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Customer Evaluation And Profit Maximization Using Machine Learning for Offline Stores

Abhijith Gopinath[1], Aloysius Joy[2], Joyal Wilson[3], Shamjith Saji[4], and Jeethu V Devasia[5]

Department of Computer Science and Engineering
Vimal Jyothi Engineering College, Chemperi - 670632

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,

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

Suhada C.
Department of Computer Science and Engineering
Vimal Jyothi Engineering College
Chemperi, India
suhadac@gmail.com

Dr. Jeethu V. Devasia
Department of Computer Science and Engineering
Vimal Jyothi Engineering College
Chemperi, India
jeethuthomas@vjec.ac.in

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

Ashly K P[1], Devika K[2], Nivedya Susil[3], and Jeethu V Devasia[4]

Department of Computer Science and Engineering Vimal Jyothi
Engineering College, Chemperi - 670632

[1]ashlyranjith@gmail.com
[2]devikanarayanan11@gmail.com
[3]nivedyasusil13@gmail.com
[4]jeethuthomas@vjec.ac.in

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

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

Shelma George.
Senior Member, IEEE
Dept. of Electrical and Electronics Engineering
Vimal Jyothi Engineering College
Kerala, India
shelmageorge@vjec.ac.in

Rajeev T.
Dept. of Electrical Engineering
College of Engineering Trivandrum
Kerala, India
rajeev.t@cet.ac.in

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

Fuzzy-Based Control Strategy for Supercapacitor Assisted Battery Powered EV

Shelma George.
Senior Member, IEEE
Dept. of Electrical and Electronics Engineering
Vimal Jyothi Engineering College
Kerala, India
shelmageorge@vjec.ac.in

Rajeev T.
Dept. of Electrical Engineering
College of Engineering Trivandrum
Kerala, India
rajeev.t@cet.ac.in

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.

Hindawi

Research Article

Effectiveness of Feature Extraction by PCA-Based Detection and Naive Bayes Classifier for Glaucoma Images

J. Shiny Christobel [ID],[1] D. Vimala [ID],[1] J. Joshan Athanesious [ID],[2]
S. Christopher Ezhil Singh [ID],[3] and Sivaraj Murugan [ID][4]

[1]Department of Electronics Communication Engineering, Sri Ramakrishna Institute of Technology, Coimbatore, Tamil Nadu, India
[2]School of Computer Science and Engineering, Vellore Institute of Technology, Chennai, Tamil Nadu, India
[3]Department of Mechanical Engineering, Vimal Jyothi Engineering College, Kannur, Kerala, India
[4]Faculty of Manufacturing, Department of Mechanical Engineering, Hawassa University, Hawassa, Ethiopia

Correspondence should be addressed to Sivaraj Murugan; msivaraj2014@gmail.com

After cataract, glaucoma is one of the second leading retinal diseases in the world. This paper presents the methodology to detect the glaucoma using principal component analysis. The images are involved in dilation as a preprocessing, enhancement using the contrast limited adaptive histogram equalization method, and followed by the extraction of features using principal component analysis. The extracted features are classified using support vector machine, Naive Bayes, and K-nearest neighbor classifiers. Comparing with other classifiers, the Naive Bayes provides high accuracy of 95% which demonstrates the effectiveness of the feature extraction and the classifier.

1. Introduction

Glaucoma is the second-leading cause of blindness in the U.S. The prevalence of glaucoma in the world is 60.5 million in 2015, and by 2030, it is expected to increase up to 10 percentages of world population [1]. The high prevalence of undetected glaucoma in the society contributes to the high rate of blindness among the Indian people [2]. A physical eye examination technique can occasionally result in incorrect diagnosis. Automated and accurate diagnosis of retinal disease helps to prevent the loss of vision. A thorough eye examination for the detection of glaucoma involves tonometry, ophthalmoscopy, perimetry, gonioscopy, and pachymetry. Utilizing the right automated decision tools while imaging the retina improves the early detection of glaucoma and prevents visual loss. The brightest section within retinal fundus image is where the optic nerve exits the retina and to the brain, which is called the optic disc. To prevent vision loss, the optic disc region must be examined for the existence of glaucoma at an early stage. The nerve that transmits data from the eye to the nerve is called the optic nerve. When the optic nerve gets damaged, glaucoma occurs. Early on, there are no symptoms, but if a proper diagnosis is not made, vision loss sets in. The greater than usual pressure in the eye, which occasionally accompanies glaucoma, is referred to as ocular hypertension.

Initial enhancements are made to the input retinal images to improve their quality. The feature extraction technique has an impact on analyses on the detection and classification of glaucoma utilizing retinal images. Glaucoma progression is identified using morphological and nonmorphological elements. Glaucoma detection using CDR feature was performed by Xu et al. [3], Muramatsu et al. [4], Joshi et al. [5], and Yin et al. [6]. On the other hand, the categorization of the retina structures is not a characteristic of the nonmorphological features. The published investigations have demonstrated that morphological parameters like colour, pixel intensity, histogram, and texture are not used to detect glaucoma. A system based on hybrid feature extraction from fundus images using higher order spectra, trace

Compression behaviour Mg-Zn-xSr-HA hybrid nanocomposites through powder metallurgy method

George Recklin [a], P.V. Pranav [a], S. Christopher Ezhil Singh [a] 👤 ✉ , Rajkumar S. Rai [b],
T. Mary Little Flower [c], P. Sridharan [a]

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Abstract

In the present work, biocompatible materials such as zinc (Zn), Strontium (Sr) and Hydroxyapatite (HA) have been mixed with magnesium (Mg) to fabricate a biomaterial with enhance strength by powder metallurgy technique. The

Tribological and mechanical properties Mg-Zn-xSr-HA hybrid nanocomposites prepared by powder metallurgy technique

Rosh George [a], Cris Benny [a], Thomaskutty Mathew [a], M. Shyamlal [a], S. Christopher Ezhil Singh [a], T. Mary Little Flower [b], R. Malkiya Rasalin Prince [c]

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Abstract

In this work, biocompatible minerals such as zinc (Zn), strontium (Sr), and hydroxyapatite (HA) were combined with magnesium (Mg) to create a biomaterial

Wind energy conversion system-based PMSG for maximum power tracking and grid synchronization using adaptive fuzzy logic control

Teena George[a][*] · Jayapraksh P.[b] · Tinu Francis[a] · Christopher Ezhil Singh Sreedharan[a]

[a]Vimal Jyothi Engineering College, Chemperi, Kannur, Kerala
[b]Government Engineering College, Kannur, Kerala

Abstract: This paper proposes an adaptive fuzzy logic-based Maximum Power Point Tracking (MPPT) for a Permanent Magnet Synchronous Generator (PMSG)-based variable speed Wind Energy Conversion System (WECS). The control algorithm, online updates the scaling factors of the Fuzzy Logic Controllers (FLCs) at a high convergence speed. The adaptive FLC is in cooperated along with field-oriented control of PMSG to track the maximum power. The WECS is connected to the grid through a back-to-back converter. The grid side inverter is controlled by voltage-oriented control along with FLC, so that power quality standards of the grid are maintained. The performance of the system is verified using MATLAB Simulink and it is validated that power coefficient of WECS abide at its optimum value with dynamic conditions in wind speed. The WECS provides full reactive power support for the system with a unity power factor operation at the grid. The active power sharing of WECS to the grid/load changes with the availability of wind power.

*Corresponding author.
E-mail address: teena.gil7@gmail.com (Teena George).
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