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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.

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 lead 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 CO_2 from the fossil fuel plants is collected, stored and is either used in applications requiring CO_2 as the raw material or can be permanently sequestrated in CO_2 storage sites utilizing Carbon Capture, Utilization and Storage (CCUS) technology. The captured CO_2 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 CO_2 in the atmosphere. An important methodology to reduce the CO_2 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 sequesters 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 sequestrated 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 CO_2 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.

1748

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 posses more risk than in day time driving due to abuse of high beams of the head lamb. 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 o 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 widespreadly used device in vehicles. The demand for automobile safety has increased since humans started using vehicles. Automotive collision accidents causes 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

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 form 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 ininput /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 leastcomplexity 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-guassion 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.
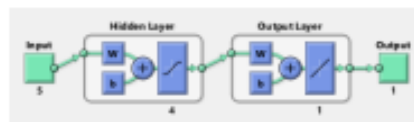

Fig.1: ANN model

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

1830

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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 ex potential 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%.

1838

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.

977

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,

495

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

542

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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 anycancers 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 inapproximately 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 modalitieswhich 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.

1763

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 lynches 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,

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.

911

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. 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

1737

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
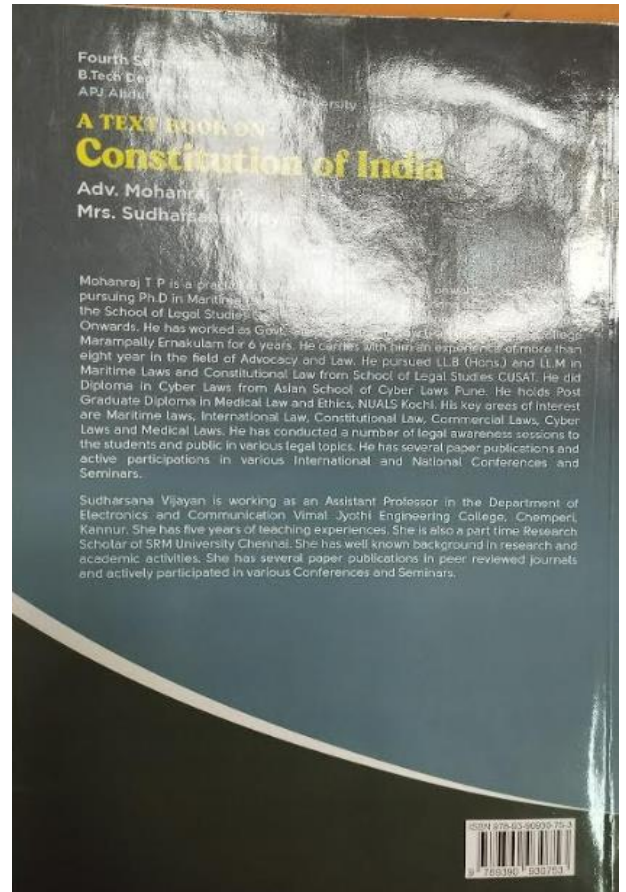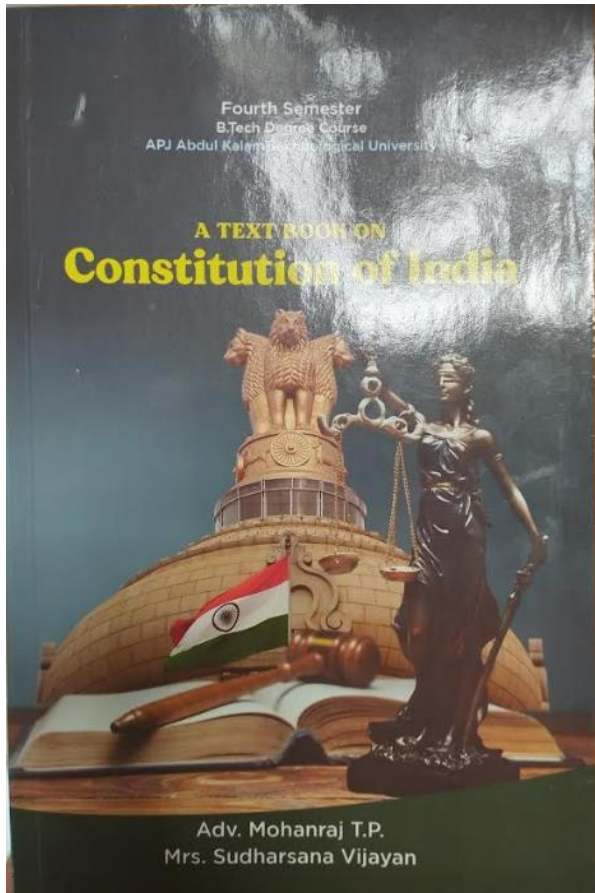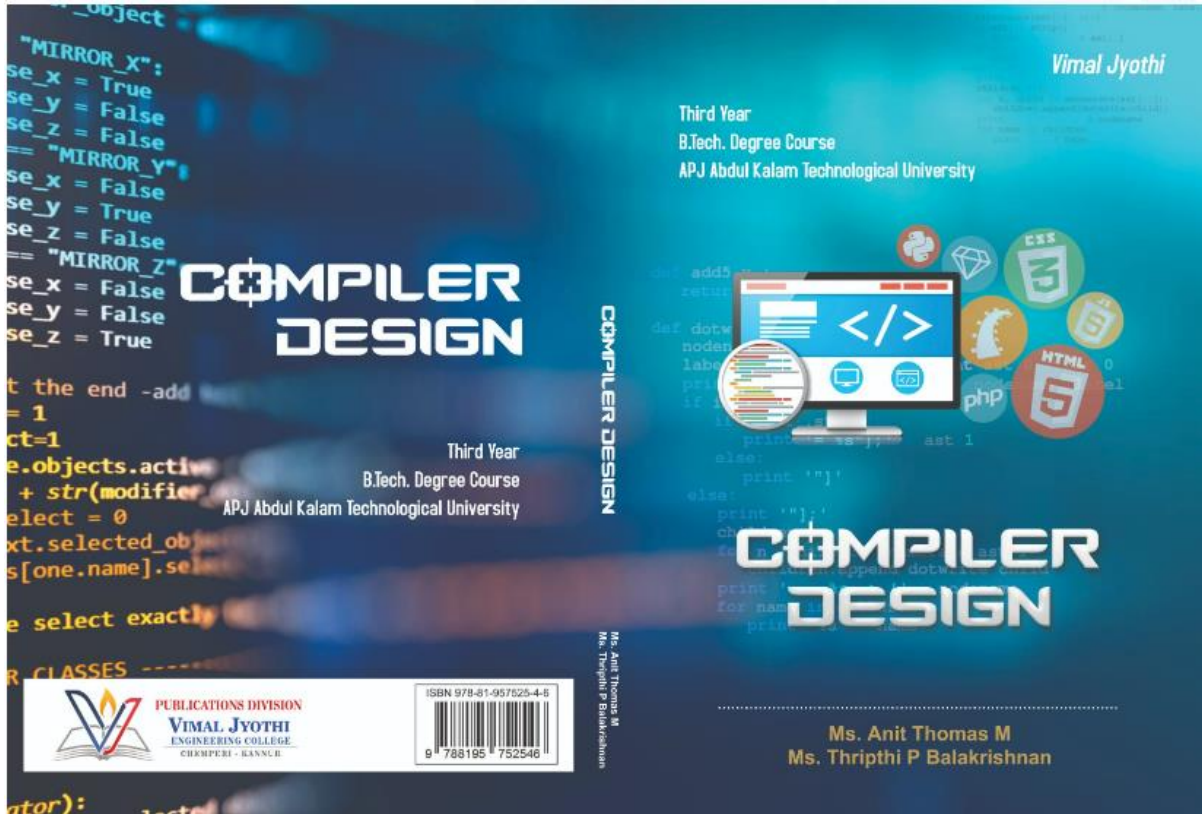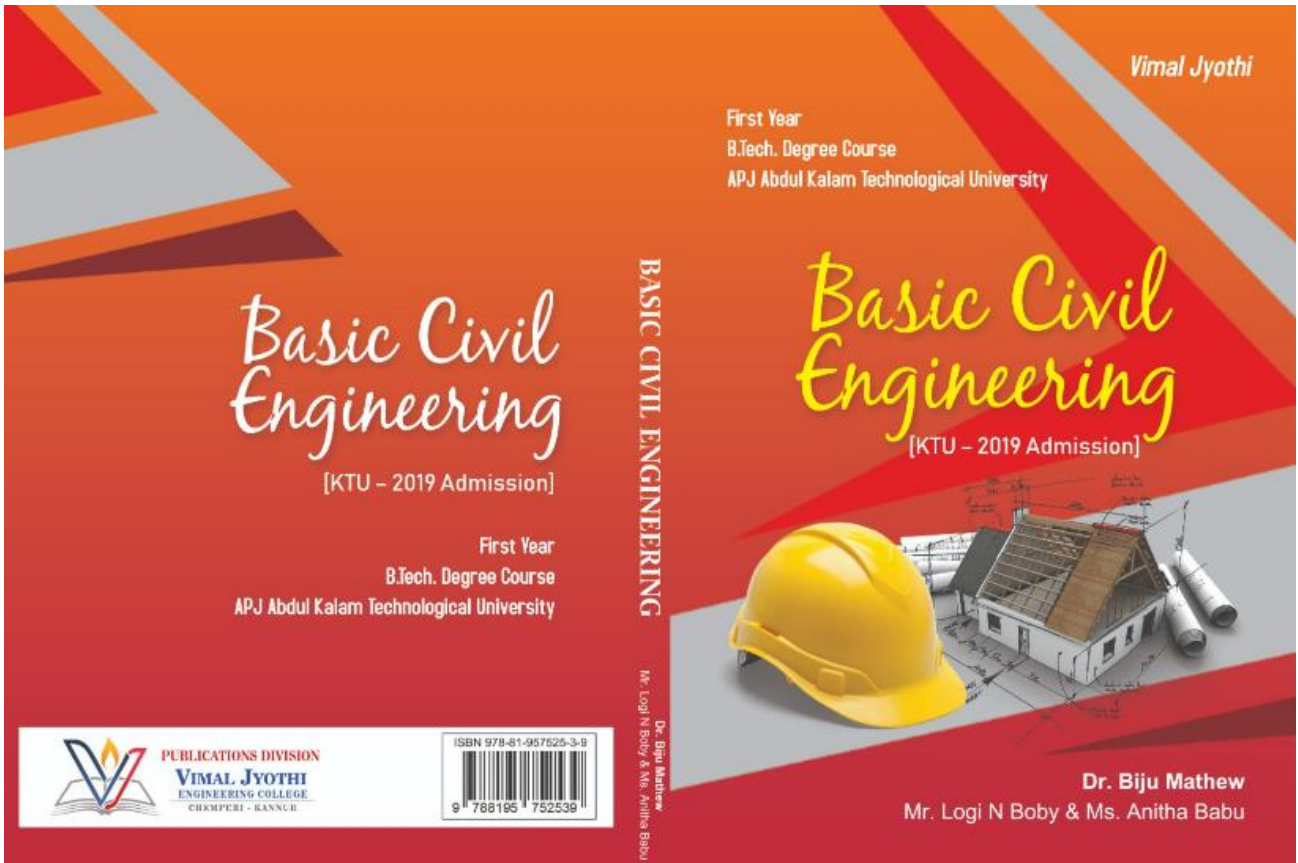
NAAC Cycle 2
Criterion: 3.3.2

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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
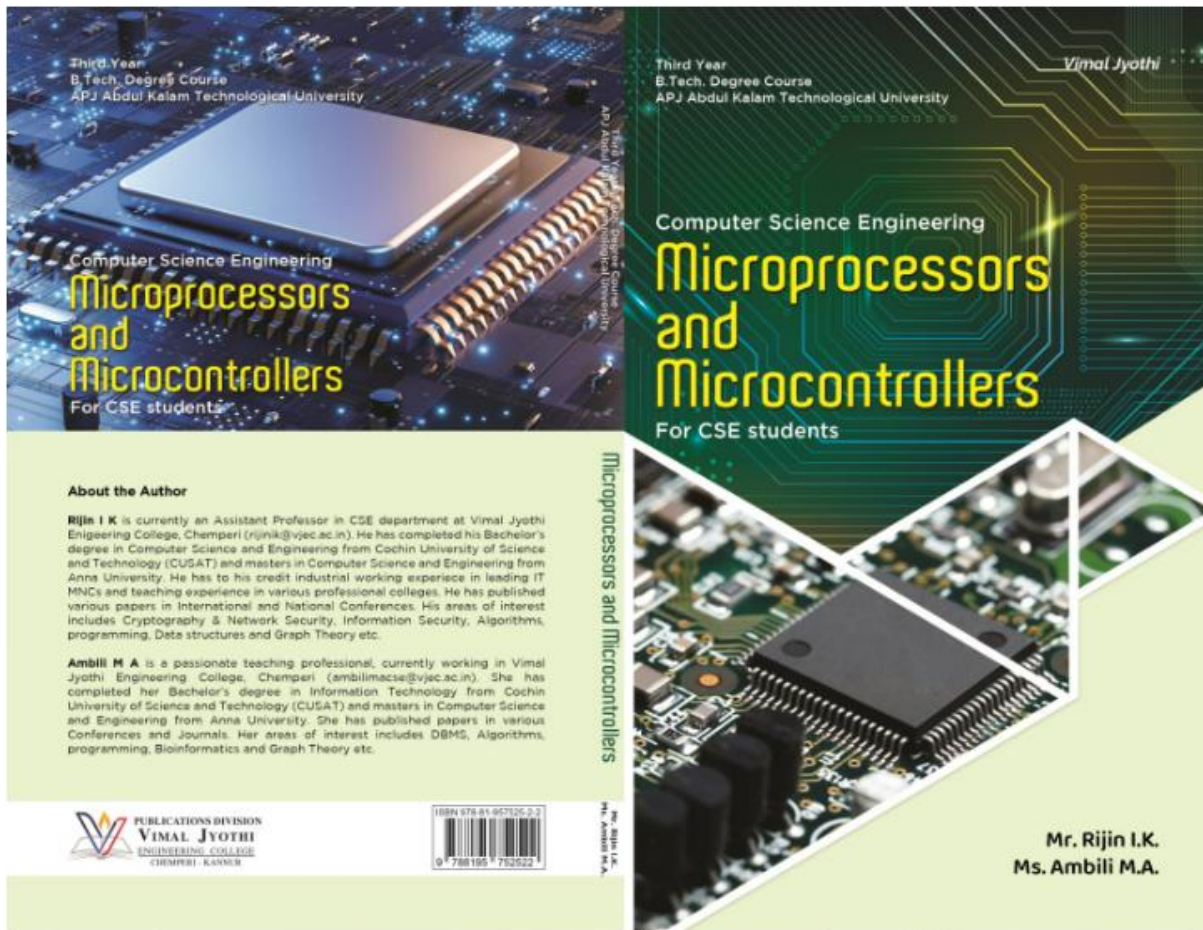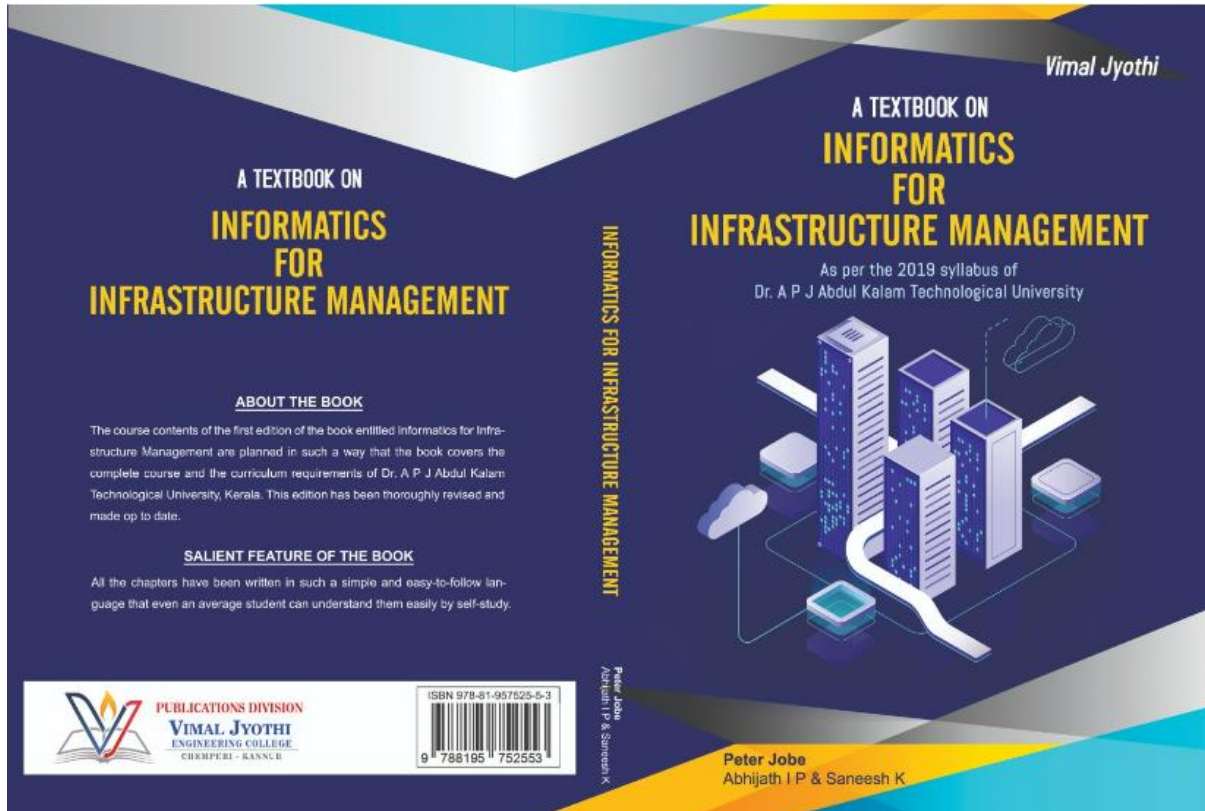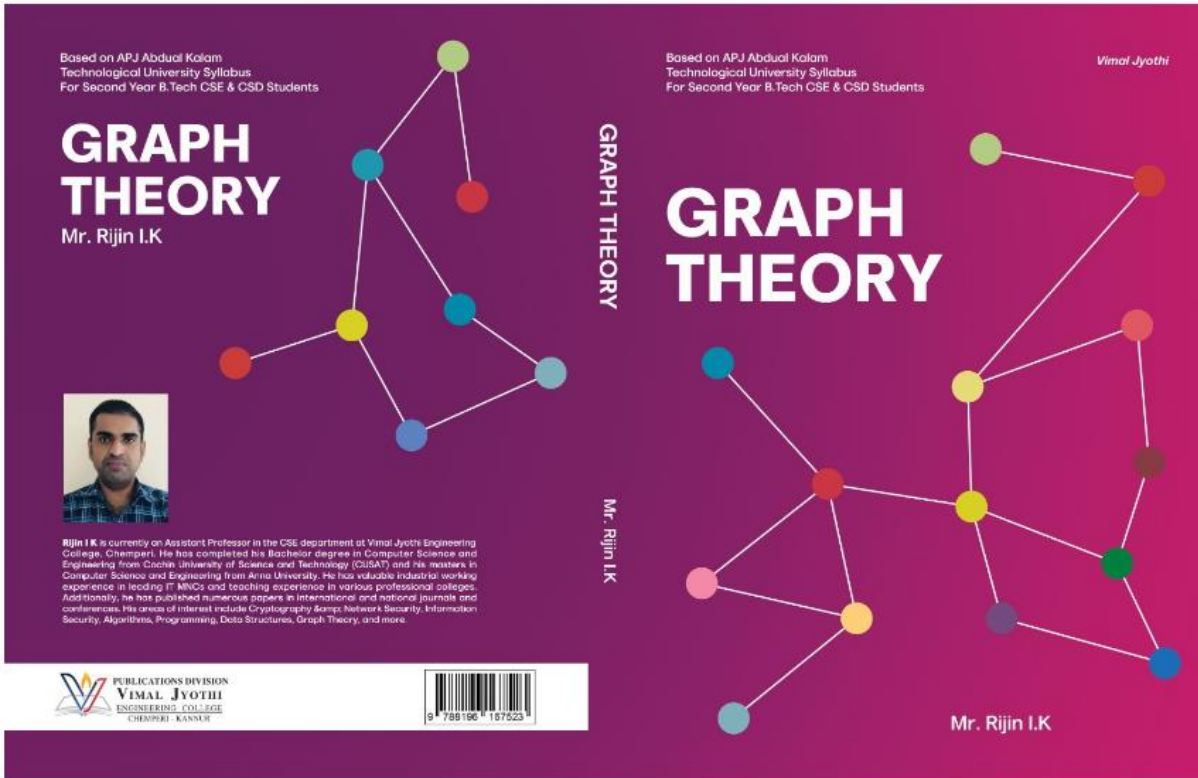
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NAAC Cycle 2

Criterion: 3.3.2

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 employedin 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

I. 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.