cross sections becomes a crucial question.

The structures of this review paper as given below: the second session gives details of the brain cancer, grade classification. In third session discusses about how the MRI image analysis. The main concepts of machine learning techniques are explained in section 4. The fifth section provides a literature review of two dimensional MRI analyses for detecting the brain tumors. Section 6 provides a review of three dimensional reconstructions of MRI images and its analysis. Section 7 gives an overall summary of this study.

II. BACKGROUND STUDY OF BRAIN TUMOR AND ITS GRADE CLASSIFICATION

In human body the new cells starts growing when the regular cells grow old or get hurt. Sometimes the human body doesn't need new cells but still the new cells are formed without damage of the old cells. This result in accumulation of a large cell called a growth or tumor.

Brain cancers consist of group of irregular cells accumulates in the brain. The Skull, which covers the brain, is very hard and it may cause complications with any development inside this restricted location. The development of these tumors within the brain results in the increase of

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Preliminary Prototype and Analysis of a Customized Handle for Winding Machine using Fused Filament Fabrication

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Abstract - Additive manufacturing transformed the prospect of product development. Customized and individualized product development never be so effortless. In this context, aim here is to develop a preliminary prototype of customized handle for winding machine using in handloom industry. Design of the handle is completed according to the hand anthropometric data of workers. CATIA V5R20 is used for 3D modeling and Analysis. Polylactic Acid (PLA) used as material and FlashForge Dreamer Additive Manufacturing (AM) machine, which works based Fused Filament Fabrication (FFF) is employed for prototyping. Analysis confirms that the design using PLA material is safe as maximum von Mises stress obtained ($6.57 \times 10^4 \text{ N/m}^2$) is less than the yield strength of PLA material ($4.9 \times 10^7 \text{ N/m}^2$).

Keywords - Prototype; Customization; Fused Filament Fabrication, Handle, Hand Anthropometry, Additive Manufacturing.

INTRODUCTION

By eliminating tool and reducing wastage of material, Additive Manufacturing (AM) or 3D Printing (3DP) can be considered as one of the most noteworthy development in manufacturing in recent years, which directly prints from Computer Aided Design (CAD) data layer - by - layer [1]. It helps the technology to be a potential player in Industry 4.0 [2]. Fused Filament Fabrication (FFF) or Fused Deposition Modeling (FDM) is an AM technology which usually fabricate the objects layer-by-layer by extruding material through a nozzle [3, 4]. FFF parts can be used in wide variety of applications from unarmed aerial vehicles to 3D Printers [5].

Parry et al. developed a customized crutch grip using 3D scanner, Autodesk Fusion 360, and Stereolithography (SLA) additive manufacturing and recommended that AM is a worthwhile method for fabricating customized Daily Living Aids (DLA) [6]. Additionally, using reverse engineering and FDM additive

manufacturing technology, a customized helmet is developed with enhanced comfort. The researchers concluded from the study that the method is suitable for rapid product development and to address the needs of the customer individually [7].

A customized hand orthosis is developed using 3D Scanner and FDM AM machine with a printing time of about 11 hours and lead time of about 1 day, which will be useful for patients [8]. In addition to this, individually customized wrist orthosis was designed using the 3D scanned data of a patient and fabricated by employing FDM technology with upper layer of the orthosis was made of ABS and inner layer was made using TPU (Thermoplastic Polyurethane) [9]. TPU has considerable elasticity and research proved that the flexible inner layer increases the comfort of user [9].

Furthermore, customized orthosis is fabricated using Autodesk Inventor 3D modeling software, 3D scanner, MeshLab software for creating an automated algorithm of 3D scan data, and Raise 3D Pro FDM AM machine [10]. The study concluded that Polylactic Acid (PLA) is strong when compared to other materials used such as Acrylonitrile Butadiene Styrene (ABS), High impact Polystyrene (HIPS), and Polyamide 12 (PA12 - nylon) [10]. Fabrication of customized prosthetic sockets for upper limbs using 3D scanner and FDM process proved the feasibility of fully functional products [11].

Textile industries facing a challenge to deliver more customized products and amalgamation of product, process, and supply chain designs is the feasible to achieve customization in textile industry [12, 13]. At the same time, Chatterjee and Ghosh believed that textile industry can utilize 3DP by exploring its unique capability of manufacturing customized products [14].

From above it can be understood that the research explored the possibility of customized products in various areas including textile



Text Detection and Script Identification from Images using CNN.

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Abstract: For humans, text is one of the most significant sources of knowledge. Detection of text in images has been an interesting computer vision topic in both industrial and academic study. There has been a lot of effort made into improving existing methods and establishing new ones. Sliding windows and connected component systems are more classic solutions. In this paper we are discussing some text detection methods. In this paper we are discussing text detection and identification based on convolutional neural network. Script identification is done by integrating local and global CNN.

1. Introduction

People who travel to different places find it difficult to communicate with locals because they do not speak the language. They can't understand what is written on any board or banner. As a result, text information extraction systems that can identify, recognize, and translate text contained in images are required. The text in images is extracted using this system. Following the text extraction method, the characters are translated into a user-friendly language. As a result, the user will have quicker access to the unfamiliar language and will be able to interpret it.

Under multi-lingual scenarios, identification of script is an unavoidable step to natural image text understanding. The text identification process for images consists of two steps: localization of text to obtain segmented lines of text, and also identifying the types of these segmented text lines. The second phase, recognizing the script types of text in natural scene photographs, is the subject of this research. Convolutional neural networks have recently changed the superior machine learning method for visual tasks due to their high capacity and invariance to translation and distortions, and CNNs are becoming the models for many image classification problems. However, there are two major limitations, these CNN-based classification algorithms are not suited for use in language identification. One

difficulty is the different aspect ratios of text in the images make any CNN classifier. Because CNN use fixed size input image. The second problem is lots of areas in different script images are similar, if not identical. Existing solutions employ CNNs to mine discriminative features in order to correctly recognize those perplexing scripts. These approaches, which use patches as CNN inputs, are effective at extracting local features from text in images and overcoming some issues discussed before. However, partitioning a scene image into patches results in the loss of some global features and a reduction in overall recognition performance. So here use a single CNN to extract local and global characteristics from distinct layers and then combine the two features by upsampling or downsampling.

We combine local CNN and global CNN in this work for language identification.

1.1 Convolutional neural network (CNN)

Convolutional neural networks (CNN) are made of many layers of artificial neurons. The weights of each neuron define its behaviour. When we given pixel values of an image, the artificial neurons of a CNN detect a variety of visual features. When you send a picture into a Convnet, each of its layers produces a plethora of activation maps. The most important features of images is highlighted by activation maps. A patch of pixels as input to the neurons, the colour values of images are multiplied by its weights, combined them, and activation functions are applied. Classification layer is the final layer of CNN.





CSMI-AW: Computational System for Medical Image Authentication Using Watermarking

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Abstract. The enormous growth of digital data in the era of information technology (IT) has provided broader scope towards improving the quality of life. However, the technological aspects in various data-driven solutions also resulted in data duplication and malevolent manipulation during the digital data distributions through networks, especially when it comes to images. Thereby the demand to protect the privacy of image data is highly envisioned and a crucial concern in the current scenario. Currently, medical facilities also require protecting medical image data ownership with copyright protection and content authentication to preserve the authenticity of the patient clinical details. The study in this regard introduces a computationally efficient technique, namely-computational system for medical image authentication using watermarking (CSMI-AW) to protect the ownership of the patient chest x-ray images. The system uses the potential factors associated with the spectral domain techniques, such as with Discrete Cosine Transformation (DCT) approach with non-blind detection. The optimized procedure of DCT-based significant technique for message image/watermarking and substitution methods for embedding process makes the CSMI-AW more robust to retain the medical image watermark and watermarked image perceptual quality. It also simplifies the algorithm steps in such a way where it optimizes the performance of CSMI-AW with a proper balance between robustness, computational cost, and embedding efficiency. However, the CSMI-AW system not only ensures a higher degree of security for digital x-ray images but also attains better computational performance with higher perceptual quality of the watermark. It attains approximately 40% better outcome of PSNR and 60% computational improvement. The comparative performance analysis for the traditional approaches shows its effectiveness in terms of computational efficiency and peak-signal-to-noise ratio (PSNR).

Keywords: Medical image watermarking · Spectral domain · Bit-plane extraction · Optimized security performance · Perceptual quality



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Brain Tumor Detection that uses CNN in MRI

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Abstract: Brain cyst is a mass of unnecessary cells growing in the brain or the multiplication of normal or abnormal cells that are not essential for the brain, which may even be the cause for death. The brain tumors that occur in the initial stage of medication which is a slow expanding and deteriorating process by rapid cell growth and depends on its rate of cell growth. Magnetic Resonance Image of brain is an important factor to perform surgical procedures and to complete allied surgery. In order to support the effect of radiologists in reviewing the information from MRI, we use this system. This proposed paper uses classification method based on Convolutional Neural Network for MRI images. The detection is done from single slice and we need to get a big data set and it is used as a testing methodology preprocessing of MRI and proposed model compared with it. It also compares the proposed architecture with the VGG16 architecture to compare the accuracy and advantages. The experimental results of the model shows that it has a good accuracy and is predictive and has very low latency rate and comparatively less execution time. The results are compared in other data sets to check the classifier's accuracy and the confusion matrix. The VGG16 model achieved an accuracy of 89% and the proposed model achieved an accuracy of 92.7% with a good accuracy.

Keywords: Brain cyst, Magnetic Resonance Imaging(MRI), Convolutional Neural Network(CNN), VGG-16 (Visual Geometry Group)

1. INTRODUCTION

Globally, almost 1.30 million cases of brain and nervous system cancers were identified worldwide in 2012. China, USA, and India were the top three countries with the largest number of patients. The International Association of Cancer Registries (IACR) reported that there are over 23,000 cases of brain tumors reported in India each year, and more than 24,000 people reportedly die due to brain tumors annually. In the U.S. in 2012, an estimation of 69,560 adults of age 40+ will be detected with the primary brain cyst, and 71.7 percent of 5 years relative average survival rate for adults will be detected with a primary brain cyst. The estimate for malignant tumors is 21.5 percent and for non-malignant tumors, 96.2 percent. Also an estimation of 14,300 new cases of adolescents and young adults brain tumors will be diagnosed in 2021. The common prevalent type of cancer is brain tumors among teenagers only [1-4], contributing towards 2.1 percent of diagnosis each year in this age group. About 70,000 - 75,000 new or six times are treated with brain secondary brain tumors (metastases) per year, while nearly 80,000 will die from brain metastasis each year. [5] which shows the real importance of detection of brain tumor in early stage. The unnecessary mass of cells growing in the

brain which leads to abnormal tissues in the brain is the brain tumor. It has the potential to affect anyone of any age. The effects of a brain tumor may vary from person to person and even from one therapy session towards the next. Brain tumors come in a variety of structure and dimensions, and they can be seen in any position and with varying image contrast. They are of two types benign tumors or malignant tumors. The benign tumors have a structural homogeneity and do not contain active cells or cancerous cells, however malignant tumors do not have structural homogeneity and contain active cells [6]. Many techniques and medical imaging procedures like Computed Tomography (CT) scanning and MRI (Magnetic Resonance Imaging), can be utilized to find any abnormality in tissues and organs beforehand.

MRI scan is a rapidly evolving medical imaging method that fabricates a high-resolution images of soft tissues. It is a non-invasive procedure for the analysis of tissues in our human body [2]. MRI is a non-invasive tool for brain imaging research, and it is commonly used for obtaining and conveying anatomical or structural data and in Fig 1 Normal MRI and presence of tumor in MRI is shown. Brain structure recognition using MRI is critical in neuroscience, and it has a wide range of applications including brain development studies, neuroanatomical studies of the brain, and stress. As a result, the majority of MRI data are employed in medical image segmentation for the goal of comprehending and doing research analysis. For brain image analysis, MRI segmentation incorporating learning procedures and pattern identification algorithms have proven to be quite effective. The method specifies a parametric model that takes into account selected characteristics using a density function. Because of the inhomogeneity or recording media, quantization error, and other factors, MRI images contain a lot of noise. Surgery is the most popular method for brain tumors, chemotherapy and radiation may be utilized to treat the greatest of tumors that cannot be removed surgically and are likely to be malignant. One of the most effective approaches used to determine brain cysts is MRI, which provides information images of the brain. Furthermore, using MR imaging to detect brain tumors can improve diagnosis, generate predictive, and treatment planning.

There are a number of methods used for the image classification to classify whether the MRI image is tumorous or not using [8] many techniques like SVM (Support Vector Machine), CNN (Convolutional Neural Network) [9, 10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100]. The proposed technique uses dual stepping for preprocessing, and further WMGM and CSF





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1	A Systematic Review on Recent Techniques for the Detection of Multiple Myeloma
2	Carbon Capture, Utilization and Storage (CCUS) - The Energy source of the future
3	Graphical User Interface for intelligent automotive with vehicle-to-vehicle communication and adaptive light
4	DATA DRIVEN MODELLING AND PREDICTION OF RAINFALL
5	NETWORK-BASED CONTROL FOR NONLINEAR SYSTEM
6	Pneumonia Detection in Chest X-ray using InceptionV3 and Multi-Class Classification
7	UNet with Two-Fold Training for Effective Segmentation of Lung Section in Chest X-Ray
8	Customer Evaluation And Profit Maximization Using Machine Learning for Offline Stores
9	PEER TO PEER LENDING: RISK PREDICTION USING MACHINE LEARNING ON AN IMBALANCED DATASET
10	PEER TRACKING AND COLLISION FREE NAVIGATION FOR VISUALLY IMPAIRED
11	A Review on Breast Imaging Modalities based on Technical Aspects
12	SMS BASED REMOTE MOBILE PHONE DATA ACCESS SYSTEM
13	A NOVEL FAKE NEWS DETECTION APPROACH USING MACHINE LEARNING
14	An exploration on plant disease detection
15	The Mediation Effect of Technology Anxiety and Barriers on Technology Exposure to Teachers' Technology Adoption
16	A Comparative Analysis on Deep Learning Techniques for Skin Cancer Detection and Skin Lesion Segmentation
17	A Text book on Constitution of India





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22	DC Machines & Transformers
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24	Graph Theory
25	A Review of Drive Selection, Converters, and Control For Electric Vehicle
26	Fuzzy-Based Control Strategy for Supercapacitor Assisted Battery Powered EV





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A Systematic Review on Recent Techniques for the Detection of Multiple Myeloma

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Abstract— Multiple myeloma is a kind of blood cancer caused by the uncontrolled clonal proliferation of malignant plasma cells, which results in decreased hematopoiesis, increased monoclonal protein synthesis, bone tissue destruction, and renal system changes leading to kidney failure. The purpose of this article is to discuss recent Techniques for the Detection of Multiple Myeloma. The many methods of detection as well as the recent developments in technological methods of detection have been reviewed and summarised. Using search engines, about 18 articles were chosen based on different ways to find them. And carefully read the chosen papers and put the results into groups based on the methods that were used. Multiple myeloma treatments include magnetic resonance imaging (MRI), bone marrow testing, computed tomography (CT), and biopsies, among others.

Index Terms — Multiple Myeloma (MM), Magnetic Resonance Imaging (MRI), Microscopic Images, Deep Learning, Support Vector Machine (SVM)

I. INTRODUCTION

When an abnormal plasma cell forms in the bone marrow and rapidly divides, it causes the cancer known as multiple myeloma. Myeloma is a cancer that starts in the bone marrow and spreads throughout the body. Cancerous myeloma cells generate abnormal antibodies known as monoclonal (M) proteins, which can damage kidneys and cause other severe health problems.

Plasma cells are an essential part of the immune system because they produce antibodies in the form of immunoglobulin proteins (M-proteins). Antibodies are specialised proteins made by the body to fight off pathogens, poisons, and other invaders. These proteins, known as M proteins, are found in unusually high amounts in the bodies of affected persons due to an overproduction of plasma cells. Bone discomfort, particularly in the back and ribs, low levels of circulating red blood cells (anaemia) causing weakness, exhaustion, and loss of colour (pallor), and abnormalities in the kidneys (renal abnormalities) are all possible signs of multiple myeloma. As a result, some

affected people are more likely to get bacterial illnesses like pneumonia.

Recent research indicates that Multiple Myeloma accounts for 2% of all cancer deaths and contributes for 1% of all cancer diagnoses. When detected early, multiple myeloma has a very good chance of being cured. A thorough clinical evaluation, a full patient history, and a variety of specialist testing are used to make the diagnosis of multiple myeloma. Removal and microscopic inspection of small samples of bone marrow (biopsy or aspiration), blood tests to detect low levels of red and white blood cells, and various x-ray techniques such as magnetic resonance imaging (MRI), computed tomography (CT), and positron emission tomography (PET) scans that may indicate characteristic changes to bones are examples of such testing.

II. REVIEW OF SELECTED WORKS

For their 1997 study, Shuya Kusumoto et al. [1] analyzed spinal Magnetic Resonance Imaging (MRI) in 61 patients with multiple myeloma. T1-weighted sagittal images, T1-short inversion time, STIR-inversion recovery images were obtained. Diffuse (D), nodular (N), mixed (D+N), and normal MR patterns of the bone marrow were identified (n). Fifty (or 82% of the sample) of the 61 individuals had irregular patterns. The MR imaging results were discovered to have some connections between them. Poorer outcomes were seen in patients with abnormal MRI patterns compared to those with normal patterns. In terms of overall survival, patients who exhibited a nodular pattern did not fare any worse than those who had a regular pattern. Multiple myeloma patients' prognoses are heavily influenced by the imaging pattern detected in their bone marrow.





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2022 Third International Conference on Intelligent Computing, Instrumentation and Control Technologies (ICICT)

Carbon Capture, Utilization and Storage (CCUS) - The Energy source of the future

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Abstract—Transformation of global energy sector from fossil fuel based energy production and consumption to renewable energy sources has led to energy transition. This energy transition also aims to reduce the green house gases through various forms of decarbonization. Fossil fuels are excellent fuels and cannot be replaced immediately because of their incredible energy density, requiring no innovation to collect, store and transform into energy and the well-established structures which made the industrial revolution possible. Hence to achieve net carbon zero condition across the globe, the emitted CO₂ from the fossil fuel plants is collected, stored and is either used in applications requiring CO₂ as the raw material or can be permanently sequestered in CO₂ storage sites utilizing Carbon Capture, Utilization and Storage (CCUS) technology. The captured CO₂ is used for producing further energy thus improving the hydrogen economy and also is utilized for Enhanced Oil Recovery (EOR) which makes this CCUS technology the energy source of the future.

Keywords—Carbon Capture, Utilization and Storage (CCUS), Enhanced Oil Recovery (EOR), Hydrogen Economy

I. INTRODUCTION

Fossil fuels are formed from compression and heating of the carbon-rich remains of living things such as animals and plants million of years ago underneath the earth. Burning of these fossil fuels releases the stored carbon and other green house gases into the atmosphere. As more and more fossil fuels are burned, it will cause excess build up of green house gases which trap heat in the atmosphere causing drastic changes in the Earth's climate. Thus, burning fossil fuels not only just meet our energy demands but also paves way for global warming.

About 80% of the world's energy is derived from the fossil fuels which have been powering for more than 150 years. Power and transport sector of the United States accounts for about three-quarters of our carbon emissions by burning fossil fuels. In 2019, about 74 percent of US greenhouse gas emissions are from burning fossil fuels. Hence it becomes impossible to completely replace fossil fuels and hence avoid rapid accumulation of CO₂ in the atmosphere. An important methodology to reduce the CO₂ emission and decrease global warming is Carbon Capture and Sequestration Technology. In this process, the carbon emitted by anthropogenic activities such as burning of fossil

fuels are collected and injected back into the earth. Throughout the world, 26 commercial CCS plants were in operation, which captures about 40 million tons of carbon which accounts about 0.11% of the total yearly global emissions. With improvement in technology, it is expected to increase the number of CCS plants. This technological adoption by most of the CO₂ emitting sources in the near future can bring the 2015 Paris Agreement, signed by 194 parties and the European Union to bring the global warming "well below 2°C" come true.

This paper explains the various stages and the technologies in CCUS in section III, Carbon Capture projects in India in Section IV, Carbon capture and hydrogen economy in section V and Enhanced oil recovery(EOR) using the captured CO₂ in Section VI.

II. CARBON SEQUESTRATION

Carbon sequestration is the process of long-term capturing and storing of carbon dioxide in order to prevent it from entering the atmosphere. This allows the stabilization of carbon in solid and dissolved forms to avoid the increase in temperature atmosphere. Carbon sequestrations can be biological and geological. Naturally, vegetations such as grasslands and forests, soil and oceans act as carbon sequestrators or carbon sinks. These natural carbon sinks can store a large amount of carbon. Natural carbon sequestration can be enhanced by afforestation, no-till agriculture and by iron fertilization of Ocean surface which stimulates phytoplankton production [1]. By using advanced technologies, carbon emitted from large fossil based power plants can be sequestered or captured and send to natural reservoirs for permanent storage. In ocean sequestration, carbon is injected directly in the ocean where salt water absorbs carbon and locking it deep in the ocean bed. Natural pore spaces in underground geologic formations can also be used as carbon sink. Carbon in the form of CO₂ is injected into these porous rocks deep underground for long-term storage. This carbon storage program was initiated by Department of Energy (DOE) office of Fossil Energy in Washington in 1997 as a small-scale research effort and has significantly advanced.





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Graphical User Interface for intelligent automotive with vehicle to vehicle communication and adaptive light controls using image processing and machine learning

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Abstract - Navigation systems are a vital part of the current traffic system. Advancements in driving technology have brought about radical changes in driving behaviour and reduced routing time. However, there are also risks to users in terms of distraction or inattention. Driving in night poses more risk than in day time driving due to abuse of high beams of the head lamp. Similar to the night driving, travelling in foggy day is also difficult for all road user. As far as the disruptive effects of navigation systems are concerned, the empirical conclusions are heterogeneous. The project is aimed to develop a low and effective Advance driver assistance system which includes vehicle to vehicle communication and intelligent headlight control. The project also aims to study and analyse different multi-disciplinary techniques which include supervised machine learning techniques to effectively classify road surface conditions using data collected from smartphones to ensure a safe and comfortable driving. A Graphical User Interface was developed which increases the usability of the system. In particular, visual distraction caused by navigation systems in relation to map navigation was reviewed. The project aims to analyse the data in such a way as to improve road safety when using a navigation system in unfamiliar areas. The results show that less glances of more than 2 seconds were found on the navigation system while map navigation leads to higher off-road times.

Keywords – Graphical user interface, vehicle to vehicle communication, image processing, machine learning, adaptive light controls, nRF, road classifications,

I. INTRODUCTION

Within the last decades, navigation assistance systems have become a much popular and widely used device in vehicles. The demand for automobile safety has increased since humans started using vehicles. Automotive collision accidents cause severe threat to human lives. Manufacturers have been developing vehicles based on reliability and safety principles for a long time. Nevertheless, for reasons such as human error, circumstantial error and negligence, accidents are still frequent.

Automotive manufacturers are fully engaged in the manufacture of new novelty products with state-of-the-art adaptive technology to facilitate customers. There are many technologies which serve to save our lives. Some of them are Anti-Lock brakes, airbags, Electronic Stability control system, Adaptive headlight, Traction control. These systems can be classified as active and passive. Besides of this, there are many advanced technologies like





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DATA DRIVEN MODELLING AND PREDICTION OF RAINFALL

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Abstract— the prediction of weather and is difficult because these phenomena are highly non-linear and complicated phenomena. Technology based on artificial intelligence enables knowledge processing and is utilised in predicting. Synthetic neural network (ANN) has emerged as an alluring substitute for conventional statistical techniques for anticipating the behaviour of nonlinear systems. The purpose of this paper is to prevent tools to model and predict rainfall behavior from past observations based on past observation. There are two fundamentally different approaches that are used in the paper to develop a model, both based on statistical methods based on ANNs. The prediction efficiency was evaluated based on 115years of mean annual rainfall between 1901and 2015.

Keywords— fundamental, Artificial Neural Network

I. INTRODUCTION

Rainfall is a significant climatic phenomenon that is difficult to anticipate. Its prediction is particularly important for the agriculture industry, which makes a significant economic contribution to a nation. In this research, we compare the weather behaviours projected by neural networks that are one of several methods used to predict rainfall patterns around the world (ANNs). Since ANNs' parallel distributed processing architectures have proven to be extremely effective computational tools, they can now be utilised to successfully trigger dynamical processes like the rain. With the use of this method, we can explain the neural network made up of a sequence of basic computing units known as neurons that makes up the human nervous system.

Globally, One of the most crucial and difficult tasks is weather forecasting. operations performed by metrological service. There are numerous specialized fields of knowledge involved in this process. Human life is directly affected by rainstorms more than any other weather event.to a large extent, human civilization depends on its frequency and amount at various scales.in recent years, Artificial Neural Network (ANN) have become a variable alternative to traditional statistical method in predicting the behaviors of nonlinear system.

Models are simplified representation of real-world systems. However, even physically based models, which solve complex system of differential equation to describe physical processes, require simplifications relating to the identification of the parameter values, the uncertainty input/output measurements, the point scale nature of physically based equations and so on. The best model is therefore the one that has the fewest parameters and the least complexity and gives realistic results. The main purpose of hydrological models is to understand and predict various runoff processes. Each model requires the input of meteorological variables, such as rainfall data, as well as watershed variables, including drainage area, soil properties,vegetation cover, and

topography.

II. PREDICTION USING ANN

A. Ann model

The India meteorological department provided this database of mean annual rainfall data. The data ranges from 1901 to 2015(115years).As a nonlinear and non-gaussian series, the series serves as a measure of the efficiency of the nonlinear model.

ANNs are massively parallel distributed processes with a built-in propensity to preserve and make accessible experimental knowledge. Researchers have long been intrigued by its efficiency and speed, which resembles that of the human brain. recognising these processes and addressing the ANN methods development. With neural networks, the goal is to adopt a nonlinear modelling strategy that offers a reasonably precise, all-purpose approximation of any operation. Data processing in parallel gives it power. No earlier knowledge of the model's form is necessary while it is being built. The most popular model type for time series modelling and forecasting is a single hidden layer feed forward network. These model's characteristics are based on

The most popular type of feed forward network used in time series modelling and forecasting is the single hidden layer network. Parker (1986), Lippmann (1987), Rummelhall & McClelland (1986), among others, formalized the back propagation network algorithm. The inversion prediction, which entails It is usually used for two passes: a forward pass and a backward pass.By adding the outputs of the neurons in the previous layer, the net effect is calculated. The nodes in the output layers compute the sum of the output value's squared divergence from the goal value and transmit that information back to the previous layers so they can modify subsequent computations to reduce the error.

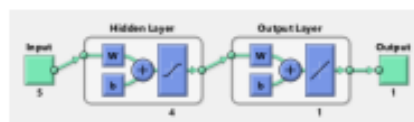


Fig. 1: ANN model

A three-layer network of interconnected basic processing units makes up the model's defining feature. An input layer is the initial layer that receives input data. An output layer is the final layer that generates output data. Among The hidden layers are the output and input layers.. There can be a concealed layer or layers. As seen in fig. 1, connections





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NETWORK-BASED CONTROL FOR NONLINEAR SYSTEM

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Abstract— The most popular technique for classifying images now is the convolutional neural network. During its training, it is crucial to adjust two factors: the learning rate and gradient. The pre-processing phases involve the fuzzy clustering approach. To change the learning rate, two Event-Based control loops called E (Exponential) and PD (Proportional Derivative)-Control are used. An exponential control loop is employed to prevent an abrupt decline in learning rate as the model gets closer to its ideal state. The learning rate is used by the proportional derivative control loop to determine when to move on to the subsequent data batch. The weight is updated using the back propagation approach based on the loss value that was determined. The proposed method improves the performance with an Accuracy of 96.8%.

Keywords—CNN, Exponential and Proportional Derivative (E/PD), Fuzzy clustering, Back propagation

I. INTRODUCTION

A well-liked machine learning approach for classifying images is the convolutional neural network (CNN). The online learning scenario that is the focus of this work involves training data that is sent in chunks throughout time. A CNN model is a type of neural network structure whose weights are learned incrementally from training data using techniques such as stochastic gradient descent. A learning rate is a parameter for SGD. Before training the neural network there is a first and crucial steps for creating a machine learning model, it is data pre-processing. The data pre-processing refers to the transformation of raw data before fed to the machine learning model. Training a CNN on raw data will probably lead to poor performance. Hence, Fuzzy clustering method is used for image pre-processing.

When training the deep neural network, it is often used to reduce learning rate as the training progress. This can be also done by using predefined learning rate methods. Depending upon the predefined schedule the learning rate is adjusted during training. Common learning rate schedules are time decay, step-decay and exponential-decay.

The first approach for adjusting learning rate to employ control theory is exponential and proportional derivative (E/PD) [1]. There are two event-based control

loops—exponential and proportional derivative control—that can be used to modify learning rate. The first control loop uses an exponential strategy to prevent an abrupt decline in learning rate as the model gets closer to its ideal state. The second control loop uses the proportional derivative method to determine when to transition to the next data batch in accordance with the rate of learning.

By increasing the learning rate, the loss value for training can be reduced but, it is time consuming. This can be minimized using Back-propagation. Back-propagation is an extensively used method for training feed forward neural network and it is used to adjust how accurately a neural network performs. This paper is evaluated using Facial Expression Recognition 2013 Dataset (FER2013) and the result is compared with existing methods.

II. LITERATURE SURVEY

There are many methods for image classification and prediction on different dataset using various machine learning algorithms. Through this literature survey some existing technique for classification are analyzed. Convolutional neural networks (CNNs) [1] are commonly used for image classification tasks. During its training, adaptation is often performed by tuning the learning rate. Usual learning rate strategies are time-based i.e., monotonously decreasing.

Zhao et al. [2] evaluate the performance on CIFAR 10 dataset using CNN. the learning rate is adjusted using exponential and proportional integral(E/PI) control which is a conditional learning strategy. And it was concluded that E/PI Control achieves an accuracy of 95%.

Zi Zhao Zhang et al. [3] presents a novel method for training CNN with text guidance and thereby recognize image irrespective of the text availability. TandemNet and Tandem Net2 are two other approaches used to achieve an interaction between visual and semantic knowledge. This method shows a leading performance on public benchmark and improvement on medical image dataset with an accuracy of 88.6%.





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Pneumonia Detection in Chest X-ray using InceptionV3 and Multi-Class Classification

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Abstract— The lung is a imperative internal organs in human physiology. The abnormality in the lung will cause severe respiratory problems. Pneumonia is a severe lung infection, and early screening and treatment are essential to heal the illness. This research aims to implement a pre-trained InceptionV3 scheme to detect pneumonia in chest X-ray pictures. This scheme consists of the following phases; (i) Image collection and resizing, (ii) Deep-features extraction using InceptionV3, (iii) Feature reduction with firefly algorithm, (iv) Multi-class classification, and (v) Validation. A four-class classifier is employed in the proposed scheme to classify the X-ray into normal, mild, moderate, and severe classes using 5-fold cross-validation. The experimental outcome of the K-Nearest Neighbor (KNN) classifier confirms that this scheme offered a classification accuracy of 85.18% on the considered image database.

Keywords—Lung abnormality, Pneumonia, X-ray, InceptionV3, KNN classifier, Validation.

I. INTRODUCTION

Recently the occurrence rates of infectious diseases are gradually rising in humankind due to various unavoidable reasons. Early detection and treatment will reduce the disease spread rate. Pneumonia is one of the infectious diseases which causes major issues in children and the elderly, and a timely diagnosis will help to cure pneumonia with appropriate medication [1-3].

In humans, pneumonia is caused by bacteria and viruses. An appropriate methodology is necessary to detect this infection's cause (bacteria/virus) to provide a suitable treatment. The clinical level screening of pneumonia consists of a recommended protocol, and the traditional method involves; (i) an Initial test by the clinics, (ii) Image supported diagnosis, (iii) Verification of the image by an experienced doctor, and confirmation of the disease and (iv) Decision making and treatment [4-6].

In hospitals, the lung infection due to pneumonia is evaluated by medical imaging modalities, such as chest radiograph (X-ray) or Computed-Tomography (CT). Due to its simplicity and reputation, still, chest radiographs are widely used in hospitals to detect pneumonia. After recording the lung infection using an X-ray, the severity of pneumonia in patients is checked by a doctor or a computerized algorithm. Personal evaluation of pneumonia is time-consuming and associated with human error. Hence, several machine learning (ML) and deep learning (DL)

methods have been proposed and implemented to detect pneumonia in X-ray pictures in recent years.

The earlier works in the literature normally execute a two-class (Normal Vs. Pneumonia) or three-class (normal Vs. Viral Pneumonia Vs. Bacterial Pneumonia) classification method [7-10]. These methods detect whether the X-ray images consist of the pneumonia traces or not. The assessment of the severity of pneumonia in a patient is necessary during the treatment planning process. Hence, in the proposed work, mild, moderate, and severe pneumonia detection is presented.

The necessary test images of this work are collected from the benchmark pneumonia database available in [11]. During this investigation, the images with the category; normal (500 images), mild (500 images), moderate (500 images), and severe (500 images) are considered for the assessment. The examination is performed using a pre-trained InceptionV3 scheme with chosen multi-class classifiers.

The experimental task is implemented using Python® on a resized image of dimension pixels, and 400 images (80% data) are considered for the training, and 100 images (20% image) are considered for the testing. The performance of the classifier is demonstrated by a 5-fold cross-validation. This study confirms that the K-Nearest Neighbour (KNN) offers better detection accuracy (85.18%) compared to other classifiers implemented in this research.

The main contribution of this research includes;

- (i) Implementation of InceptionV3 for pneumonia detection in chest X-ray.
- (ii) Pneumonia detection performance evaluation with multi-class classifiers.

The other sections are arranged as follows; Section 2 shows the earlier works on pneumonia detection, Section 3 shows the methodology, and Sections 4 and 5 demonstrate investigations results and the conclusion.

II. RELATED RESEARCH

Due to its large occurrence rate, computerized pneumonia detection using chest X-rays is widely discussed by several researchers. These works confirm that the pre-trained and customary DL scheme-based pneumonia detection provides better accuracy than other techniques. This section presents





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UNet with Two-Fold Training for Effective Segmentation of Lung Section in Chest X-Ray

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Abstract— Segmentation and evaluation of the Region of Interest (ROI) in medical imaging is a prime task for disease screening and decision-making. Due to accuracy, Convolutional-Neural-Network (CNN) based ROI segmentation has been widely employed in recent years to evaluate a class of medical images recorded using chosen modality. The proposed work aims to demonstrate the segmentation performance of the UNet scheme with a one-fold and two-fold training process. To experimentally verify the merit of the proposed scheme, segmentation of the lung section from the chest X-ray is studied. This research includes the following parts: (i) Resizing the test image and image mask to pixels, (ii) Training the UNet with one-fold and two-fold approaches, (iii) Extracting the ROI, (iv) Comparing the ROI with the mask to compute the image metrics and (v) Validating and confirming the segmentation performance of UNet. The performance of UNet is then verified with UNet+ and UNet++. The investigational ending substantiates that the proposed approach helps to get better Jaccard (>95%), Dice (>97%), and Accuracy (>98%) in two-fold training compared to other methods considered in this study.

Keywords—Chest X-ray, Lung segmentation, UNet, Two-fold training, Validation.

I. INTRODUCTION

The computerized disease examination is widely employed in modern and multi-specialty hospitals to support timely and accurate disease detection using much patient information, such as bio-signals, bio-images, and electronic health records [1,2].

Most infectious and acute diseases in humankind are commonly examined using several clinical methods. Bio-imaging is one of the techniques widely considered to detect the disease in internal and external organs. Appropriate detection of the disease and its severity plays a vital role in decision making and treatment. Hence, many bio-image examination procedures are proposed and implemented to examine the images recorded using a Gray/RGB scale with various dimensions. The common image examination methods include: (i) Segmentation of the Region of Interest (ROI) [3-5] and (ii) Classification [6-8].

Extraction of the ROI is essential to extract and evaluate the suspicious section in the bio-image to detect the disease's location and severity. The ROI extraction is implemented using manual operator, traditional methods, and

Convolutional-Neural-Network (CNN) schemes in the literature. The earlier works in the literature confirm that the CNN-based methods help achieve accurate and automatic segmentation of the ROI compared to the alternatives. Hence, several CNN schemes are proposed and implemented to evaluate various medical images [9-12].

UNet is one of the CNN schemes proposed by Ronneberger et al. (2015) to find the possible solution for the ISBI2015 challenge database [13]. This work was initially implemented to solve the cell tracking challenge problem using the image frame with a chosen dimension of pixels and achieved a superior result compared to other approaches. Due to its merit, UNet is widely adopted by researchers to solve various image segmentation problems. Further, in recent years, along with the traditional UNet, its enhancements, such as UNet+, UNet++, VGG-UNet, and ResNet, are also available to provide a solution for a chosen image segmentation problem [14,15].

Even though the CNN scheme helps get a superior result for a chosen problem, it needs to be trained for the ned dataset, which is to be examined. The training time for a CNN depends on the number of epochs that we assign to learn and the workstation configuration in which we implement the CNN scheme using a chosen software tool. Changing the workstation for a specific application leads to a higher initial cost. Further, reducing the number of epochs to reduce the training time may lead to poor training. To overcome these issues, the proposed work demonstrated a two-fold training scheme to increase the performance of the pre-trained UNet scheme for a chosen image segmentation problem. The experimental outcome of this scheme confirms that the two-fold training with lesser iteration improves the overall result of the UNet scheme.

This work considered the chest X-ray dataset provided by Rahman et al. (2020) [16] to demonstrate the proposed technique. This dataset consists the pixel-sized X-ray images along with their binary mask. In the proposed work, 300 numbers of images are considered for the examination. The segmentation performance of the unit is verified with a one-fold and two-fold training process. The segmented lung section is compared with its mask. The necessary image metrics, such as Jaccard, Dice, and accuracy, are computed. Based on these values, the merit of the proposed scheme is confirmed. Further, the result of UNet is compared with UNet+ and UNet++, and the performance is validated.





Customer Evaluation And Profit Maximization Using Machine Learning for Offline Stores

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Abstract—Proper planning is essential for a long-term business. This can be done by implementing proper marketing strategies from time to time. Machine learning can play a key role in decision-making. Machine learning can play a key role in decision-making. This paper proposes a systematic approach which can help offline stores target their customers and obtain maximum profit by using the clustering application of machine learning. It helps offline stores get the benefits of the latest technologies in their business. The initial step for this system is to analyse the acquired sales data based on the purchase history, which will be used to group the customers. K-Means clustering is used to segment customers. Later, the most preferred product of each cluster is determined, and the result of this can be used by the shopkeepers to analyse their business and make good decisions for the long life of the business. It can assist offline stores in finding different groups of customers rather than viewing the entire customer as a single unit.

Index Terms—Data Mining, Customer Relationship Management, K-Means.

I. INTRODUCTION

Customer relationship management (CRM) [5] is a marketing approach that allows a store to learn about its customers' behaviour and wants to build a strong relationship and customer loyalty. It can help in increasing the sales and profit of the store. Advancements in technology can facilitate the above-mentioned objectives successfully and more efficiently. Stores may recognise their important customers and anticipate their future actions and their favourite items by using data mining and extraction of hidden patterns of client purchases from massive databases. This paper aims to use such technologies to improve the business of offline stores. This can help the stores make good decisions. The two intelligent components of Customer Relationship Management are customer clustering and buyer targeting. In this paper, it proposes an approach that can help offline stores cluster customers according to their purchase behaviour and find out the best-selling product in each group. It can help the stores analyse their customers and their needs. The stores can get an idea about the products their customers prefer and provide those products with high quality to satisfy them.

This system proposes an approach that helps the stores group the customers according to their behaviour and other patterns to enhance the existing marketing model.

II. GENERAL BACKGROUND

Machine learning is a branch of artificial intelligence that focuses on using data and algorithms to copy how humans learn and eventually improve accuracy. It can assist the system in automatically improving through experience and the utilisation of data. Nowadays, it is used for a variety of applications such as security, predictions, agriculture, engineering, etc.

Supervised learning, unsupervised learning, and reinforcement learning are the three types of machine learning. In supervised learning, models are trained using a labelled dataset where the model learns about each category of input [1]. The model is tested on test data when the training process is completed, and it then predicts the output. An optimal scenario will allow the algorithm to correctly identify the class labels for unseen instances.

In Unsupervised learning is an algorithm that learns patterns from untagged data. It is the process of deducing underlying patterns of interest from historical data. A machine learning model can try to detect any similarities, differences, patterns, or structure in data on its own using this approach. No prior human intervention is needed. Some examples of unsupervised learning algorithms include K-Means Clustering, Principal Component Analysis, and Hierarchical Clustering.

In Reinforcement Learning, it enables the agent to learn from the result of actions in a specific environment. It provides data analysis feedback that directs the user to the best result. One of the common applications of this is in teaching a robot new tricks, making recommendations on YouTube, etc.

III. LITERATURE SURVEY

The proposed method in [1] is about segmenting customers who have similar behaviours into similar segments and customers who have different patterns into different segments. This paper describes different clustering algorithms (k-Means, agglomerative, and meanshift) which can be implemented to segment the customers and finally compare the results of clusters obtained from the algorithms.

Murugeswari R. and Ramasakthi G. relate the process of classifying a small text piece into positive, negative, or neutral [2]. The process of sentiment analysis is carried out by performing a step-by-step process. First, the dataset is collected. Then, the dataset is loaded, and preprocessing is done. After that, the data is split. Then, the data is trained on the model. Finally, it categorises the comments as positive,





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PEER TO PEER LENDING: RISK PREDICTION USING MACHINE LEARNING ON AN IMBALANCED DATASET

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Abstract—Peer-to-Peer lending is to eliminate or take away the mediator such as banks or financial institutions. For a small-scale business firm or several individuals without adequate financial status or financial history, the best approach for loan application is Peer to Peer lending (P2P lending). The key issue on the lending of Peer to Peer is data imbalance in this system. It does not accurately evaluate the default risk of P2P lending. Lenders can fund the loan for borrowers only by the data prepared by borrowers. It will lead to unbalanced default loans and non-default loans. Unbalanced datasets are relatively ordinary in the real life. The usual machine learning schemes are not friendly with the imbalanced data. Systems without any flexible methods would be the center of attention in learning the normal repayment. Machine learning algorithm tends to bias the majority classes. The property of the minority or smaller class is important in the loaning business. For the default risk prediction of P2P lending and re-sampling to process imbalanced datasets, several machine learning schemes are present. In this paper, various machine learning methods are compared in terms of random under sampling, random oversampling and SMOTE. It is observed that random under-sampling shows greater performance in terms of accuracy for default risk prediction.

Index Terms—P2P lending, machine learning, Random Forest Classifier, Decision Tree, Logistic Regression, Smote, imbalanced dataset.

I. INTRODUCTION

Recently, Peer-to-Peer (P2P) lending has advanced quickly in the world. Peer-to-Peer is a technique to acquire credit without a money related firm included such as banks and to acquire preferable than in the conventional system of banking [1]. P2P lending also produces a platform for an online face-to-face connection for lenders and borrowers without intermediaries. To remove the brick and mortar working cost, lending peer to peer can deliver reduced rates of interest for borrowers compared to that of banks and more benefits for lenders. So, for some individuals with no or enough financial history, lending peer to peer is an alternative method for small-scale businesses. Information asymmetry becomes a primitive

drawback of Peer-to-Peer lending because lenders know only the information of loan that is supplied by borrowers [1].

In the actual world, there exist many imbalanced datasets like medical diagnosis, risk management, and fraud detection. So, it is tough to produce a prediction on an imbalanced dataset because the classifiers are susceptible to finding the majority or larger class instead of the minority or smaller class. So, the classification outcome will be biased. Machine learning algorithm tends to bias the majority classes. Therefore, problem addressing in the imbalanced dataset classification is highly important. Generally, P2P lending has imbalanced datasets because fully paid and non-paid loans are non-uniform. The proportion of default and non-default loans is distinct. The majority class is more huge than the opposition (minority class).

The paper studies under sampling and over sampling techniques for handling the imbalanced datasets. Therefore, some machine learning techniques like decision tree, logistic regression and random forest for predicting Peer to Peer lending default risk, are applied.

II. LITERATURE SURVEY

A discussion on existing methods is given in this section. Yen-Ru Chen et al [1] and Gudipati Thanuja [2] discuss the past of peer to peer lending. The authors investigate the positives and negatives of P2P lending and describe how and why peer-to-peer lending works and describe the dissimilarity between the conventional system of banking and Peer to Peer lending. They list a few advantages of P2P lending. But P2P lending has a primary complication because of the imbalanced dataset. The system employs many machine learning algorithms like Neural Network, Logistic Regression and Random Forest to see the default risk of peer-to-peer lending and uses cost-sensitive mechanisms and re-sampling techniques for processing datasets that are imbalanced. In this study, Random under-sampling has shown better performance among different classifiers. After doing preprocessing and selecting features,





PEER TRACKING AND COLLISION FREE NAVIGATION FOR VISUALLY IMPAIRED

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Abstract—In the indoor space, the chances of a visually impaired person (VIP) getting lost on their way to their destination are very high. Unable to detect the terrain and surrounding environment, it makes it difficult for visually impaired people to move independently. Since the Global Positioning System (GPS) does not work well in the indoor environment and the existing indoor navigation systems are not very accurate, blind people find it difficult to locate and meet their peers without assistance. It is very difficult for them, as well as their family members or peers, to locate and get them back to the destination. Different connectivity technologies such as RFID (Radio Frequency Identification), ZigBee, or Bluetooth are deployed in real-life scenarios, but most of these technologies have limitations in terms of reliability, coverage, and implementation cost. Hence, this paper aims to implement a system that will help blind people in peer tracking and enable them to navigate in the indoor space with voice assistance to reach the desired location. The system includes a feature that detects and warns of any obstacles found in the desired path. Implementation of an effective indoor navigation system will turn out to be a visionary service for the disabled community.

Index Terms—Wi-Fi, Tensorflow API, SSD, MQTT protocol.

I. INTRODUCTION

Blind humans do lead an ordinary life with their very personal style of doing things. They do, however, face challenges due to inaccessible infrastructure and socially irritating conditions. According to the World Health Organization (WHO), 285 million humans are predicted to be visually impaired worldwide; 39 million are blind and 246 have low vision [7]. Whether it occurred by chance or as a result of the effects of a disease, this physical impairment has profound effects on day-to-day life-sustaining activities. As a matter of fact, motion is significantly restrained. Moreover, visually impaired people can also lose orientation and function at a higher risk of falling. But, humans need to move, whether at home or at work or at leisure. We have assembled a world that serves the majority. Any person who is not average has to deal with a slew of issues because they are no longer considered average. Indoor navigation in a complex environment can be very vital for blind humans to move independently and securely. Among activities affected by vision impairment, navigation plays an

important role, as it lets the person move independently and safely. Independent navigation in new environments, where the chances of getting lost are high, is a difficult task for visually impaired people. In comparison to the outdoors, visiting inner public regions is a different story, because many signals pertaining to the indoor environment have their own complexities and cannot be used. When visiting indoors, most of the outdoor irritating conditions are not present, but head-level and trip accidents, or may be movable devices, are to be considered [2]. To promote the tracking, navigation, and creation of better technology for visually impaired people, it is vital to understand the facts and actual troubles that they face and what behaviours and strategies they use to overcome these troubles.

One of the most famous positioning technologies is the Global Positioning System (GPS) [3], which fits very well within the outdoor environment and facilitates different types of applications, which include mobile phones, vehicle navigation, ships, planes, and so on. However, it is unsuccessful within the indoor environment as it requires a line of sight transmitter and receiver, and this is considered the number one venture for this technology within the indoor environment (non-line of sight) [3], [4]. Indoor area technology is applied in various types of commercial, naval, and public safety applications [3]. Nonetheless, current systems suffer from inconvenient conditions in terms of accuracy, real-time, low charge, and reliability [1]. The inaccuracy is due to the indoor environment elements like barriers, which, on the side of humans, walls, and fixtures, have a massive impact on the signal strength. This necessitates the need for a device that might provide peer tracking and navigation with obstacle detection. The proposed device, if implemented, will prove to be a promising one, helping the visually impaired experience and enjoy independence.

II. RELATED WORK

K. Chaccour and G. Badr discuss a computer vision guidance algorithm [1]. Obstacle detection is provided and it assists the user in reaching his destination. A mobile





A Review on Breast Imaging Modalities based on Technical Aspects

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Abstract - Most common invasive cancer in female is Breast cancer and rarely, it will be affected in men also. From the several studies found that the second leading cause of cancer death is breast cancer in women after lung cancer. The Breast cancer occurs when the cells in the breast grow and divide that cell in an uncontrolled way. Due to this cell creating a mass of tissue in the breast itself is called tumor or mass. Signs of breast cancer are seeing changes of skin on a breast, feeling a lump in a breast and size change of breast etc. If the breast cancer/ mass detected at the early stage or at initial stage, then the survival rate of patient will be improved. In this review, several modalities have been introduced to detect the breast cancer. Furthermore some of the output parameters of these modalities have been investigated. Based on various imaging modalities, were selected around 40 articles by using search engines. And studied the selected papers thoroughly and categorize the results based on modalities which have been used. The used Breast cancer imaging techniques are Mammography, Ultrasound, CT scan, MRI and PET scan etc. The modality selection has been completely depends on the patient's like current state of cancer tissue and density, age of the patient etc.

Keywords: Breast cancer, Mammography, Ultrasound, MRI, CTscan, Tomography

I. INTRODUCTION

The breast cancer becomes one of the major health challenges in society. It is a common type of cancer malignancy in between women and it also been linked to other type of cancers like Lung, Colon and brain cancer etc [1,2]. Early stage detection and diagnosis of any cancers help to reduce the mortality rate of patients and improve their quality of life also but the rate of early stage detection is very less in our medical field. Because of the field of detection has not been adequate medical recourses and lack of timely diagnosis of patient's malignancy [3].

Breast cancer is the second leading cancer in human society but it has leading one in women only and it cause of death after lung cancer [5]. About one by eighth of women in the world suffer from breast cancer [6].

The spreading and mortality rates of patients have been increased in However, mortality rate of breast cancer patients in some countries has been decreased because the most attributable efficient systemic therapy availability to early detection of Breast cancer [1, 7].

Micro calcifications in breast tissues are the major key indicator suggested by the radiologist in early stage detection of breast cancer [8]. The small calcium deposition in the women breast tissues is called Micro calcification. These are very usual and are mostly it's considered as a benign (noncancerous). In some cases, certain type's calcifications of breast may leads to early breast cancer suggested by radiologist. Mainly two types of breast calcifications are: macro and micro. Macro calcifications seem like as a large white dot in a breast image and are spread out randomly inside the breast itself. Macro calcifications are common calcium deposition and found in approximately half of women age of 50 above, and one by tenth of women below age of 50 are considered as noncancerous cell. Micro calcifications are small amount of calcium deposition in breast that looks like white spots in a breast image. These calcium depositions are (Micro calcifications) not usually the result of cancer [9]. But if appear in certain patterns and are clustered together in the breast, it may be the sign of pre-cancerous cells or early breast cancer [9]. American Cancer Society has some set of guidelines for the detection of breast cancer in women aged 40 and above, which include a Clinical Breast Examination (CBE), and an optional self- breast examination (SBE) [10]. Details of traditional breast cancer screening and traditional breast cancer detection methods are described in the "Different modalities which is used to breast cancer detection" section.

II. BREAST CANCER STAGES

The breast cancer is staging based on spreading rate or severity of the same and size of the tumor is also considered. And the main parameter is depends on the spreading rate to lymph nodes.





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SMS BASED REMOTE MOBILE PHONE DATA ACCESS SYSTEM

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Abstract—Presently cellphone and other cellular gadgets have emerged as one of the inevitable component in every aspect of our existence. Mobile phones are an effective communication tool that can make life easier. It allows to send and receive messages, connect with people in any part of the world with high reliability and security. Mobile tool safety is an essential element that secures all of the sensitive information of the consumer stored on the device. The proposed system, SMS Based Remote Mobile Phone Data Access System allows the user to perform major operations without using internet, with high security. The venture aims to develop a cell protection machine as a way to allow consumer to perform various operations such as, obtain contact details from mobile device for remote user, change the profile, track the location and lock the mobile phone via SMS.

Index Terms—SMS, offline, access, location, lost mobile

I. INTRODUCTION

Today, the role of mobile phone in one's daily life is massive. The importance of smartphones in human's daily life is inevitable. Smartphones are very important as most of our important duties depend on our phones. It stores all of the necessary and touchy information of the user, which the user does not want to be accessed by someone else, which may sometimes result in misuse of those data in several ways. The proposed gadget SMS Based Remote Mobile Phone Access System provides cell tool users with a spread of security functions that assist to defend the mobile tool from being hijacked and also act as a person assistant, in any troubles they'll face in their each day existence. This project pursuits to improve the mobile safety device a good way to allow the user to get admission to his cell device from any other tool through SMS which may be used to get entry to contact facts from the consumer's cell telephone remotely, help to locate the cellphone by growing quantity and playing tone, tune current smartphone region and lock the cell tool.

Consider a situation, where the user forget his phone at house and he wants to make an urgent call to someone whose mobile number is not known, but saved as a contact in his

phone. In such a situation, the system allows to access the contact details by sending an SMS to the user's mobile from any other mobile using the specified message format and the details will be received as a reply through SMS. Similarly, the application offers functionalities such as, to change the profile of mobile phone from silent to general. It also helps to lock the mobile and track the location of the phone if it is misplaced somewhere by sending SMS without the need of internet.

II. LITERATURE SURVEY

Mokar, Mohamed Abdalla and Fageeri, Sallam Osman and Fattoh, Saif Eldin [1] proposed a new framework that may be used by any utility programmer to apply it for managing cellular utility through the use of FCM technology which stands for Firebase Cloud Messaging, that's assisted through Google. It's far a completely effective technology in sending notification to cellular application via information messages that may be used to change the conduct of cell packages that set up on clever device. The machine is planned to cope with a couple of Firebase utility on the same time and ship information messages that designed with the aid of the programmer both with the aid of growing those facts manually or to get this information from every other surroundings. This device turned into designed to store the facts of the packages that want to get control and the information messages can be saved within the system database. The proposed machine is operating as rest client to ship statistics that contains JSON layout with key-value pairs, that is created inside the device itself or through the usage of current record messages from databases so that his messages may be send to specific application and it is viable to ship this facts messages and statistics to a specific character or particular organization of users inside the identical institution using subscribe subject matter or all clients of the cell app. The device is designed for the use of generation of Dot internet, internet carrier, Firebase Cloud Messaging and square server database that are used





A NOVEL FAKE NEWS DETECTION APPROACH USING MACHINE LEARNING

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Abstract—The largest number of smartphone users choose to check statistics through social networks over the Internet. Social media websites post facts and provide certifications. This question may relate to the credibility of knowledge and articles distributed on social networks such as WhatsApp, Facebook pages, Twitter, and various microblogs and social networking sites. It is very dangerous for society to simply accept rumors and false information as truth. An hour's need is to prevent gossip, especially within developing countries such as India, and to prevent interest in relevant and credible news articles. This article will show you the versions and how to detect fake news accordingly. We used machine learning and natural language processing to gather news and tried to use Vector's support engine to determine if the news was real or fake. The proposed options is compared with the existing model. The proposed version works correctly and determines accuracy with up to 93.6% accuracy.

Index Terms—Authentication, Fake news detection, Support vector machine, Natural language processing.

I. INTRODUCTION

Sometimes anyone can publish content online. Unfortunately, fake information is getting a lot of attention on the internet, especially online media. People get lost and don't review previous streams of such misleading articles in the most remote parts of the community. This type of activity does not seem appropriate in a society where any rumors or incomprehensible information evaporate the fearful thoughts of many relatives or certain classes of people. Time goes by so quickly, so you need to take precautions if you want to work out at the same pace. Massive communication takes a lot of effort to reach the majority, and it's commonplace, so there are people who take advantage of it. There are various websites that offer fake items. They intentionally disguise real news to distribute useful advertisements, deceptions and lies. Their main role is to manage the facts that can give her friendly trust. There are many examples of such sites across the entire sector. So fake news affects people's brains. As the scientist points out, some artificial calculations of brain power can help uncover unrealistic news.

Disinformation detection is designed to prevent rumors that can spread to many platforms such as social media or messaging systems. We will appear during this mission. We

constantly see numerous news articles about mafia lynchings that eventually kill people.

Fake news detection ambitions to come across fake news and save you acts that promote violence [1]. The primary goal is to look at fake information, which can be a conventional easy sentence word problem. Consequently, we need a version to distinguish among 'real' information and 'faux' information. This influences social networking web sites like facebook and Instagram, microblogging websites like Twitter and immediate messaging packages like WhatsApp and Hike, which unfold this fake information to humans. The proposed device facilitates to find the credibility of the news. If the records isn't always actual, the purchaser usually recommends relevant news.

II. RELATED WORK

A. WELFake: Word Embedding Over Linguistic Features for Fake News Detection

Social media is a way to keep up with the latest news from around the world. A sharp increase in number or quantity is one of the reasons for fame. A wide variety of users of specific age, gender and social beliefs engage with social networking website [12]. Despite these favorable factors, the biggest downside is fake news. Because people tend to study and correlate facts without caring about the source of the truth. To address these issues, this article proposes a model called WELFake, which is based entirely on syntax embeddings (WE), rather than linguistic features for false information detection using machine learning classes mass media [13].

In the first stage, a set of statistical data is preprocessed and language skills are used to verify the reliability of the informational material. The second section combines units of linguistic features with WE and applies voting categories. [14]. To test this technique, the text also painstakingly develops a single WELFake statistic set of approximately 72,000 articles containing specific units of record to generate unbiased class inferences. As a result of the experiment, the WELFake version classifies news into real news and imaginary form by 90.73%, 1.31% improvement in overall accuracy compared to bidirectional encoder encoder (BERT) representation and using convolutional neural networks (4.25% in convolutional neural networks). It happened CNN) model. Their model,



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AN EXPLORATION ON PLANT DISEASE DETECTION

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Abstract - Plant diseases cause significant losses in agricultural productivity, economics, quality, and quantity. To avoid such diseases, plants must be observed from the beginning of their life cycle. Human eye observation is the most common method for this monitoring, but it is time-consuming and demands a high level of competence. As a result, in order to make this operation easier, the disease detection system must be automated. Image processing techniques are used to construct the disease detection system. Many researchers have designed systems depending on multiple image processing approaches. This research examines the possibility of methodologies for detecting plant disease detection systems that contribute in agricultural improvement. It consists of several processes,such as image acquisition, image segmentation, feature extraction, and classification

Keywords— Image processing, Detection, Identification of plant leaf diseases, feature extraction

I. INTRODUCTION

Agriculture is the backbone of every economy on the planet. Crop production is one of the most important variables influencing domestic market conditions in every country. [1]Agriculture has been a part of everyone's life, either directly or indirectly.It is the method of crop production that results in the provision of food, which is the foundation of every human being. Whether a person lives in a city or a countryside, everyone relies on agricultural production in some manner. With the emergence of civilization, mankind began producing crops such as wheat, cotton, and others. Crop production involves monitoring all operations to maximise output across all seasons. It involves a thorough examination of the soil, the seeds used, the key nutritional requirements of the crop, and several other factors. Yields from crops and other sources are being used to fulfil the everyday demands of not only farmers, but also others. However, as with any industry, agriculture or crop production has significant challenges in the form of crop diseases. [2]With such a high demand for food all around the world, crop production must be prioritised. Its goal is to preserve the total yield without loss before it reaches the market. Apart from natural disasters such as draughts and earthquakes, diseases are also responsible for significant crop output losses.

Crop diseases are mostly caused by infections such insect pests, bacteria, fungi, and viruses.[3]These diseases were identified and have the potential to spread throughout the plant, such as the stem, vegetables, and fruits, and can be

discovered by recognizing the afflicted region,obtaining the contaminated area's feature set, diagnosing and categorising diseases.

The purpose of this research is to assess and analyse several plant disease detection methods in terms of various factors. Several studies have been conducted in the literature for leaf diagnosis as well. The image is collected, preprocessed, and noise-free during the disease detection procedure.The image is then segmented, then feature extraction and classification are performed. Plant diseases are distinguished by the colour, texture, or structure of their leaves. This technique is primarily concerned with pixel numbering schemes based on RGB properties. Genetic algorithms, K-means, HSV, ANN, CCM, RBE, Neutral networks, and other studies have been published in peer-reviewed journals. The afflicted region's parameters are identified, disease leaves are discovered, the affected area is quantified, and so on. The detection and diagnosis of leaf diseases is made more efficient by applying computer-based digital image analysis, which has a better capability. The following paper provides a quick overview of image processing techniques

II. LITERATURE SURVEY

Sachin D. Khirade et al [4] describes plant disease diagnosis is crucial for lowering agricultural productivity and quantity losses.It is necessary a significant amount of labour, in addition expertise in plant diseases and an extended responsetime.Image processing is employed in plant disease detection.Image segmentation,image acquisition,image preprocessing,feature extraction,classification are all processes in the disease detection process. Several approaches for segmenting the plant's disease area were explored in this study. The precise detection and categorization of plant diseases is crucial for crop production performance, and image processing can help with this.Extracting the properties of diseased leaves and to categorise plant diseases, feature extraction and classification techniques are applied. The application of ANN approaches, such as self-organizing feature maps, back propagation algorithms, SVMs, and others, for disease classification in plants.Using image processing tools, we can accurately detect and categorise a wide range of plant diseases.





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The Mediation Effect of Technology Anxiety and Barriers on Technology Exposure to Teachers' Technology Adoption

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Abstract—The millennium generation is earmarked with their innate affinity for the technology systems and is fostering swift technology-based development throughout the globe. The Covid pandemic has greatly accelerated technology implementation, especially in the education systems. However, the Technology Anxiety and the attitudinal Technology Barriers of the educators impeded the Technology Adoption process even during the virtual education days. This descriptive research is conducted with 851 random sample responses from the teachers. The study identified that the teachers' Technology Anxiety and attitudinal barriers have a significant mediatory effect on their Technology Exposure to Technology Adoption. Gender and other demographic factors have little influence on the mediation. Teachers' attitudinal barriers negatively influenced their Technology Adoption

Keywords— *technology adoption, technology barriers, exposure, technology anxiety, higher order of thinking skills*

I. INTRODUCTION

The technology integration in the teaching-learning process was rather a snailish process due to the multiple factors. The earlier studies affirmed that educators were experiencing multiple technology assimilations issues denoted as the first order barriers due to the lack of access to the quality technology systems and interrupted data connectivity. The more crucial was the second-order Technology Barriers which were manifested through the psychological disposition of the educators related to their repugnance to the technology-based learning process and reluctance to the effective utilization of the available technology systems [1], [2]. The first order Technology Barriers were considerably reduced due to the availability of affordable digital peripherals and the considerable institutional investment towards the up-gradation of the technology systems in the post-millennium period. The extent of the Technology Exposure of the teachers considerably increased due to the implementation of the digital learning systems in education [2]. The covid pandemic rapidly fuelled the exponential growth of the technology-based learning systems and the learning process almost brusquely became virtual throughout the globe. The subsistence of this

Technology Adoption process after the covid pandemic depends on the extent of Technology Adoption of the educators [16], [18]. This temporary adoption process needs to be fostered by reducing the Technology Anxiety and barriers of the teachers. This research analyses the mediating influence of the Technology Anxiety and barriers of Teachers concerning their Technology Exposure to the Technology Adoption Process.

II. TECHNOLOGY ANXIETY AND TECHNOLOGY BARRIERS

The millennium learners are denoted by their techno-savvy kinship toward the technology-integrated learning process. The technology affinity of the pre-millennium generation is rather governed by their technology immigrant nature and their technology inhibiting factors are to be addressed properly. The Technology Anxiety of the premillennial educators towards the complex educational learning systems and subsequent evaluation processes reduces their Technology Adoption levels [1]. Regular Technology Exposure to the systems of learning and the supporting facilities can reduce their Technology Anxiety. The user-friendly customization of the technology systems, inbuilt user support tips, on-call support for troubleshooting, inbuilt facilities for technology learning, and regular learning support through peers can reduce the Technology Anxiety [1], [14], [16]. The atychiphobia (fear of failure) in technology use in front of peers and students is inducing anxiety in the educators. Solving the periphery management with data connectivity issues and incompatible time schedules are other reasons for the anxiety [12]. Technology Anxiety reduces the Technology Adoption process and increases the secondary or mental Technology Barriers which in turn inhibits their Technology Adoption [1], [5]. The primary Technology Barriers were considerably reduced due to the availability of the quality ICT infrastructure at the education institutes in the post-millennium period and the availability of an affordable array of gadgets in the digital market partially eliminated the primary barriers even in developing countries. The secondary Technology Barriers are caused due to the belief and attitudinal factors related to the





A Comparative Analysis on Deep Learning Techniques for Skin Cancer Detection

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Abstract—Melanoma is one of the most dangerous types of skin cancer, which can cause sudden death. Melanoma needs to be detected early so that proper treatment can be provided, increasing the patient's survival rate. The traditional way of identifying melanoma is through physical examination, biopsy tests. However, the lab results may take some time. So, with the help of a computer-aided diagnosis, the entire process can be made faster. Here comes the advantage of introducing deep learning in the field of skin cancer detection. As we all know, deep learning is popular worldwide and used in many detection and classification tasks. With the help of these advancing deep learning techniques, we can detect these deadly forms of cancer. In this paper, an analysis is made by comparing the performances of different deep learning methods recently used by many researchers for skin cancer detection and skin segmentation task. And a possible research direction is provided at the end of this paper.

Index Terms—Deep learning Techniques, Skin Cancer Detection, Melanoma, Classification

I. INTRODUCTION

Skin cancers are tumors that start in the skin and spread to other parts of the body. They occur as a result of the growth of abnormal cells with the ability to expand [1]. UV ray radiation, a weaker immune system, a genetic history of cancer, and other factors may all play a role in cancer development for an individual. Basal-cell skin cancer (BCC), Squamous-cell skin cancer (SCC), and Melanoma are the three most popular skin cancer forms. Among these types, Melanoma is the most serious one, and it will regrow even after it has removed [2]. Seventy-six thousand two hundred fifty different invasive melanoma cases were reported in the USA in 2012, and around 9,180 patients died due to this deadly cancer [3]. Early detection of melanoma is critical because it provides better surgery and increases the chance of survival [4]. To recognize and treat melanoma in its early stages, a suitable melanoma detection mechanism is required. Melanoma is usually detected and diagnosed using clinical analysis and biopsy testing. Dermatologists use a dermatoscope to perform clinical examination, an optical device like a microscope that magnifies and enhances the view of human skin. Melanoma is discovered through a visual inspection in this case. A dermatologist's microscopic assessment is based on the traditional method as ABCD criteria, followed over many years by dermatologists and others [5].

The input skin lesion image is defined by the ABCD rule, categorized into four attributes: asymmetry, border irregularity, color, and diameter. Using these criteria the input skin image is classified into melanoma or non-melanoma type [6]–[8]. The four attributes are listed below as:

- **Asymmetry:** Asymmetry is one of the most significant characteristics that will help determine whether a tumor is benign (not cancer) or malignant (cancer). The fundamental theory behind asymmetry is to divide the picture into two equal sections and measure them to determine whether or not the tumor is benign. It is benign if the two components are identical. Otherwise, it is treated as melanoma.
- **Border:** For melanoma affected skin the boundary or border seems to be irregular in shape.
- **Color:** The color of a cancerous skin lesion is not uniform. It is enough to detect the existence of up to six different colors. And for non cancerous benign moles there may have different shades of brown color.
- **Diameter:** Cancerous lesions or melanoma are found to be 6 mm wide and more in size. So, detecting the diameter value give inference about melanoma presence in that area.

Using this ABCD rule, the dermatologist can detect melanoma from the individual's physical examination. For melanoma diagnosis, another approach known as the A7-point Checklist is used. The atypical color network, grey-blue areas, atypical vascular shape, bands, blemishes, irregular dots and blobs, and regression models are covered in this A7-point list. Whenever these signs are discovered, a medical practitioner is contacted [9].

Another traditional method for identifying skin cancer is by conducting a biopsy test. Suppose the doctor or dermatologist suspects a lesion region as skin cancer. In that case, that area or a small portion of the skin tissue will be cut out and sent to a laboratory for further detailed analysis. [10]. Melanoma's complex structure and composition make it impossible to distinguish handcrafted characteristics based on the cancer cell's nature, colour, texture, shape etc [9]. And for the biopsy test-based examination, it takes a long time processing to get the final results which will delay the early



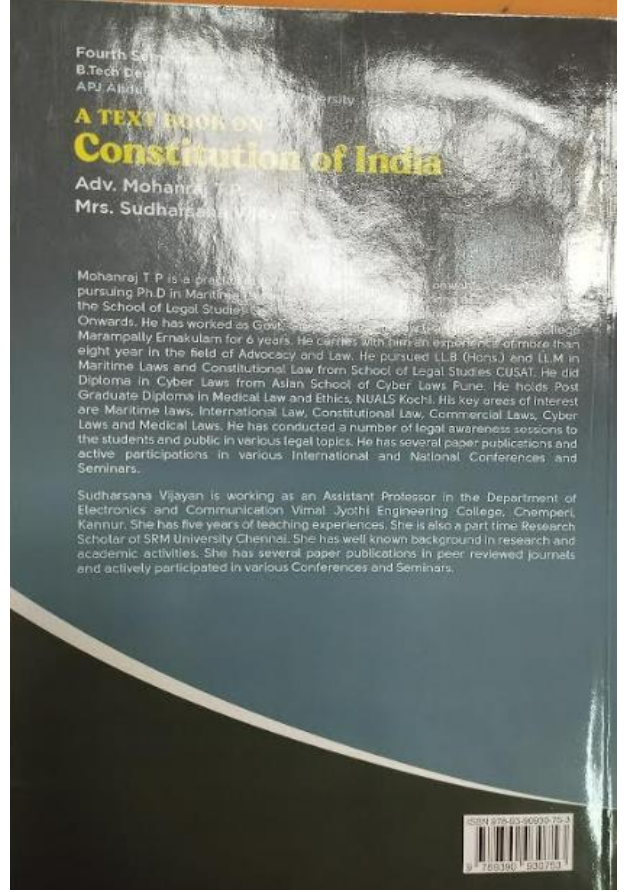
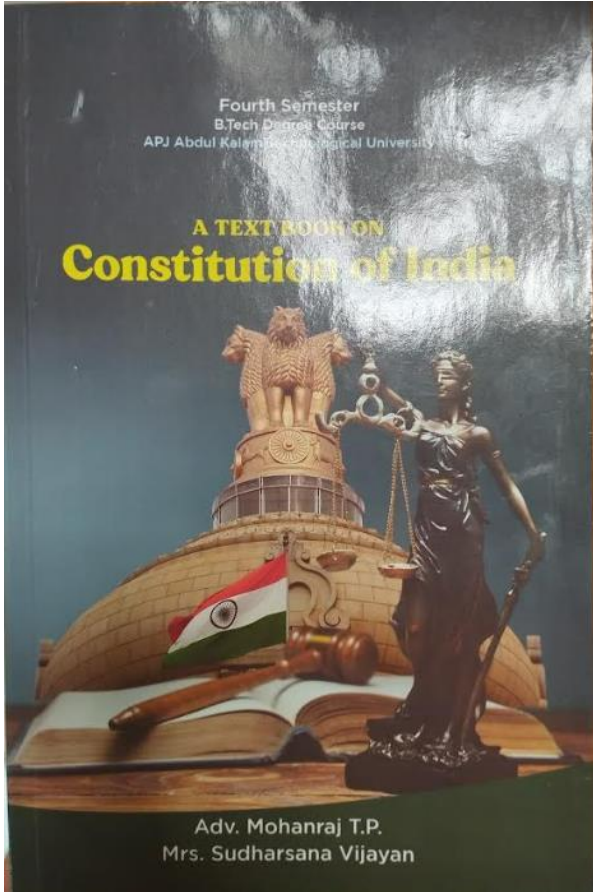
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Fuzzy Based Hybrid Control Topology for Fuel Cell and Battery Powered EV

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Abstract—The green energy revolution showcases the potential of hydrogen-powered vehicles. Moreover, hybrid energy sources are replacing the conventional energy supply system of the electric vehicle. In this context, this paper presents a fuel cell and battery-powered hybrid vehicle topology. The paper describes the mathematical modelling of a fuel cell-powered hybrid EV power train. Since a fuel cell is an energy supplier only, it requires secondary storage, like a battery. The battery can store energy during regenerative operation. A practical drive cycle generally involves uncertainty in the driving pattern on various roadways. Uncertainty in the drive cycle needs an adaptive control strategy for the performance improvement of EVs. A fuzzy logic-based control algorithm for effective utilization of energy storage units is developed. The result shows that the proposed fuzzy control is effective in the city drive cycle, which has the characteristics of frequent starting, stopping and acceleration. The potency of the proposed control strategy is validated with a case study using a modified drive cycle considering the driving pattern of Trivandrum, Kerala. The result shows that the fuzzy-based control strategy results in a significant improvement in driving range.

Index Terms—Electric Vehicle, fuel cell, super capacitor, drive cycle, state of charge, fuzzy logic

I. INTRODUCTION

Fuel Cell powered Electric Vehicles are one of the promising forms of vehicles in the upcoming future of transportation sector due to its features like long driving range, high energy efficiency, and zero emission, it does not run down or needs recharging. Fuel cells can produce electricity and heat as long the fuel is supplied. It is an energy supplier not an energy storing device. So, fuel cells always need secondary storage like a battery for regenerative energy storage and assisting the vehicle operation in the needy time. Hence fuel cell-powered vehicles are always hybrid. The use of fuel cells or hydrogen powered vehicles reduces the dependency on fossil fuels and contributes to the green energy revolution.

The green energy revolution is going on. Governing bodies of various nations support green energy sources for transportation sector. Government of India has also taken several initiatives to support the progress of hydrogen powered vehicles. The government of India Ministry of Power, on 17th February 2022, released a policy on green hydrogen and green ammonia.

Hydrogen and ammonia are the future fuels that will eventually replace fossil fuels. Green hydrogen and green ammonia mean the production of hydrogen and ammonia by utilizing the power from renewable energy sector. This are one of the major requirements towards environmentally sustainable energy security of the nation. Therefore, the transition from fossil fuel/ fossil fuel-based feedstock to green hydrogen/ green ammonia has become a requirement [1]. R&D programme on Hydrogen Energy and Fuel is also supported by the Ministry of New and Renewable Energy [2].

Pure battery vehicles are the better alternatives for reducing fossil fuel dependencies. Hybrid Vehicles are also a solution to reduce fuel dependencies. Hybrid source systems can take power from any source, based on operational and performance characteristics. Hybrid electric vehicles are the very good examples of dual source systems or hybrid source systems. Depending upon the powering nature of hybrid sources many configurations are available. However, the major challenge is to manage the power flow from the source to the wheel with a minimum fuel consumption and pollution rate. The complexity of the vehicle configuration demands an intelligent and efficient hybrid controller to ensure consistent and stable operation of the vehicle.

A control strategy is required for satisfactory fuel cell and battery-powered hybrid electric vehicles [3-7]. The control of power flow among the source can be achieved in various ways. The most common and simple method is the use of a PI controller. The method has the advantage of eliminating offset in proportional control, and also, at the same time, it has the problem of a narrow range of stability.

The control strategies used for vehicle control can be broadly classified into the following categories 1) Experimental methods based on laboratory results 2) Optimal control 3) Intelligent methods like a fuzzy, neural network ...

Controller is the overall manager of the whole power train, which decides how to distribute the power flow among the sources. The controller should decide so that the vehicle performance should meet the expected driving criteria and cover all driving criteria[8-10].

Hence, a fuzzy-based control topology for a hybrid storage system with the fuel cell and the battery is proposed in this

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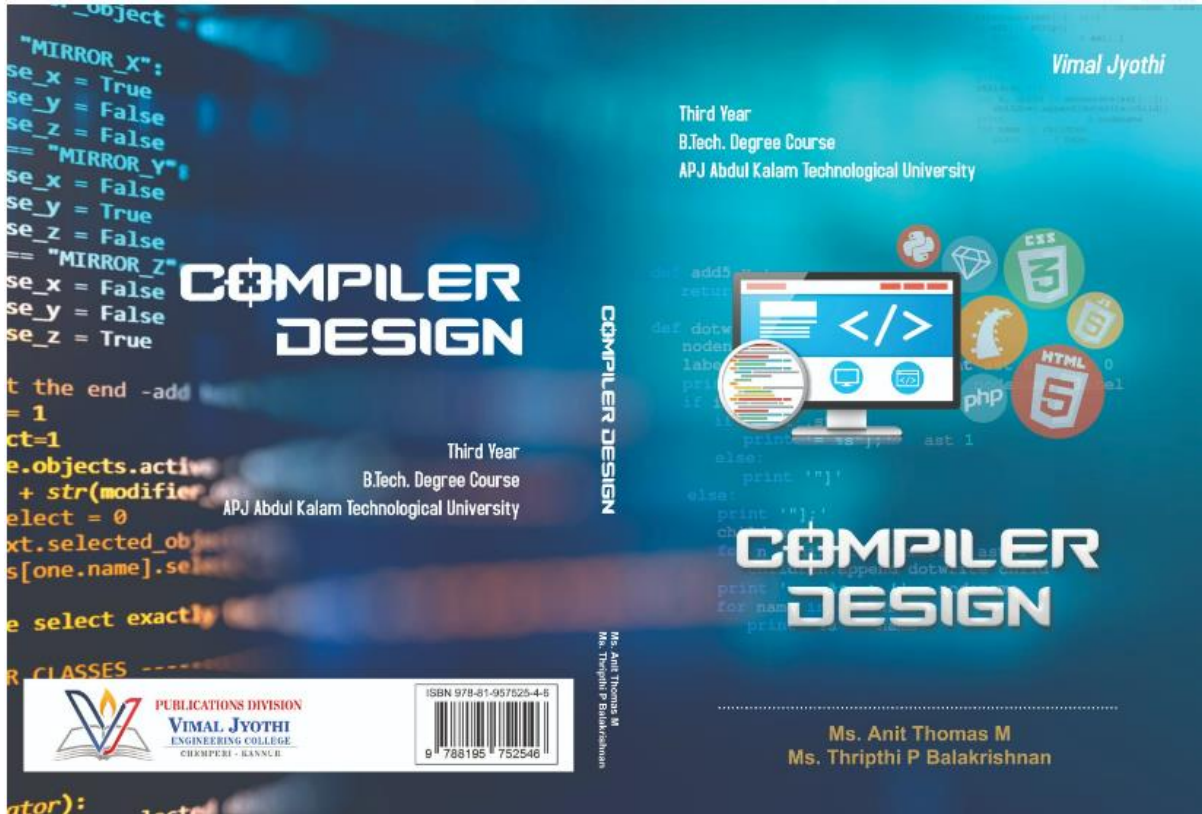
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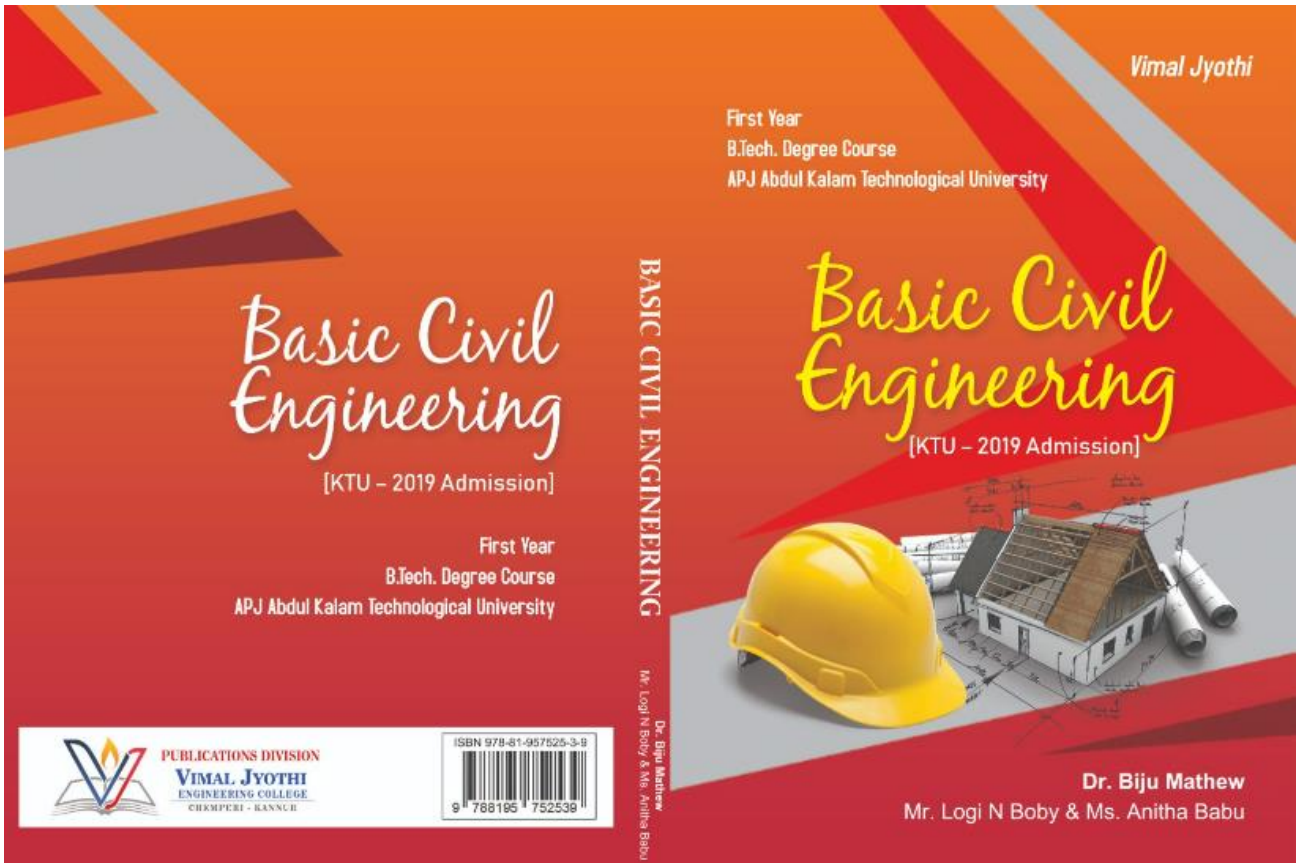
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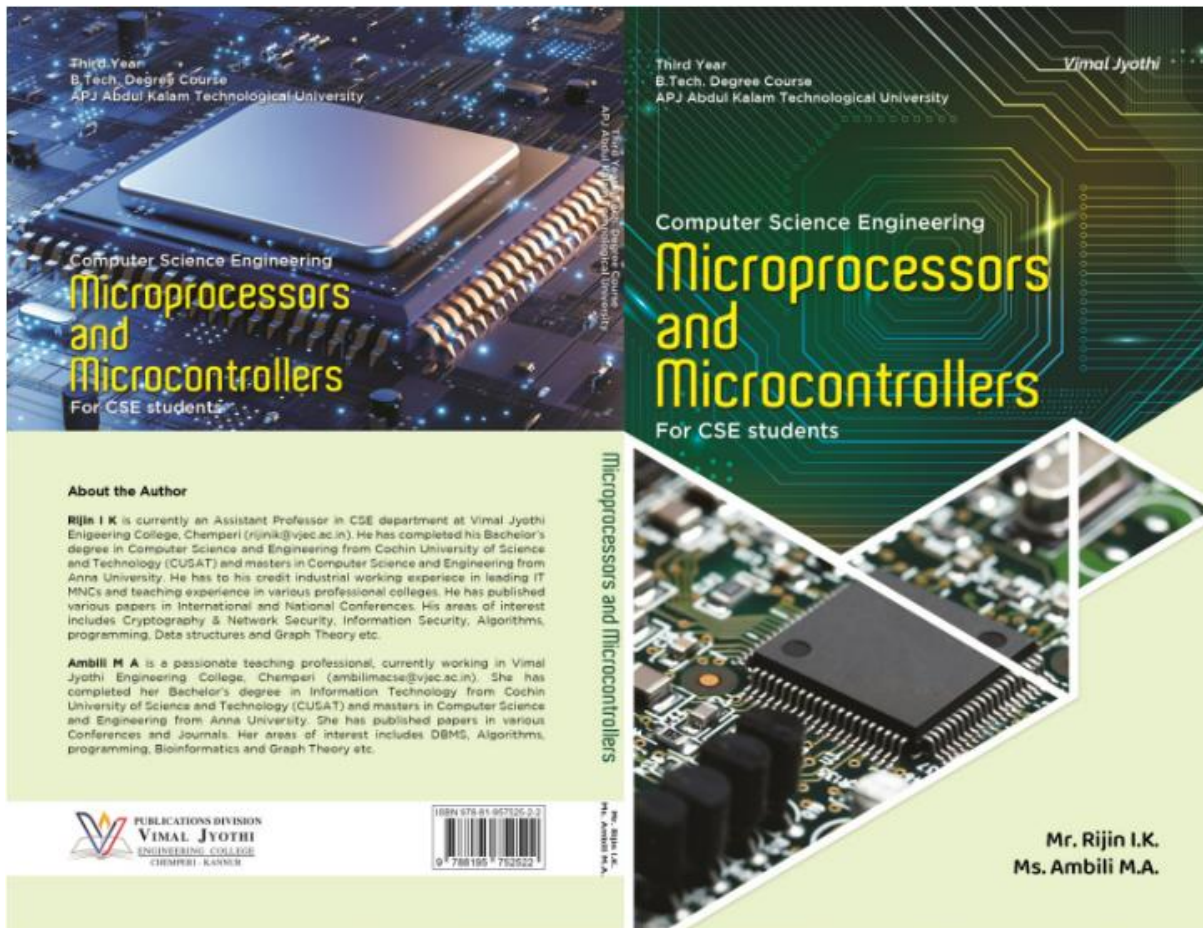
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Prof. Laly James is a passionate teaching professional, currently working as the head of the EEE department of Vimal Jyothi Engineering College. She has over 26 years of teaching experience and 8 years of industrial experience. She is an IEEE senior member and actively participates in its professional body activities. Her areas of interest include Control Systems, Electrical Machines, Power Systems & Renewable Energy Systems.

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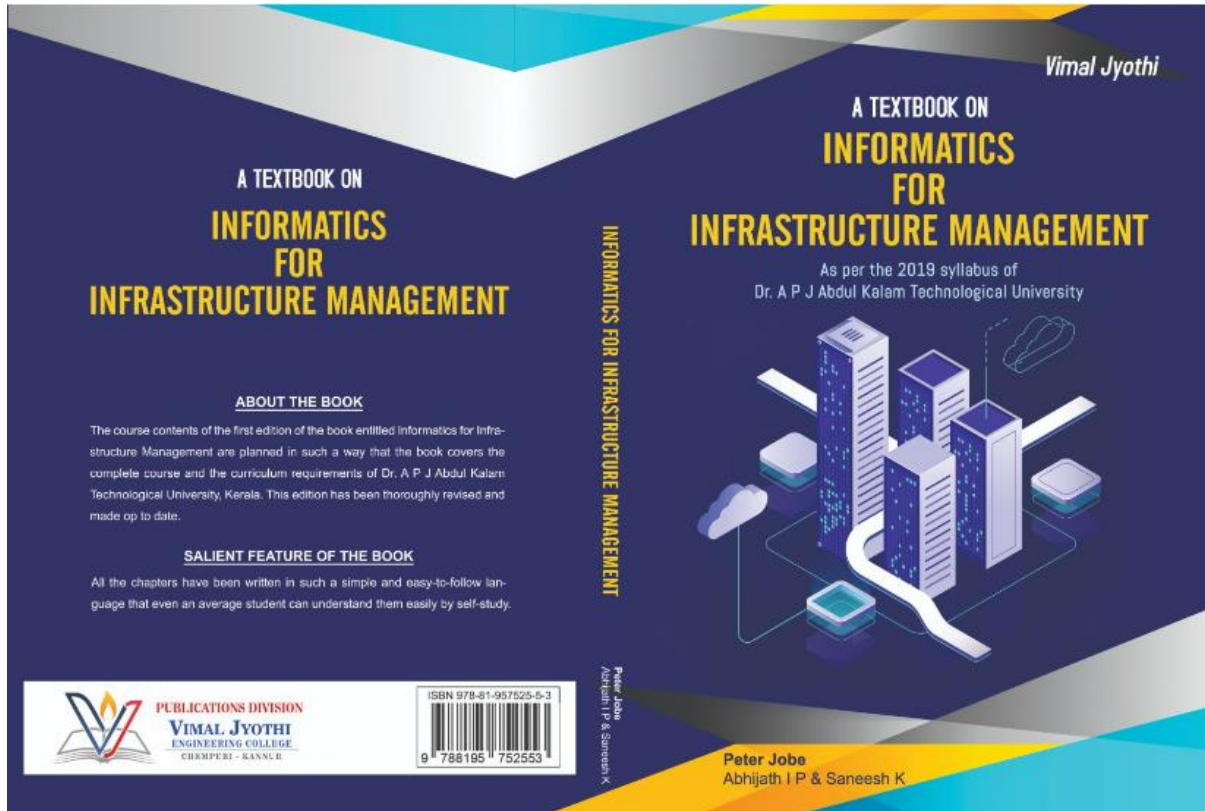
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A Review on Drive Selection, Converters and Control for Electric Vehicle

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Abstract: The rising consumption of fossil fuels, as well as the substantial environmental damage caused by them, have provided considerable motivation for the growth and progress of fuel-efficient automobiles. Efforts in research and development have been directed toward the creation of innovative concepts, low price systems, and dependable electric powertrains. This paper examines various configurations of electric vehicles (EVs) including hybrid electric vehicle (HEV), traction motors for the electric propulsion system, power converters employed in EVs/HEVs, and superior speed management of traction drive as well as sensorless control. Novel machine topologies providing potential efficiency benefits are also presented.

Keywords: Electric vehicles, Hybrid vehicles, powertrain, traction motor, converter, motor sensorless control

1. INTRODUCTION

With rising concerns about global warming, fuel economy, regulations on emissions, and constraints on energy resources, leading to changes in the automotive industry, particularly in the domain of electrification of the drive train (J. Hu et al., 2017). On the market, there are various categories of electric vehicles (EVs). The most common forms of EVs include plug-in hybrid electric vehicles (PHEVs), plug-in electric vehicles (PEVs), hybrid electric vehicles (HEVs), and battery electric vehicles (BEVs). Fuel cell vehicles (FCV) use hydrogen as a fuel to generate power, hence they emit no emissions (H. Marzougui et al., 2016). FCVs are not currently offered to the civic because of hydrogen generation, storage, and other technological restrictions of fuel cells. In the upcoming years, HEVs are anticipated to lead the innovative propulsion market. Hybrid technologies may be applied to nearly all types of fuels and engines. High efficiency, robustness, reduced size, and cheap prices in power electronic converters and motors, are all issues in electric vehicles (A. Emadi et al., 2004).

The following is an overview of the structure of this paper: Different powertrain configurations for EVs/HEVs are compared in Section II. A comparison of different traction motors is discussed in Section III. Sections IV and

V present several control approaches for traction motors and sensorless control systems, respectively. Different power converter topologies are presented in section VI. Section VII discusses current advancements in EV motor technologies and designs, with the ability to enhance the efficiency of electric powertrains. Section VIII contains the summary and findings.

II. POWER TRAIN CONFIGURATIONS

A. Hybrid Electric Vehicles

By combining an internal combustion engine (ICE) and motor in such a manner that the most desired qualities of each can be employed, HEVs reduce pollution and save energy. As indicated in Fig 1, hybrid electric vehicles are categorized as series hybrids, parallel hybrids, series parallel hybrids, and complex hybrid systems. Dynamic performance and fuel economy depend on the hybridization factor and the optimum point lies between 0.3 and 0.5. Increasing the capacity of the electric-propulsion system after this point will not increase HEV performance (Z.Rahman et al., 2000; K. Rajashekara, 2013). Based on the function played by the ICE and motor, as well as the purpose that the model is supposed to complete, hybrid vehicles are classified as micro hybrids, mild hybrids, power assisted hybrids, and plug-in hybrids. While operating in pure electric mode, a PHEV can be a series or parallel hybrid, with the battery being charged onboard and externally by the grid, extending the range.

1. Series HEV system

Among the three variants, the Series HEV model employs the simplest propulsion power flow process. The traction motor provides the total torque required to propel the vehicle. The battery pack is charged using ICE and is normally run at its most efficient with the least amount of gasoline use. In a series HEV, there are six operation modes to choose from 1) the ICE is turned off, and the vehicle is driven solely by the battery; 2) the traction motor is driven by the ICE/G; 3) shared mode: the traction motor is driven by both the ICE/G set and the battery. 4) ICE/G power split for driving and charging the battery; 5) Charging at a fixed

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Fuzzy-Based Control Strategy for Supercapacitor Assisted Battery Powered EV

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Abstract—Hybrid Energy Storage Systems (HESS) are now being explored the most for performance improvement of EVs. HESS utilizes one or more energy storage systems, taking advantage of each. A hybrid topology of sources with complementary characteristics and an adaptive control strategy reduces battery-powered EVs' frequent charging and discharging need. In this context, a battery and supercapacitor combination with a fuzzy control strategy is proposed in this paper. Supercapacitors can handle peak power in short time intervals. The battery can supply loads continuously for extended periods. A tiny battery with a lower peak power output is all needed when using a hybrid system. The high power density of SC results in performance improvement with reduced battery size. The results show that the proposed fuzzy controller operates satisfactorily with a supercapacitor-assisted battery-powered EV. The frequent charging and discharging of the battery can be reduced, thereby improving the life span of the battery.

Index Terms—Hybrid Energy Storage Systems (HESS), Supercapacitor, Battery, Electric Vehicle, Hybrid Electric Vehicle

I. INTRODUCTION

The need to switch from fossil fuels to more sustainable energy sources is urgent. As a result of the fast rising amount of electricity being produced from unpredictable and variable sources, the energy landscape is drastically shifting. The rapidly growing awareness of energy storage is due to the degrading state of the energy market in developing nations and changes in the transportation industry [1-5].

Since most consumer electronics are powered by battery-like technologies and the use of renewable energy sources for electricity generation is expanding quickly, energy storage has emerged as one of the essential needs in industries.

The utilisation of this rechargeable electrochemical storage or battery technology is most frequently observed. A battery is a tiny, portable power source that can be placed anywhere and transforms electrochemical energy into electricity. Lead acid, redox flow, sodium sulphur, and lithium-ion are the most frequently used battery cells. Due to their long lifespan, high potential density, smaller weights, and less self-discharge, lithium-ion batteries are chosen over other

battery technologies in various applications, aircraft, EVs, satellites, maritime systems, smartphones, computers, and other consumer gadgets.

Rechargeable batteries and SCs store and convert energy through ion diffusion and migration, and their chemical structures are generally comparable. However, the SCs offer a few benefits that will be helpful for storage systems. A double-layer electrochemical capacitor called an SC has a far higher energy storage capacity than a typical capacitor. Additionally, they have a long lifespan with virtually no losses [6]. They can conduct far more charge and discharge cycles than lead-acid batteries, which can only process a few thousand and produce much higher currents than batteries [7-9].

A control technique is needed for successful SC and battery-powered hybrid electric cars. The following categories can be used to categorize the control strategies used for vehicle control broadly: 1) Experimental techniques based on lab findings 2) Optimal management 3) Intelligent techniques, such as a fuzzy neural network. The controller, who oversees the entire power train, selects how to divide the flow of power among the sources. The controller should make decisions to ensure that the vehicle's performance meets all driving and anticipated driving criteria. As a result, this research proposes a fuzzy-based control architecture for a hybrid storage system using an SC and a battery [10].

The content of the paper is organized as follows. Section two details the hybrid electric vehicle configuration. Section three thoroughly examines the physical and electrical properties, operating principles, benefits, and limitations of SCs, batteries, and their structural makeup. The mathematical modelling of a hybrid electric vehicle is described in section four, and the use of fuzzy logic controllers is described in section five. The operation of the vehicle with an SC and batteries as a hybrid energy storage system is examined in the last section.