RASPBERRYPI-POWEREDFARMINGROBOTFORPLANTHEALTH MONITORING VIA IMAGE PROCESSING

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ABSTRACT

InIndia,agricultureisoneofthemostsignificantand traditional jobs. India's economy depends heavily on agriculture, hence food production must be handled with the greatest care. Plants that are infected by viruses, fungi, and bacteria suffer from a reduction in both quantity and quality of output. due to such a significant output loss. Thus, taking good care of plants is essential for the same. This project provides an overview of a farming robot powered by a Raspberry Pi that uses image processing techniquesto identify different plant diseases. Farming Robot offers more effective techniques to identify plant illnesses brought on by bacteria, viruses, or fungi. Increasing the number of eyeobservations to identify illnesses is inaccurate. When people overuse pesticides, they may develop dangerous chronic illnesses. Farmers are now suffering from several chronic illnesses, some of which are fatal, as a result of pesticides being sprayed on crops. Overuse also degrades the nutritional content of plants. Forfarmers, it means massive productivity losses. Therefore, it is beneficial to apply image processing techniques to identify and categorize illnesses in agricultural applications utilizing a Raspberry Pi- based farming robot.

I. INTRODUCTION

1.1INTRODUCTION:

Agriculture is an ancient career. It performs a crucial role in our daily existence. Food is basic need of all people. To distribute meals among massive population desires proper amount of manufacturing. In India huge variety of populace lives in rural areas where livelihood of humans relies upon totally on agriculture. Accordingly Indian economic system on the whole relies upon on agriculture. Hence increasing first-rate production has grown to be necessary every day. Monitoring of crop/vegetation and their control from early degree is crucial. It consistsofnumbersofobligationslikepreparation of

soil, seeding, including manure and fertilizer, irrigation, ailment detection, spraying pesticides, harvesting and garage. Among these spraying proper amount of pesticides needs to be taken proper care. Pesticides are used to attract, seduce and break pests subsequently known as crop protection product. Pesticidesarepreparedbyusingdangerouschemicals or every so often by using organic strategies to kill pests, weeds or infections on plant. India is a cultivated country and approximately 70% of the populace depends on agriculture. Farmers have massiverangeofvarietyforchoosingdiversesuitable vegetation and finding the suitable pesticides for plant. Disorder on plant results in the large reduction in both the satisfactory and quantity of agricultural merchandise.Thestudiesofplantailmentconferwith the research of visually observable patterns at the plant life. Tracking of fitness and sickness on plant perform a vital role in a success cultivation of vegetation within the farm. In early days, the monitoring and analysis of plant diseases have been finished manually by using the informationindividual in that field. This call for first rate amount of work and additionally calls for excessive processing time. The photograph processing techniques can be used within the plant sickness detection. In maximum of the cases sickness symptoms are seen on the leaves, stem and fruit. Today various means are available to increase yieldin production and reduce human efforts.Technologies have been vastly developed and spread in all fields including agriculture. One of the inventions is agricultural Robot. Agricultural robot is an agricultural robot used for performing various agricultural tasks. It performs all sorts of agricultural tasks.Thisreduceshumanefforts,increasesyieldand decreases cost of labor. Due to which one getshealthy food. Deep neural networks are now thestate-of-the-artmachinelearningmodelsacrossa

MATERIAL SCIENCE AND TECHNOLOGY

DESIGN OF POWER EFFICIENT 14T FULL ADDER CIRCUIT

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ABSTRACT

Low power design is a new approach in very large-scale integration expertise as it effects devices such as battery powered portable systems, electronic pocket communication products, workstation, computers, wireless local area network, electronics good, etc. Previously performance, area, reliability and cost were emphasized in designing vlsi circuits. However nowadays power consumption is the key design criteria compared to the area and speed. Full adder is the most basic component of arithmetic logic unit. Researchers have proposed various design techniques for the full adder circuit targeting to power efficiency, access time and circuit complexity among all the circuit design techniques, low transistor count full adder design in pass transistor logic has received attention by researchers to ease circuit density for attaining power efficiency .this paper presents design of a new stable 14t full power efficient adder circuit. The proposed circuit is designed based on pass transistor logic network using nmos transistor only. The proposed circuit is simulated at layout level using microwind eda tools for 45nm technology in terms of power and voltage level at the sum and carry nodes. The proposed circuit performance is compared with a similar 14t adder circuits and found the proposed adder circuit consumes lower power due to smaller load capacitance and parasitic resistance. The logic level at the sum and carry nodes maintains at strong 1 or strong 0 due to proposed circuit's design architecture.

I. INTRODUCTION

The digital system plays a major role in our day to day life. The arithmetic operations inclusive of addition, subtraction and multiplication still carry on from regarded problems which include thin quantity of bits, transmission time delay, and also the complexity of circuit. At present adders are frequently used in a variety of electronic applications such as digital signal processors (dsp) and computing devices these adders are used to carry out a variety of algorithms similar to fir, iir etc. In virtual processors the delay can cast off by way of improving the velocity of adders in which they've constraints like vicinity, energy and pace necessities. The most important proposal of this proposed 14transistor full adder circuit is to reduce the number of transistors in the conventional full adder, xor gate and tg circuits based on the pass transistor logic were used which results in the design of 14t full adder circuit as shown in figure. The improvement of this 14t full adder led to better outcome for holdup as well as power consumption as compared to the earlier works in the full adder. The

14transistor full adder worked well with high performance multipliers with much less strength dissipation. On the other hand the adder did not show the development in threshold strength loss. In addition the 14transistor full adder would consume momentous power as compared to the presented 28transistor full adder. The 14transistor complete-adder with 14 transistors can also eat extensively less energy inside the order of microwatts and has higher speed of operation. The 14transistor full-adder reduces the brink loss hassle compared to the 28 transistor fulladders. Within this segment a single bit complete adder circuit is designed by means of the use of mosfet for the purpose of enhancing the performance of adder in phrases of power and leakage using 14 transistors. Full adder is a combinational circuit that performs the addition operation of 3 input bits. It basically consists three inputs and two outputs. The input variables are expressed by a, b and cin. The two output variables are expressed by sum (s) and carry (cout) [4]. Fig. 1 shows the essential block diagram of full adder cell.

DESIGN OPTIMIZATION TECHNIQUES FOR LOW POWER CMOS VLSI

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ABSTRACT

Low power is the real test for late hardware businesses. Control scattering is an essential thought as far as execution and area for vlsi chip outline. Control administration procedures are for the most part used to configuration low power circuits and frameworks. Insights demonstrate that 40% or considerably higher rate of the aggregate power utilization is because of the leakage of transistors. This rate will increment with innovation scaling unless streamlining methods are acquainted with bring leakage inside points of confinement. This paper concentrates on circuit improvement and plan mechanization strategies to fulfill this target. It additionally portrays many issues with respect to circuit outline at building, legitimate and gadget levels and exhibits different procedures to beat the previously mentioned issues. The initial segment of the paper gives a diagram of primary wellsprings of leakage current in cmos transistor. The second part of the paper depicts various circuit streamlining procedures for controlling the standby leakage current. Some leakage current lessening procedures like rest approach; stack approach, and lector strategy are talked about for planning cmos entryways which fundamentally chops down the leakage streams. The benefits of lector method are it doesn't require any extra control and observing hardware, in this way constraining the range increment and furthermore the power dissipation in dynamic state when contrasted with different systems and it doesn't influence the dynamic power which is the significant confinement with the other leakage diminishment strategies, is likewise examined in this paper.

I. INTRODUCTION TO VLSI

VLSI TECHNOLOGY VLSI

Design presents state-of-the-art papers in vlsi design, computer-aided design, design analysis, design implementation, simulation and testing. Its scope also includes papers that address technical trends, pressing issues, and educational aspects in vlsi design. The journal provides a dynamic high-quality international forum for original papers and tutorials by academic, industrial, and other scholarly contributors in vlsi design.

The development of microelectronics spans time which is even lesser than the average life expectancy of a human, and yet it has seen as many as four generations. Early 60's saw the low density fabrication processes classified under small scale integration (ssi) in which transistor count was limited to about 10. This rapidly gave way to medium scale integration in the late 60's when around 100 transistors could be placed on a single chip.

It was the time when the cost of research began to decline and private firms started entering the competition in contrast to the earlier years where the main burden was borne by the military. Transistor-transistor logic (ttl) offering higher integration densities outlasted other ic families like ecl and became the basis of the first integrated circuit revolution. It was the production of this family that gave impetus to semiconductor giants like texas instruments, fairchild and national semiconductors. Early seventies marked the growth of transistor count to about 1000 per chip called the large scale integration.

By mid-eighties, the transistor count on a single chip had already exceeded 1000 and hence came the age of very large scale integration or vlsi. Though many improvements have been made and the transistor count is still rising, further names of generations like ulsi are generally avoided. It was during this time when ttl lost the battle to mos family owing to the same problems that had pushed vacuum tubes into negligence, power dissipation and the limit it imposed on the number of gates that could be placed on a single die the second age of integrated circuits revolution started with the introduction of the first microprocessor, the 4004 by intel in 1972 and the 8080 in 1974. Today many companies like texas instruments, infineon, alliance semiconductors, cadence, synopsys, celox networks, cisco, micron tech, national semiconductors, st microelectronics, qualcomm, lucent, mentor graphics, analog devices, intel, philips, motorola and many other firms have been established and are dedicated to the various fields in "Vlsi" Like programmable logic devices, hardware
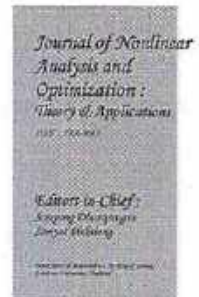
IMPROVED DESIGN OF CMOS 1-BIT COMPARATOR WITH STACKING TECHNIQUE

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ABSTRACT The comparator is an electronic circuit which compares the magnitude of one signal to another signal. The comparators are used in analog to digital converters. Comparator is the "Heart" of the Analog to digital converter (ADC). As we talk about the VLSI technology, in this environment the device should be of higher speed, less cost and low power consumption. Many of the electronic devices like mobile devices and other portable computing devices have constraints in terms of power consumption. Power consumption is one of the important factors of VLSI circuit design for CMOS is the primary technology. The power consumption has become a fundamental problem in VLSI circuit design. Therefore, reducing the power consumption of integrated circuits through design improvement is a major challenge in portable system design. To solve the power consumption problem, many different techniques from circuit level to device level and above have been proposed by researchers. This paper presents the design and analysis of a CMOS based efficient one bit comparator circuit. Comparator has been designed and simulated in 180nm TSMC technology. The proposed circuit uses a XNOR gate, two AND gates and two NOT gates. Stacking technique has been used to improve the conventional design. Power supply has been varied from 1.0V to 2.8V for the proposed and basic design. Result reflects that proposed approach shows less power consumption and improved power delay product (PDP).

I.INTRODUCTION TO VLSI

VLSI TECHNOLOGY VLSI

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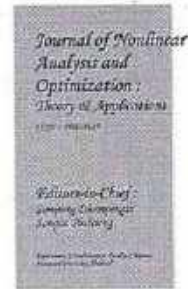
The development of microelectronics spans time which is even lesser than the average life expectancy of a human, and yet it has seen as many as four generations. Early 60's saw the low density fabrication processes classified under Small Scale Integration (SSI) in which transistor count was limited to about 10. This rapidly gave way to Medium Scale Integration in the late 60's when around 100 transistors could be placed on a single chip.

It was the time when the cost of research began to decline and private firms started entering the competition in contrast to the earlier years where the main burden was borne by the military. Transistor-Transistor logic (TTL) offering higher integration densities outlasted other IC families like ECL and became the basis of the first integrated circuit revolution. It was the production of this family that gave impetus to semiconductor giants like Texas Instruments, Fairchild and National Semiconductors. Early seventies marked the

MEMSTECHNOLOGYINAUTOMATEDWHEELCHAIRSFOR DISABLED USERS

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ABSTRACT

In the robotics community, human-machine interactionhasgainedimportancesinceitcanbeused toawiderrangeofroboticapplications.Asaresultof technological advancements, new gadgets are being created in almost every industry. A variety of new applications are being created with these newgadgets; one of the most recent is the "Hand Gesture based Robot." As is common knowledge, in order to operate any robot, we often send it commands by hitting buttons, etc. to change its course. However, with this project, we won't need to push anybuttons— instead, the robot will travel in the same way as long as we move our hand in that direction. The orientation of the robot is thus controlled by the hand's movement. MEMS technology makes this feasible. Micro Electro Mechanical System isreferred to as ·MEMS. Since the robot is controlled wirelessly, the RF transmitter transmits wireless data while the MEMSis interfaced with the remote's micro controller. In order to create and send command codes, the control module will be a MEMS interfaced with the controller. The micro controller onthe robotinstructs the motors to move in certain directions based on these commands. Similar to a motion sensor is the MEMS. We may get the voltage variation that is provided to the ADC and the digital information that is sent to the controller in the remote control by slightly varying the X, Y, or Z axes. Through the use of an RF transmitter, this encoded data is sent. This encoded data is picked up by the robot's RF receiver and sent to the controller, which decodes it and usesit to move the robot.

I. INTRODUCTION

IR SENSOR

IRdetectorsarelittlemicrochipswithaphotocellthat are tuned to listen to infrared light. They are almost always used for remote control detection - every TV and DVD player hasoneof theseinthe frontto listen for the IR signal from the clicker. Inside the remote control is a matching IR LED, which emits IR pulses to tell the TV to turn on, off or change channels. IR light is not visible to the human eye, which means it takes a little more work to test a setup.

There are a few difference between these and say a CdS Photocells ():

• IRdetectorsare speciallyfiltered for Infrared light, they are not good at detecting visible light. On the other hand, photocells are good at detecting yellow/green visible light, not good at IR light

• IR detectors have a demodulator inside that looks for modulated IR at 38 KHz.Just shining an IR LED won't be detected, it has to be PWM blinking at 38KHz. Photocells do not have any sort of demodulator and can detect any frequency (including DC) within the response speed of the photocell (which is about 1KHz)

• IR detectors are digital out - either they detect 38KHz IR signal and output low (0V) or they do not detect any and output high (5V). Photocells act like resistors depending upon how much light they are exposed to.

TELEGRAM BOT-ENABLED IOT PLANT MONITORING SYSTEM

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ABSTRACT

In the sphere of agriculture, the employment of technology has grown more important. The majority of people in our nation rely on agriculture, which is the backbone of the nation. Water shortage is the primary problem facing agriculture. Water is squandered because the resource is not used effectively. This may be avoided by automating the watering operation. Water waste may be decreased in this industry by using the Internet of Things. the use of IoT sensors and actuators to modernize and increase the efficiency of everything in the field. We are able to operate quickly and effectively. Additionally, the task may be completed in a short amount of time. By creating this clever method to monitor and regulate soil moisture in plants and plantations, it not only expedites labor but also minimizes water waste by giving the plant the necessary quantity of water. It transmits a Telegram message that can be accessed at any time that includes information on the plant's water content.

I. INTRODUCTION

PROJECT OVERVIEW:

More and more it has become necessary to use technologies in the agriculture field. The use of sensors for IoT and actuators that make everything in the field more efficient and modern. We can do work easily and efficiently. The work can also be done within a very short period. By developing this intelligent system aimed at monitoring and controlling soil moisture in plants and plantations, it not only speeds up the work but also reduces the wastage of water. by supplying required amount of water to the plant. It sends Telegram message which contains the details of the water content in the plant and can be viewed whenever we want. The circuit starts sensing the soil moisture using Soil Moisture Sensor and sends to the ESP32 in quick intervals.
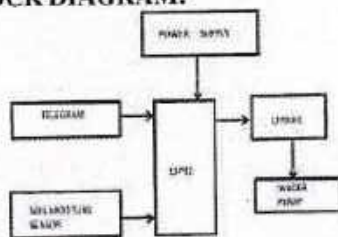
BLOCK DIAGRAM:

Figure 1:Block Diagram of IoT Based Plant Monitoring System with Telegram Bot

BLOCK DIAGRAM DESCRIPTION:

Power Supply:

Here we used +5V dc power supply from a computer USB/9v battery. The main function of this block is to provide the required amount of voltage to essential circuits. +5V is given to Soil Moisture Sensor, ESP32. +9V is given to the water pump.

ESP32:

ESP32 is a single 2.4 GHz Wi-Fi-and-Bluetooth combo chip designed with the TSMC lowpower 40 nm technology. It is designed to achieve the best power and RF performance, showing robustness, versatility and reliability in a wide variety of applications and power scenarios. This microprocessor supports RTOS and operates at 80MHz to 240 MHz adjustable clock frequency. ESP32 has 520 KB RAM and 4MB of Flash memory to store data and programs. ESP32 can be powered using a Micro USB jack and VIN pin (External Supply Pin). It supports UART, SPI, and I2C interface.
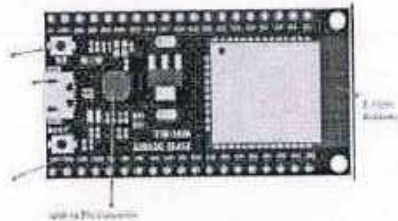

Figure.2 ESP32 Board

Soil Moisture Sensor:

A soil moisture sensor measures the volumetric water content of soil. A resistive soil moisture sensor works by using the relationship between electrical resistance and water content to gauge the moisture levels of the soil. These sensors possess two exposed probes that are inserted directly into the soil sampleA electrical current is sent from one probe to the other, which allows the sensor to measure the resistance of the soil between them. When the water content in the soil is high, it has a higher electrical conductivity (water is a good conductor of electricity!). Hence, a lower resistance reading is obtained which indicates high soil moisture. When the water content in the soil is low, it has poorer electrical conductivity. Hence, a higher resistance reading is obtained, which indicates low soil moisture.

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FIREDETECTIONSYSTEMUSINGRASPBERRYPIANDIMAGE PROCESSING

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ABSTRACT

The primary feature of the project's imageprocessing-based fire detection system is its early warningcapability.Forthepurposeofdetectingfires, this system may be deployed almost anywhere in commercial buildings, shopping centers, and other public areas. This technology detects flames using a camera. Therefore, additional sensors are notrequired to detect fire. Any distant location where there is a chance of a fire mishap may have this system installed. picture processing is a kind of processing where certain methods are performed toan input picture to change it into an output image. In order to detect fires, the system processes the camera input and then the CPU processes it. To identify if there is a fire and take appropriate action, photos are analyzedforheatsignaturesandfirelightingpatterns.

The device sounds an alert and enters emergency mode upon sensing fire. alsoshowsthe system's state on the LCD display, providing information. First respondersandemergencyservices maybecombined with Raspberry Pi-based fire detection systems. The two main benefits of this approach are remote monitoring for prompt action and information delivery to the user at any time and from anylocation.

I. INTRODUCTION

PROJECTOVERVIEW:

The project focuses on developing a fire detection system using image processing techniques and Raspberry Pi 3, along with a camera module, buzzer, and LCD display. The objective is to create an automated and efficient solution for detecting fires basedonanalysingimagescapturedbythecamera.

The system utilizes the capabilities of Raspberry Pi 3 as the central processing unit and control unit. It is connected to a camera module, which continuously captures images or video frames of the monitored area. These images are processed using image analysis algorithms to identify fire-related patterns or characteristics.

The image processing techniques employed may includecolour-basedsegmentation,edgedetection,or template matching. By evaluating pixel intensity values and applying thresholding techniques, the system can distinguish between normal scenes and potential fire situations. If a fire is detected, the systemtriggersthebuzzerforaudiblealerts,ensuring that individuals in the vicinity are promptlyalerted to the danger.

The system also incorporates an LCD display to providevisual feedbackand status updates. The LCD screen can display relevant information, such as the fire detection status, alarm activation, or evacuation instructions. This enhances the user interface and ensures that users have real-time information regarding the fire situation.

The image processing-based fire detection system offers several advantages. It provides a quick and automated response to fire incidents, minimizing the risk of property damage and potential harm to individuals. The use of image processing techniques allows for accurate and reliable fire detection, reducing false alarms. The integration of RaspberryPi 3, camera module, buzzer, and LCD display ensures a comprehensive and user-friendly system.

MOTIVATIONOFPROJECT:

SMART OFFICE CHAIR WITH RASPBERRY PI INTEGRATION

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ABSTRACT

Longer hours are spent sitting in offices pertaining to software, working professors at schools, universities, etc. This has led to a growing number of health problems for them, including obesity, joint discomfort, back pain, and other ailments.

The "Intelligent Office Chair" project was created as a solution to this. If a person sits on this chair for an extended period of time, it provides instructions. Additionally, you may use the app to change the height of this chair.

A prototype module is created with a Raspberry Pi to demonstrate the idea in practice. We can change the height and set a siren to alert the user when they are sitting for longer than usual so they may take a short break by using the IP address. If the user is not seated correctly, an ultrasonic sensor is also used to provide instructions.

The chair uses sensors to monitor several factors, such as an infrared sensor to identify obstacles and an ultrasonic sensor to evaluate a person's posture distance.

The Raspberry Pi, the most demanding technology, was used in the creation of this project. According to preliminary findings, the Chair and the case study smartphone application can precisely identify the parameters and provide information or indications via the output devices, such as vibrators.

IP addresses are important to our project as they allowed us to construct it. Relay aids in our ability to detect vibrations.

I. INTRODUCTION

I.I INTRODUCTION OF PROJECT:

Recently, various systems and applications utilizing IoT technology have been developed to help people in addressing issues that occur in our everyday life. Most people today spend more than half of the day on chairs for various purposes such as studying, driving, or working. For this reason, modern people are afflicted with waist disease such as lumbar disc, hip twisting and scoliosis, which rarely occurred in the past. For this reason, many hospitals which specialize in treating spines have been established nowadays.

In this project work, a Smart IoT Chair which supplements the limitations like sitting properly, taking breaks, drinking water, etc makes users sit correctly with recognition of their own current state by providing intuitive and visualized data in real time to Smartphone application. We can decrease back and hip pain caused by sitting for a long time through dispersing the pressure on the back and hip by dimidiating correcting posture of a person sitting on the chair. The focus is on ease of use, and allowing simple data connections with little programming required.The Smart IoT Chair implemented by this study can be used in various fields. First application area that we are targeting is in games for leisure or for posture calibration. With these games, the goal would be to correct user's posture while enjoying games by directing appropriate sitting position opposite to the user's usual habit based on collected data.

In addition, it can analyze sitting pattern of each individual and stimulus such as vibration or sound. Furthermore, other Smart devices can also be created by combining other furniture with this IoT device. (e.g., a bed which analyzes sleeping pattern, a sofa or kitchen chair that provides custom services). As an immediate future work, we plan to precisely quantify the sensing ranges of our custom designed sensors, conduct thorough evaluation, deploy the chairs at a larger scale, and employ a gateway to collect posture data from large number of chairs make the project work more realistic, much importance is given for practical orientation, therefore a prototype module is constructed for the demonstration purpose. This module simulates the real working system and based on this technology with slight changes in the structure and motor ratings, the chair can be constructed for real applications. The chair is constructed with electronics, electrical & mechanical components.

BLOCK DIAGRAM:
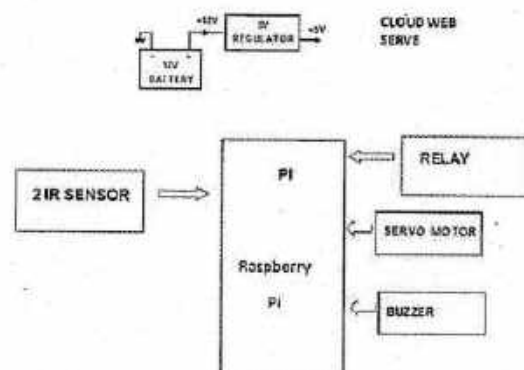
EXPLANATION OF EACH BLOCK:
FUNCTIONAL

The functional description of the project work "**Intelligent Office Chair**" is explained in this chapter. For better understanding, the total module is divided into various blocks and each block explanation is provided here. The diagrams (block diagram and circuit diagram) of thisproject work are provided

Principal
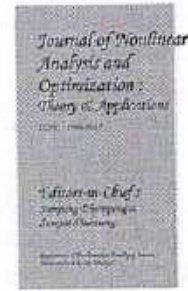
ENHANCINGWOMEN'SSAFETYWITHRASPBERRYPI PICO

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ABSTRACT

Women's safety has become a serious concern in today's society since they are afraid to leave their homes at any moment for fear of physical abuse and violence. With the use of a women's safety device, they may now be stopped. The components of this safety gadget are an emergency button switch and a RASPBERRY PICO controller. This gadget uses a GSM module to recognize emergency situations and sends the position of the woman to emergency contacts. This safety gadget has two sensors: a DHT11 sensor that will sound a buzzer alarm if the temperature rises, and a heartbeat sensor that will send the user an SMS with their position anytime the pulse increases. Apush button allows the ladies to be alerted of an attacker and request assistance, giving them an opportunity to flee. GPS receivers get position data in the form of latitude and longitude from satellites. An SMS is sent to the pre-specified mobile number using the GSM modem. A woman may activate the switch that is carried by her when she feels threatened. The complete system will turnonwhenthe switchispressed. Therecipientwillthen get the SMS right away, along with a location-tracking GSM and GPS link that can be found on Google Maps.

I. INTRODUCTION

INTRODUCTION:

The main purpose of this device is to act as an emergency device for women who are in potential dangerofbeingattacked.TheWomenpossessingthis device will press the panic button if in danger. An SMS containing the latitude and longitudecoordinateswillbesentto mobilenumbersinforming them aboutthedangerandthelocation.Thereceived coordinates can be viewed on Google maps to determine the location of the women and appropriate help can be provided .For sending the message to relevant controlling authority, GSM technology .can be used . This concept was devised for the rouse of serious crime against women in India and to helpcurb those crimes. Women's safety in India has become a concerning issue, crimes against women growing at an appropriate rate . Crimes like kidnapping, sexual harassment towards women and young girls have been increasing day by day. The casesofcrimeagainstwomenhavebeenregisteredof the total 4.05 lakhs by National Crime Records Bureau (NCRB) during 2019 . Violence against women is a serious problem in India. Overall, one- third of women age 15-49 have experienced physical violence and about 1 in 10 has experienced sexual violence.DuringthefirstfourfacesoftheCOVID-19 relatedlockdown,Indian women filed moredomestic violence complaints than recorded in a similar period in the last 10 years. In our project we use three ways of connecting to the concerned authorities.

- ➤ In first when women in danger she can press a button then the SMS will send to theconcerned contact number with the current location.

- ➤ In second the existing device is redone to become familiar with the individual exampleof temperature, Heart Rate of the human body then find out the threshold. When these both are in the above threshold value then it automatically sends a message to concerned authorities.
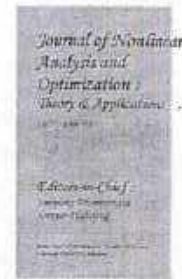
DETECTION OF CYBERBULLING ON SOCIAL MEDIA USING MACHINE LEARNING

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ABSTRACT

Cyberbullying is an activity of sending threatening messages to insult person. To prevent cyber victimization from the activity is challenging. Cyberbullying is a major problem encountered on internet that affects teenagers and also adults. It has lead to mishappening like suicide and depression. Cyberbullying detection is very important because the online information is too large so it is not possible to be tracked by humans. Regulation of content on Social media platforms has become a growing need. The following study uses data from two different forms of cyberbullying, hate speech tweets from Twitter and comments based on personal attacks from Wikipedia forums to build a model based on detection of Cyberbullying in text data using Natural Language Processing and Machine learning. Three methods for Feature extraction and four classifiers are studied to outline the best approach. For Tweet data the model provides accuracies above 90% and for Wikipedia data it gives accuracies above 80%.

I. INTRODUCTION

Now more than ever technology has become an integral part of our life. With the evolution of the internet. Social media is trending these days. But as all the other things mis users will pop out sometimes late sometime early but there will be for sure. Now Cyber bullying is common these days.

Sites for social networking are excellent tools for communication within individuals. Use of social networking has become widespread over the years, though, in general people find immoral and unethical ways of negative stuff. We see this happening between teens or sometimes between young adults. One of the negative stuffs they do is bullying each other over the internet. In online environment we cannot easily said that whether someone is saying something just for fun or there may be other intention of him. Often, with just a joke, "or don't take it so seriously," they'll laugh it off Cyber bullying is the use of technology to harass, threaten, embarrass, or target another person. Often this internet fight results into real life threats for some individual. Some people have turned to suicide. It is necessary to stop such activities at the beginning. Any actions could be taken to avoid this for example if an individual's tweet/post is found offensive then maybe his/her account can be terminated or suspended for a particular period.

So, what is cyber bullying??

Cyber bullying is harassment, threatening, embarrassing or targeting someone for the purpose of having fun or even by well-planned means

1.1 BACKGROUND

Researches on Cyber bullying Incidents show that 11.4% of 720 young peoples surveyed in the NCT DELHI were victims of cyber bullying in a 2018 survey by Child Right and You, an NGO in India, and almost half of them did not even mention it to their teachers, parents or guardians. 22.8% aged 13-18 who used the internet for around 3 hours a day were vulnerable to Cyber bullying while 28% of people who use internet

DRUG RECOMMENDATION SYSTEM BASED ON SENTIMENT ANALYSIS OF DRUG REVIEWS USING MACHINE LEARNING

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ABSTRACT

The Drug Recommendation system based on sentiment analysis of drug reviews utilizes machine learning for sentiment analysis, a significant advancement in healthcare technology. This innovative approach helps medical professionals and patients make informed drug- related decisions by extracting and categorizing attitudes in medication evaluations. Since coronavirus has shown up, inaccessibility of legitimate clinical resources is at its peak, like the shortage of specialists and healthcare workers, lack of proper equipment and medicines etc. The entire medical fraternity is in distress, which results in numerous individual's demise. Due to unavailability, individuals started taking medication independently without appropriate consultation, making the health condition worse than usual. As of late, machine learning has been valuable in numerous applications, and there is an increase in innovative work for automation. This paper intends to present a drug recommender system that can drastically reduce specialist heap. In this research, we build a medicine recommendation system that uses patient reviews to predict the sentiment using various vectorization processes like Bow, TF-IDF, Word2Vec, and Manual Feature Analysis, which can help recommend the top drug for a given disease by different classification algorithms. The predicted sentiments were evaluated by precision, recall, f1score, accuracy, and AUC score. The results show that classifier Linear SVC using TF-IDF vectorization outperforms all other models with 93% accuracy. Index Terms—Drug, Recommender System, Machine Learning, NLP, Smote, Bow, TF-IDF, Word2Vec, Sentiment.

I. INTRODUCTION

With the number of coronavirus cases growing exponentially, the nations are facing a shortage of doctors, particularly in rural areas where the quantity of specialists is less compared to urban areas. A doctor takes roughly 6 to 12 years to procure the necessary qualifications. Thus, the number of doctors can't be expanded quickly in a short time frame. A Telemedicine framework ought to be energized as far as possible in this difficult time.

Clinical blunders are very regular nowadays. Over 200 thousand individuals in China and 100 thousand in the USA are affected every year because of prescription mistakes. Over 40% medicine, specialists make mistakes while prescribing since specialists compose the solution as referenced by their knowledge, which is very restricted. Choosing the top-level medication is significant for patients who need specialists that know wide-based information about microscopic organisms, antibacterial medications, and patients. Every day a new study comes up with accompanying more drugs, tests, accessible for clinical staff every day. Accordingly, it turns out to be progressively challenging for doctors to choose which treatment or medications to give to a patient based on indications, past clinical history.

With the exponential development of the web and the web-based business industry, item reviews have become an imperative and integral factor for acquiring items worldwide. Individuals worldwide become adjusted to analyse reviews

MACHINE LEARNING-BASED EARLY DETECTION OF FISH DISEASES THROUGH WATER QUALITY MONITORING

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ABSTRACT:

The capacity of the aquaculture sector to provide sufficient nourishment is being threatened by diseases that damage fish. It is challenging to detect sick fish in aquaculture at an early stage and to determine whether or not fish are infected due to a lack of adequate infrastructure. The timely and precise identification of sick fish is an essential step in the battle against the disease's further spread. Finding the disease that affects salmon fish in aquaculture is the aim of this study since salmon aquaculture is the food production system that grows the quickest in the world and because it makes up 70% of the market (2.5 million tonnes). Our ability to identify sick fish resulting from many diseases is a result of the cooperative relationship between flawless image processing and machine learning techniques. There are two major sections to this work. Picture pre-processing and segmentation have been used in the first stage to reduce noise and enhance the look of the image, respectively. In the second section of our investigation, we classify diseases and then extract the features associated with each disease using a machine learning technique called Support Vector Machine (SVM) with a kernel function. This support vector machine (SVM) model was applied to the first section's processed images. Next, we perform a comprehensive experiment on the salmon fish photo dataset that was used to study the fish disease, using the mix of techniques that were provided. This work has been presented on a new dataset that include instances where image augmentation was applied as well as instances where it wasn't. Our conclusion is that the SVM we have been employing performs effectively, as shown by its accuracy of 91.42 and 94.12 percent, respectively, when augmentation is and is not used.

I. INTRODUCTION

1.1 BRIEF INFORMATION

A multi-sensor water quality monitoring system was used in order to carry out the monitoring of the Chemical Oxygen Demand (COD), Total Suspended Solids (TSS), and Oil & Grease (O&G). The use of reduced weights and the construction of models based on weighted variables were utilised in an enhanced boosting strategy for the purpose of suppressing quality-relevant factors. Predictions of wastewater quality were made using these models. The observation framework was tested out in the field with successful results, which showed the feasibility of this approach to assess the water quality online. In 2014, a second research was conducted utilising methods of machine learning to determine the level of pollution in the ocean off the coast of South Korea. Between 2011 and 2012, 63 samples were gathered by them. The analysis of the Geostationary Ocean Colour Imager (GOCI) photos was used in the research, and it was effective in discussing the distribution of water quality metrics. In 2012, a research project led by S. Shah was carried out in twenty distinct sites throughout the Indian state of Kerala. According to the findings of the research, the majority of the water samples collected in the area were appropriate for agricultural use. In order to make the water suitable for the marine life that lived in it, a fairly simple pretreatment was required. N. Karlar conducted research on the water samples he obtained from ten different communities. He examined physicochemical factors such as temperature, conductivity, pH, ionic strength (Cl-), total dissolving solids (TDS), alkalinity, Ca2+, and Mg2 +. Because the WQI of these samples varied from 40.67 to 69.59, it was clear that the water taken from the block surface needed to be treated before it could be used. Usha conducted study in the year 2013 to determine the water quality rating and health of urban water bodies in the town of Bilari. During the first three months of 2011, water samples were collected from 10 different places around the country. Several physico-synthetic characteristics of surface water were investigated over the course of this study. According to the WQI, the level of pollution in the water was becoming worse every day. A. B. Frontier engaged in the process of doing his study. In order to conduct an investigation on the physicochemical characteristics of the water, samples were collected from a variety of communities located within the Nasik district of the Kalwan Tahsil.

PERSONALITY AWARE PRODUCT RECOMMENDATION SYSTEM BASED ON USER INTEREST MINING AND METAPATH DISCOVERY

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ABSTRACT

In the context of epidemic prevention and control, food safety monitoring, data analysis and food safety traceability have become more important. At the same time, the most important reason for food safety issues is incomplete, opaque, and asymmetric information. The most fundamental way to solve these problems is to do a good job of traceability, and establish a reasonable and reliable food safety traceability system. The traceability system is currently an important means to ensure food quality and safety and solve the crisis of trust between consumers and the market. Research on food safety traceability systems based on big data, artificial intelligence and the Internet of Things provides ideas and methods to solve the problems of low credibility and difficult data storage in the application of traditional traceability systems. Therefore, this research takes rice as an example and proposes a food safety traceability system based on RFID two dimensional code technology and big data storage technology in the Internet of Things. This article applies RFID technology to the entire system by analysing the requirements of the system, designing the system database and database tables, encoding the two-dimensional code and generating the design for information entry. Using RFID radio frequency technology and the data storage function in big data to obtain information in the food production process. Finally, the whole process of food production information can be traced through the design of dynamic query platform and mobile terminal. In this research, the food safety traceability system based on big data and the Internet of Things guarantees the integrity, reliability and safety of traceability information from a technical level. This is an effective solution for enhancing the credibility of traceability information, ensuring the integrity of information, and optimizing the data storage structure.

I. INTRODUCTION

With the widespread of personal mobile devices and the ubiquitous access to the internet, the global number of digital buyers is expected to reach 2.14 billion people within the next few years, which accounts for one fourth of the world population. With such a huge number of buyers and the wide variety of available products, the efficiency of an online store is measured by their ability to match the right user with the right product, here comes the usefulness of a product recommendation systems. Generally speaking, product recommendation systems are divided into two main classes: (1) Collaborative filtering (CF), CF systems recommend new products to a given user based on his/her previous (rating/viewing/buying) history Sahraoui Dhelim, Huansheng Ning and Nyothiri Aung are with School of Computer and Communication Engineering, University of Science and Technology Beijing, 100083, Beijing, China. Runhe Huang and Jianhua Ma are with the Faculty of Computer and Information Sciences Hosei University, Japan. Corresponding author: Huansheng Nin(ninghuansheng@ustb.edu.cn). Manuscript received September 24, 2019; revised October 03, 2020. and his/her neighbours. For example, as shown in Figure 1 (a), most of the people of previously bought a football jersey,

A STUDENT ATTENDENCE MANAGEMENT METHOD BASED ON CROWDSENSING IN CLASSROOM ENVIRONMENT

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ABSTRACT

In smart cities, intelligent learning environment is an important application scenario, and class attendance checking is an important measure to urge students to attend on time and ensure the quality of learning. Aiming at the existing problems in class attendance checking, such as low efficiency and easy to cheat, this paper proposes a student attendance management method named AMMOC (Attendance Management Method based on Crowdsensing). AMMOC includes two phases, i.e., the initialization phase and the authentication phase. In the initialization phase, a teacher sends an attendance checking request to the server. After receiving the request, the server sends a request to tell students to submit their location information, and then forms the student location map once the server receives all the response from students. In the authentication phase, the server verifies the truth of the location information by sending requests to several students to count the number of students. The authentication phase includes two modules, i.e., the task assignment module and the attendance verification module. In the task assignment module, AMMOC first finds the optimized sequence of subregions and verifiers by using the Monte Carlo algorithm, and then requires the verifiers to count the number of students in the subregion. Finally, the statistics results will be verified in the attendance verification module. Experiment comparisons and analyses show that AMMOC has the advantages of good anti-cheating performance, fast speed, and little disturbance to class, and is suitable for attendance checking applications in classroom environment.

I. INTRODUCTION

With the popularity of mobile devices, how to build a mobile learning interactive environment has become an important problem during the construction of smart cities. Mobile learning is increasingly becoming an indispensable learning paradigm in modern education systems. Applying the mobile computing technology to the classroom environment (i.e., mobile education) can solve many problems in traditional class learning systems, e.g., laborious class management, non-timely feedback in teaching effect, and poor communication between teachers and students. Nowadays, mobile education has become one of the hotspots in the modern education field. Class attendance ratio is one crucial indicator for evaluating the quality of a course. Lukkarinen et al. used clustering and regression analysis to study the relationship between college students' class attendance ratio and IEEE Access and Transaction on IOT, Volume: Issue Date:18.February.2021 academic performance . They found that it is positively correlated

between attendance ratio and scores, and the high attendance ratio of students will improve the effect of teaching. Besides, absence from class will affect not only the individual scores but also the learning atmosphere of a class. Therefore, attendance has always been an important part of school management.

The existing class attendance checking is usually carried out in manual mode, and it can be divided into two forms, i.e., the one without teacher supervision, and the one with teacher supervision. During the class attendance checking without teacher supervision, students pass a check-in form in the classroom to complete the attendance checking, but the delivery of the check-in form will not only interfere in the class order, but also cause a certain degree of fake attendance checking. During the class attendance checking with teacher supervision, teachers (or teaching assistants) confirm the attendance of students by roll-calling one by one. This kind of roll-calling method is very inefficient. When the number of students is large, the roll-calling process will

ADVANCED IRIS RECOGNITION WITH MACHINE LEARNING

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ABSTRACT

Based on the iris recognition system and related technologies, one of the primary outcomes of the validation system is the fingerprint-based system. The whole biometric procedure is much more genuine and distinct than the other kinds of validation procedures and recognition systems. This has given people creative ideas for their everyday lives. In general, the multimodal biometric process has used a variety of applications to appropriately address the most important and relevant shortcomings of the "unimodal biometric system." In general, the complete process has been incorporated, taking into account the appropriate noise sensitivity, population coverage regions, situations of variability involving both intra- and inter-class concerns, vulnerability involving potential hacking, and non-universality criteria. The machine learning system with a deep learning orientation has been the primary topic of the whole research article. Convolutional neural network (CNN) technology has been primarily used in the fingerprint-based iris recognition system to provide accurate human validation. The iris recognition system has mostly been used in relation to the "high security protection system with actual fingerprints" in the current data validation procedure. The optimal uniqueness, reliability procedure, and appropriate "validity of the iris biometric validation system" for the real goal of person identification have been briefly discussed throughout the whole text.

I. INTRODUCTION

1.1. Introduction

The biometric process has been mainly used to recognize individual types of physical aspects and features. For this purpose, a tremendous amount of acknowledgement technologies have been generally provided with the actual fingerprint, iris procedures and voice acknowledgement. The biometric mainly deals with the proper technical and technological fields for the body controls and body dimensions. The authentication system is based on the appropriate biometric security system that has increased the actual importance within all countries. The used system has been shown the proper valid and best impressive performance based on all these procedures and aspects. For this purpose, the fingerprint is the only procedure for providing the proper security techniques to provide the true uniqueness and the strong privacy properties of the entire system. The exceptional fingerprint assurance or the proper kind of imprint approval has been mainly insinuating the automated methods and procedures to ensure similarity between the two people fingerprints. The entire chapter has been generally provided with the actual purpose of the fundamental research that is overall dependent on the research objectives and respective research questions. In this chapter, the research framework of the entire study has also been provided. The fundamental research has described all the factors that are responsible for this recognition process.

II. LITERATURE REVIEW

The literature review chapter has been mainly provided with a detailed description of the various problems and different types of recognition aspects that has been mainly associated with the entire area of the research study. The fundamental research has been conducted with the help of the different types of research notes of different authors and researchers. The entire process is also evaluated by the brief description of the research from the different online articles, journals and various websites. The fundamental research has been conducted with respect to the in-depth analysis process of the entire validation based recognition system. Including all of these, this particular chapter has also demonstrated the particular models and theories of the proposed

MATERIAL SCIENCE AND TECHNOLOGY

CONSTRUCT FOOD SAFETY TRACEABILITY SYSTEM FOR PEOPLE HEALTH UNDER THE INTERNET OF THINGS AND BIG DATA

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ABSTRACT

In the context of epidemic prevention and control, food safety monitoring, data analysis and food safety traceability have become more important. At the same time, the most important reason for food safety issues is incomplete, opaque, and asymmetric information. The most fundamental way to solve these problems is to do a good job of traceability, and establish a reasonable and reliable food safety traceability system. The traceability system is currently an important means to ensure food quality and safety and solve the crisis of trust between consumers and the market. Research on food safety traceability systems based on big data, artificial intelligence and the Internet of Things provides ideas and methods to solve the problems of low credibility and difficult data storage in the application of traditional traceability systems. Therefore, this research takes rice as an example and proposes a food safety traceability system based on RFID two dimensional code technology and big data storage technology in the Internet of Things. This article applies RFID technology to the entire system by analyzing the requirements of the system, designing the system database and database tables, encoding the two-dimensional code and generating the design for information entry. Using RFID radio frequency technology and the data storage function in big data to obtain information in the food production process. Finally, the whole process of food production information can be traced through the design of dynamic query platform and mobile terminal. In this research, the food safety traceability system based on big data and the Internet of Things guarantees the integrity, reliability and safety of traceability information from a technical level. This is an effective solution for enhancing the credibility of traceability information, ensuring the integrity of information, and optimizing the data storage structure.

I. INTRODUCTION

As the global new crown virus (COVID-19) epidemic intensifies, there are more and more cases of COVID-19 spreading through cold chain logistics channels. COVID-19 has become the most important source of hazards to food safety in the cold chain logistics process. Although the overall prevention and control situation of our country's new corona virus pneumonia epidemic continues to improve, the accelerated spread of the overseas epidemic has led to the domestic epidemic prevention situation of "foreign import and internal prevention" is still severe. In the context of epidemic prevention and control, food safety monitoring, data analysis, and food safety traceability have become more important. Especially for cold chain food imported from overseas, every food should be monitored and traced to prevent the spread of COVID-19 virus and protect the health and safety of the population. Therefore, the establishment of a safe and reliable food safety traceability management system is an urgent requirement of the society and the people, and it is also an effective way to fundamentally solve the post-epidemic era and protect the health of the population. The food safety traceability management system is based on automatic identification and information technology to integrate information in the entire chain of food production, processing, storage, transportation and sales. A comprehensive service management platform that is presented to users and consumers in real time through the Internet, terminals, phone calls, and text messages.

1.1   Scope:

The development of automatic information generation equipment represented by sensors and intelligent terminal recognition has enabled rapid development of technologies such as perception, measurement and monitoring based

CYBERSECURITY AWARENESS IN ONLINE EDUCATION A CASE STUDY ANALYSIS

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ABSTRACT

This study presents to what extent Kyrgyz-Turkish Manas University students are knowledgeable about cybersecurity in the distance education process. The survey was conducted with a sample of 517 students from all faculties of the university at the undergraduate, graduate, and PhD levels. Our research study shows that although huge numbers of cyberattacks are occurring around the world, the students did not have any knowledge about cybersecurity and the effects of cyberattacks overall. An analysis of cybersecurity awareness was undertaken by asking questions focused on malicious software, password security, and social media security. Although we live in an age of technology where our entire lives are indexed to the internet through the distance education process, it has been determined that students have a weak cybersecurity awareness. It has been further concluded that cybersecurity education should be given to prevent the students from becoming a victim of cyberattacks, helping them to use the internet more effectively.

I. INTRODUCTION

With the spread of technology and the penetration of the internet into every aspect of daily life, cybersecurity has begun to be of great importance for both individuals and states alike. Although these innovations have made our lives easier, the increase in cyberattacks has made it necessary to take measures in this area. In addition, one of the most basic points is that the types of cyberattack, in other words the malicious use of cyberspace, have changed in the last 20 years. This has led to the use of new "cyber" concepts and risks in the literature.

A cyberattack is defined by Hathaway et al. as follows: "A cyber-attack consists of any action taken to undermine the functions of a computer network for a political or national security purpose". The most basic question to ask is 'Does this definition define cyberattacks today?' Today, saying that cyberattacks are carried out only for political purposes is insufficient when it comes to trying to understand the nature of cyberattacks. This is because new cyber concepts have emerged that have changed the nature of cyberattacks.

What remains similar is the use of computers in attacks. In this context, cybercrimes are defined as crimes committed through computers. The Department of Justice of the USA defines a cybercrime as "any violations of criminal law that involve knowledge of computer technology for their perpetration, investigation or prosecution".

On the one hand, it is important to explain what cybersecurity is. Although the concept does not have any common definition, the International Telecommunication Union (ITU) defines cyber security as "the collection of tools, policies, security concepts, security safeguards, guidelines, risk management approaches, actions, training, best practices, assurance and technologies that can be used to protect the cyber environment and organization and user's assets. Cybersecurity strives to ensure the attainment and maintenance of the security properties of the organization and user's assets against relevant security risks in the cyber environment'.

Although there are now more complex structures in cyberattacks and cybersecurity compared to the past, the ability to perform cyberattacks has developed. The capacity to learn through websites that almost every computer user can access has increased. This is especially so the new generation, called the Z generation. They are often completelyinvolved with computer technologies and can easily perform any activity they want by using it.

II. SYSTEM ARCHITECTURE

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HOTEL REVIEW ANALYSIS FOR THE PREDICTION OF BUSINESS USING DEEP LEARNING

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ABSTRACT

Sentiment analysis is a widely used topic in Natural Language Processing that allows Identifying the opinions or sentiments from a given text. Social media is the scope for the customers to share their opinion over the products or services as part of customer reviews. Dissect this review has become an important factor for business analysis since online business is exponentially growing in today's techno-friendly competitive market. A large number of algorithms have been found in recent articles.

Among those deep learning is an important approach. In the proposed methodology, long short-term memory (LSTM) and gated recurrent units (GRUs) have been used to train the hotel review data where the accuracy rate of identifying customer opinion is 86%, and 84% respectively. The dataset is also tested by using Naïve Bayes, Decision Tree, Random Forest, and SVM. For Naïve Bayes obtains an accuracy of 75%, for Decision Tree obtains an accuracy of 71%, for Random Forest the accuracy is 82% and for SVM our accuracy result is 71%. Deep learning is used to obtain better business performance and also get the review from customers and also to predict the sentiment about customer review. Our algorithm works properly and gives better accuracy.

I. INTRODUCTION

In the age of modern science, everything is based on online and on the internet. Internet-based shopping has become easier and more popular because of better quality, and fast logistic systems. Internet-based shopping and booking is very comfortable. People can easily make a booking without going outside. The most effective s ide part of online-based work is that people can give a review. Recognizing reviews allows others to easily understand the emotions of others and obtain the rationality result of different products.

In the hotel review, the prediction of business using Deep Learning was analysed [24]. Many start-up businesses became failure due to lack of analysis and the sentiment of the customer. Sentiment Analysis is the most significant to improve a business site. Here, different type of data from social media as well as from the Hotel Management Website was collected using Unami tools. And also, some supervised an unsupervised data is used to predict the best result. This article will help to improve the business.

1.1 Scope

At present, online-based opinions can easily analysis with the help of Sentiment Analysis (SA). It is the management of sentiments, different opinions subjective text, and different emoji used for giving reviews. People can easily get the comprehension information related to people review.

Mainly Sentiment analysis is one kind of tool that helps to get the public sentiment. By capturing reviews of product or location or person might be found from a different internet-based site like Face book, Amazon. Sentiment Analysis is used to increase the requirement of analysing and structuring hidden information which comes from social media in the form of data.

The growing popularity of online booking platforms, hotel reviews have become a valuable source of information for travellers when making their accommodation choices. However, analysing the vast amount of text data contained in these reviews manually is a time-consuming and labour-intensive task. Hence, there is a need to develop automated methods for sentiment analysis of hotel reviews. Sentiment analysis, also known as opinion mining, is the process of automatically identifying and classifying subjective information from text data. It involves analysing the language and tone used in text to

PHISHING WEBSITE DETECTION USING MACHINE LEARNING ALGORITHMS

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ABSTRACT

Phishing attack is a simplest way to obtain sensitive information from innocent users. Aim of the phishers is to acquire critical information like username, password and bank account details. Cyber security persons are now looking for trustworthy and steady detection techniques for phishing websites detection. This paper deals with machine learning technology for detection of phishing URLs by extracting and analysing various features of legitimate and phishing URLs.

Decision Tree, random forest and Support vector machine algorithms are used to detect phishing websites. Aim of the paper is to detect phishing URLs as well as narrow down to best machine learning algorithm by comparing accuracy rate, false positive and false negative rate of each algorithm.As a result, finding strategies that can automatically detect phishing websites and quickly manage zero-day phishing attempts is an open challenge in this field. The web page in the URL which hosts that contains a wealth of data that can be used to determine the web server's maliciousness.

I. INTRODUCTION

Nowadays Phishing becomes a main area of concern for security researchers because it is not difficult to create the fake website which looks so close to legitimate website. Experts can identify fake websites but not all the users can identify the fake website and such users become the victim of phishing attack. Main aim of the attacker is to steal banks account credentials. In United States businesses, there is a loss of US$2billion per year because their clients become victim to phishing [1]. In 3rd Microsoft Computing Safer Index Report released in February 2014, it was estimated that the annual worldwide impact of phishing could be as high as $5 billion [2]. Phishing attacks are becoming successful because lack of user awareness. Since phishing attack exploits the weaknesses found in users, it is very difficult to mitigate them but it is very important to enhance phishing detection techniques.

The general method to detect phishing websites by updating blacklisted URLs, Internet Protocol (IP) to the antivirus database which is also known as "blacklist" method. To evade blacklists attackers uses creative techniques to fool users by modifying the URL to appear legitimate via obfuscation and many other simple techniques including: fast-flux, in which proxies are automatically generated to host the web-page; algorithmic generation of new URLs; etc. Major drawback of this method is that, it cannot detect zero-hour phishing attack.

Heuristic based detection which includes characteristics that are found to exist in phishing attacks in reality and can detect zero-hour phishing attack, but the characteristics are not guaranteed to always exist in such attacks and false positive rate in detection is very high [3].

To overcome the drawbacks of blacklist and heuristics based method, many security researchers now focused on machine learning techniques. Machine learning technology consists of a many algorithms which requires past data to make a decision or prediction on future data. Using this technique, algorithm will analyze various blacklisted and legitimate URLs and their features to accurately detect the phishing websites including zero- hour phishing websites.

1.2. DATASET

URLs of benign websites were collected from www.alexa.com and The URLs of phishing websites were collected from www.phishtank.com. The data set consists of total 36,711 URLs which include 17058 benign URLs and 19653 phishing URLs. Benign URLs are labelled as "0" and phishing URLs are labelled as "1".

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PREDICTING HEART DISEASE USING MACHINE LEARNING

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ABSTRACT

The heart is an important organ in living things. The diagnosis and prognosis of heart-related disorders need more accuracy, perfection, and precision since even a little error may result in exhaustion or even death; the number of heart-related deaths is growing dramatically every day. In order to address the issue, a prediction system for illness awareness is vital. Artificial Intelligence (AI) has a branch called machine learning, which offers distinguished assistance in forecasting any kind of occurrence by using natural events as training data. In this study, we use the UCI repository dataset for training and testing to determine the accuracy of machine learning algorithms for heart disease prediction. The methods include k-nearest neighbor, decision tree, linear regression, and support vector machine (SVM). The Anaconda (jupytor) notebook is the greatest tool for implementing Python programming; it has a variety of libraries and header files that improve the accuracy and precision of the task.

I.   INTRODUCTION

Heart is one of the most extensive and vital organ of human body so the care of heart is essential. Most of diseases are related to heart so the prediction about heart diseases is necessary and for this purpose comparative study needed in this field, today most of patient are died because their diseases are recognized at last stage due to lack of accuracy of instrument so there is need to know about the more efficient algorithms for diseases prediction.

Machine Learning is one of the efficient technology for the testing, which is based on training and testing. It is the branch of Artificial Intelligence(AI) which is one of broad area of learning where machines emulating human abilities, machine learning is a specific branch of AI. On the other hand machines learning systems are trained to learn how to process and make use of data hence the combination of both technology is also called as Machine Intelligence.

As the definition of machine learning, it learns from the natural phenomenon, natural things so in this project we uses the biological parameter as testing data such as cholesterol, Blood pressure, sex, age, etc. and on the basis of these, comparison is done in the terms of accuracy of algorithms such as in this project we have used four algorithms which are decision tree, linear regression, k-neighbour, SVM.

In this paper, we calculate the accuracy of four different machine learning approaches and on the basis of calculation we conclude that which one is best among them.

Section I of this paper consist the introduction about the machine learning and heart diseases. Section II described, the machine learning classification. Section III illustrated the related work of researchers. Section IV is about the methodology used for this prediction system. Section V is about the algorithms used in this project. Section VI briefly describes the dataset and their analysis with the result of this project. And the last Section VII concludes the summary of this paper with slight view about future scope of this paper.

II.   LITERATURE SURVEY

TWEET-BASED BOT DETECTION USING BIG DATA ANALYTICS

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ABSTRACT

Twitter is one of the most popular micro-blogging social media platforms that has millions of users. Due to its popularity, Twitter has been targeted by different attacks such as spreading rumors, phishing links, and malware. Tweet-based botnets represent a serious threat to users as they can launch large-scale attacks and manipulation campaigns. To deal with these threats, big data analytics techniques, particularly shallow and deep learning techniques have been leveraged in order to accurately distinguish between human accounts and tweet-based bot accounts. In this paper, we discuss existing techniques, and provide a taxonomy that classifies the state- of-the-art of tweet-based bot detection techniques. We also describe the shallow and deep learning techniques for tweet-based bot detection, along with their performance results. Finally, we present and discuss the challenges and open issues in the area of tweet-based bot detection.

I. INTRODUCTION

Nowadays, social media is one of the most popular tools used by people to communicate with one another. It is also largelyused by organizations to reach out to customers. In, it hasbeen reported that there are 3.5 billion active social mediausers globally. Facebook, Twitter, LinkedIn, and other social media networks are used by organizations to improve brand visibility and boost their sales. Twitter is one of the mostpopular social media platforms. It has 340 million active userswho are allowed to communicate at a large scale and sharetheir opinions about different topics.

Twitter could be targeted by various kinds of attacks. For example, a spear phishingattack in July 2020 led to the hijack of high pro_leTwitteraccounts [2]. Also, fraudulent accounts could be created toimpersonate legitimate users and organizations.Twitter can

also be exploited by bot net, which is a set ofmalicious accounts that operate under a botmaster, and arecontrolled by software programs rather than human users. The tweet-based social media bots pose serious security risksto Twitter users. These bots are used to spread fake contents, phishing links, and spams. Although they are not used as botsto launch DDOS attacks, they could be utilized as Commandand Control (C&C) infrastructure to coordinate DDOS attack [3], [4]. They are capable of interacting with human accountsto deceive the users and hijack their accounts. These bots arealso used as tools to launch large-scale manipulation campaigns to influence public opinions. According to a study [5],52% of online traffic is generated by botnets, and the rest isproduced by actual users. It is also worthy to note that some bots are found with over 350,000 fake followers. To dealwith the above issues, there is a need to develop detectionsystems that can accurately distinguish between Twitter botaccounts and human accounts. Twitter data represent one of the examples of big data as around 500 million tweets aregenerated every day, i.e., 6,000 tweets every second.

Big data analytics has been widely used in different fields[7]_[11] to process large amount of data, discover hidden patterns, and find correlations among data points.

Artificialintelligence techniques are increasingly leveraged by big dataanalysis. In particular, shallow (conventional) and deep learning techniques have received considerable attention from the academia and industry due to their success in dealingwith heterogeneous and complex data, automatic learningof models, revealing unseen patterns, identifying dependencies,and getting insights from analyzing data.

Artificial intelligence has been extensively used by Twitterto determine tweet recommendations

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A new framework to enhance healthcare monitoring using patient-centric predictive analysis

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Article Info	ABSTRACT
  	In the contemporary healthcare landscape, various intelligent automated approaches are revolutionizing healthcare tasks. Learning concepts are pivotal for activities like comprehending acquired data and monitoring patient behavior. Among patient-centric concerns, addressing data heterogeneity, extraction, and prediction challenges is crucial. To enhance patient monitoring using care indicators like cost and length of stay at healthcare centers, many researchers found a model for automated tools, but do not have the artificial intelligence (AI) based models as of now. Therefore, this research study will propose an AI and internet of things (IoT) integrated automated approach with smart sensors called the "PatientE" framework with heterogeneity and patient data. Employing certain rules for data extraction to form a distinct representation, our model integrates pre-treatment information and employs a modified combined random forest, long-short term memory (LSTM), and bidirectional long-short term memory (BiLSTM) algorithm for predictive post-treatment monitoring. This framework, synergizing AI, IoT, and advanced neural networks, facilitates real-time health monitoring, especially focusing on breast cancer patients. Embracing pre-treatment, in-treatment, and post-treatment phases, our model aims for accurate diagnosis, improved cost-efficiency, and extended stays. The evaluation underscores scalability, reliability enhancement, and validates the framework's efficacy in transforming healthcare practices.

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1. INTRODUCTION

Several healthcare monitoring systems and technologies have been developed to monitor and improve patient health, streamline healthcare delivery, and enhance overall well-being. Some existing healthcare monitoring systems are electronic health records, telemedicine and remote patient monitoring, health information exchange systems, clinical decision support systems, medication management systems, and population health management systems. This study investigated the effects of remote patient monitoring with modern technologies. While earlier studies have explored the impact of stand-alone and local or physical communication-based treatment methodologies, they have not explicitly addressed its influence on remote patient monitoring. It is important to note that the adoption of these technologies may vary across

Decision Support Tool for Medical Prediction System Using Multiplexed Machine Learning Techniques

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Abstract: Medical information systems are used by large number of hospitals to control the patient data and clinical information. Typically, these systems produce enormous volumes of data in statistics, text, graphs, and images. Regrettably, these statistics are rarely utilized to assist clinicians in making clinical decisions. This problem can be solved using advanced techniques of machine learning. So, the main goal of the proposed study is to create a prototype of a Decision Support in Medical Prediction Systems using prominent and efficient machine learning techniques like Naïve Bayes, ID3, and Compact Weighted Associative Classification. It can predict a patient's chance of developing cancer, HIV, diabetes, and heart attacks. The system's performance and accuracy are investigated and examined using various test plan scenarios. A group of related inquiries must be handled to achieve the appropriate decision-making solution from the revealing prediction system. One of the system's benefits is that it may be used as a module in a hospital management system. The inputs can be automatically given from the patient details, and they produce the exact results. Everyone can easily access it, even in their homes, when the system is spread online. The proposed approach was tested on the UCI machine learning dataset with the simulation environment. The objective of the research work is to create a web-based questionnaire application for Decision Support in Medical Prediction systems. It can retrieve hidden knowledge (patterns and correlations) linked with users' answers to the particular disease from a historical diseases database. This proposed system helps predict the patient's condition and achieve better results by comparing the performance of these algorithms and calculating their accuracy.

Keywords—Decision Support, Medical Prediction System, Machine Learning Techniques

1. Introduction

Decision Support in Medical Prediction System is designed and implemented to support clinicians' diagnoses. It is visible that by improving these systems, the medical diagnostic decisions quality can be increased. Machine learning yield a better way to retrieve the information buried in the data. In large and complex collections of data ML algorithms can find patterns hidden, which evade conventional statistical methods to analysis. With the increase of deadly diseases that threaten human health and life, Health Decision Support Systems carry on with their effectiveness in supporting healthcare professionals and physicians with paves way in clinical decision-making.

.1. Medical prediction system

Many healthcare organizations (hospitals, medical centers) provide gh-quality care at low prices. They can accomplish these effective rvices by making use of relevant system based health information and cision-making methods. In recent days most hospitals use hospital 'ormation systems to process their hospital patient health data. pically, these systems generate massive volume of raw or noisy data in istics, text, tables, images and charts. It's regret that, these noisy or tructured data are seldom used to assist physicians in making critical ical decisions. These data provide a plethora of secret knowledge that rgely untapped. The challenge of turning data with noise into useful wledge or data that allows medical professionals to decide informed cal decisions is always unresolved, which is the primary motivation iis study.

1.2. Classification and prediction, decision tree, weighted association rule mining

Classification is a definitive machine learning method based on categorizing a given set of data. Classification is helpful in classifying each item in a data into one of a predefined set of classes or category. Classification is used to forecast missing or numerical data values that are not available, than class labels. In spite of the fact that the concept of prediction can refer to predictions of both class label and numeric, it is the discovery of relationships between independent factors and dependent and independent variables that is the goal of prediction. The decision tree structured as tree structure that resembles structure of flowchart. Each branching node correlates to a test on an value of attributes, the test's result represented by the branch, and leaves of the tree represent class distributions or classes. Decision trees can conveniently be transformed to classification rules. Three types of nodes make up a decision tree, Decision nodes usually represented by squares, Circle denotes Chance nodes, triangles represented as End nodes. Weighted ARM operates the weighted support and also the Confidence Framework to derive Association rule from the repository of data. The classical ARM framework assumes that all items are of equal importance or significance within a transaction or record; their weight is similar, which is not always the case. A lot of existing algorithms are used to classify the datasets. This paper presents a new efficient Medical Prediction System using three types of Machine learning Techniques, namely Naïve Bayes Classification, ID3 Decision Tree Algorithm, and Compact Weighted Associative Classification. They predict the possibility of patients who may be affected by disease. To acquire better results, the performances of these three algorithms are compared, and their accuracy is calculated.

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Predicting student's placement prospects using Machine learning Techniques

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Abstract:

Placements are extremely important in students' life as well as the prestige of educational institutions. The majority of students who enrol in college or university hope to be hired by their ideal employer. The reputation of educational institutions is influenced by the rate of placement as well as the quality of instruction. As a result, educational institutions must ensure that students are not only prepared for the industry, but also for placements. All of the colleges go to considerable lengths to assist students in landing jobs at their ideal companies. However, the placement rate varies from year to year for each college. And this has an impact on the institution's reputation. It is critical for educational institutions to prepare students not only intellectually but also for placement in the industry. Early identification of the placement probability will assist both students and management in concentrating on the required area, eliminating barriers, and increasing the possibilities of being placed. The placement prediction process helps to determine the needs of students, which increases the likelihood of their being placed. Early detection of an issue aids in the early removal of roadblocks.

Keywords: Predictive Analysis, Support Vector Machine, Kernel Functions, Behaviour Analysis, Educational data Analysis.

1. Introduction

The process of placement prediction is critical in assessing the students' tendencies and personalities at various levels [1]. At various phases of the student's advancement, a training model is required to measure the effectiveness of the student's progress. Students with diverse needs are being taught using a similar training approach [13]. Due to the unperceptive environment, a gap exists between the required training and the actual training, resulting in a failure to achieve the desired result [2]. Delays in placements have an impact on students' mental health as well as peer and family pressure. Consider a scenario in which we can forecast a student's placement using a prediction model, and we can identify a group of students who could benefit from a specific form of instruction [14]. As a result, we can meet the needs and achieve these outcomes in a win-win situation [3].

The project's outcome is an increase in the placement rate. The societal impact of this is related to student mental health, as the pressure they face could be alleviated [5]. And, as a result of the improved positions, the reputation improves such as:

- Improves placement rate
- Reduces student community pressure
- Has a transitive influence on college reputation

2. Literature Review

The writers' efforts Srinivas et al [8] looked at the students' academic history, including their percentage marks, coding skills, verbal and nonverbal skills, and reasoning capacity. The authors suggested a model that incorporated data focusing on student scores at their secondary level of study and performed a compatibility check with previous levels. The technique was implemented using logistic regression with the addition of weightage to the normal execution of the operating parameters. According to the findings, various behavioural abilities can be associated with major factors.

Huda Al-Shehri et al [4] investigated the predictive nature of correlation-based feature selection in their study. The exact association is calculated using values obtained at regular intervals between the CFS variables. SVM and K-NN classifiers were used to test the different feature combinations with SVM and K-NN classifiers. KNN's performance improved as a result of the experimental results. In the future, other combinations of machine learning algorithms with improvisation in prediction rate could be used.

Animesh Giri et al [1] published a similar study in which they used K-NN classifiers to develop a placement prediction system for the chances of students being placed. For the purpose of gauging the target among the students, the labelling is set to binary. The results were compared to those of other machine learning approaches including logistic regression and SVM models. Future work could be carried out by doing an analysis with students across various fields of study.

The authors Mangasuli Sheetal et al [9] created a decision support model with the goal of analysing the shared placement chances among the students group. To precisely determine the knowledge discovery process, algorithms concentrating on fuzzy logic with K-NN were applied. Future work can be preceded by a variety of algorithm combinations with altered operating

Sentiment Analysis of user groups in an working Environment using CNN for Streaming Data Analysis

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Abstract. The domain of sentiment analysis is mainly concerned with observing the nature of text with positive, negative, and neutral effects in a given environment. It is also called the process of opinion mining in which the emotion behind the idea, service, or product completely signifies the nature of the environment as observed. The insights from this unorganized textual data can be evaluated along with the methods available in machine learning. This research work completely focuses on the mechanism of observing the project teams with a significant analysis in monitoring the percentage of happiness involved in executing a specified project. In addition to the collection of views from the different groups of employers, we have observed their nature through a webcam-enabled platform to best determine the work nature of team members. We have used CNN with the available streaming data and captured the nature of workers in a dignified environment. A set of statistical measures has been evaluated to best validate the proposed method which extracts sentiments for the observed data. Future work can be progressed with the extraction of organizational data rather than focusing on working teams in a given environment.

Keywords: Data Analytics, Machine learning, Sentiment analysis, Neural Network, Statistical Analysis

1   Introduction

The target behind the successful execution of a project lies in the involvement of the working teams in a given environment. The work process, nature of the people, and their innovations lie at the support provided by the industrial and organizational practices. Collecting the user responses and making their inferences at the higher level needs some form of analysis which in turn provides greater insights for the user to observe. The aspect of analyzing the unstructured and semi-structural data can be made using sentiment analysis in order to observe the effects focusing on positive, negative, and neutral responses [5].

INTERCONNECTION SWITCH ON-OFF STATE IDENTIFICATION OF DISTRIBUTION NETWORKS BASED ON LOAD MEASUREMENT

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ABSTRACT

In this paper, two approaches of interconnection switch on-off state identification of medium voltage distribution network are proposed; one is using weighted least squares (WLS) to estimate the voltage variables of all nodes by measured values of end nodes under given possible topology models, and then using recursive Bayesian approach (RBA) to justify which topology model is the correct one; the second approach is using back-forward sweep (BFS) power flow algorithm to obtain the voltage variables of all nodes, then using the same RBP to identify the topology. The case study of IEEE 33 nodes distribution networks shows that both approaches have a high accuracy, but the BFS has a faster justification, fewer iterations, less computing time and simpler codes.

INTRODUCTION

Medium voltage 10kV distribution network is the most complicated grid of power grid topology. In order to ensure the quality and reliability of electric power supply, the medium voltage distribution network adopts closed-loop design but open-loop mode in operation. A large number of line section switches, branch switches, interconnection switches are installed, where interconnection switches are installed in switching stations or loop-network switch cabinets, etc. So the power grid can adopt a variety of open-loop modes to ensure the quality and reliability of power according to the requirements of overhaul, fault, economic operation [1-2]; The operation of closing and breaking Loop are very frequent in distribution network, which account for 48.1% of the daily operation of the project schedule [1]. The on-off states of the interconnection switches have become the decisive factors about the dynamic topology of the distribution network [3]. At present, the load nodes (also as the end nodes) of the medium-voltage 10kV distribution network, including special distribution transformers, public distribution transformers, customer subscriber lines, are equipped with smart metering terminals, which can acquire electrical power and energy data in a designed time interval about 15-60 minutes. However, the data acquisition of on-off states of switches in medium voltage distribution network is incomplete due to the high investment, therefore, the dynamic topology can't be directly obtained from on-time

INTELLIGENT ELECTRICAL LOAD SHEDDING IN HEAVILY LOADED INDUSTRIAL ESTABLISHMENT

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ABSTRACT

The purpose of a Load Shedding Control System (LSS) is to prevent a dangerous overloading of the generators and/or a general collapse (blackout) of an electric power system due to a generator failure or any contingency which may diminish the capacity of the operational generators below the active power required by the loads. Such a state may create an imbalance in the power supply and thus lead to a frequency decay, voltage collapse and overload on all the power generation units connected to the system. In case the electrical supply is inadequate to meet the demand of the process loads, partial supply to certain areas can be interrupted in order to prevent the failure of the whole electrical system. This process is called load shedding. This is an entirely different concept from a power failure that may occur due to various reasons. Load shedding is an effective method to prevent a total collapse of the electrical supply, which may have a disastrous impact on the continuity of the processes and operations. Unless power imbalances are properly managed, they may cause the entire workflow to collapse until the power to the industrial establishment is restored. The aim of this paper is to discuss the electrical load shedding process of a refinery, which is a heavily loaded industrial establishment, in detail.

INTRODUCTION

Maintaining the power supply to the critical process loads is vital for an industrial cogeneration power plant, both for the continuous production and the overall safety of the plant during emergencies. A sudden interruption of the production may result in significant economic losses and even cause major safety concerns. The majority of industrial establishments that require an uninterrupted energy supply in the form of electric power and steam choose to install cogeneration units [1]. Though power systems are designed to function under normal conditions, they also include a safety margin for emergencies. The main objective of the electric utility is to operate the power system without exceeding the system constraints and operational limits. However, in certain conditions such as a

IMPROVING ENERGY EFFICIENCY IN PREDICTED ENERGY AND ACTUAL ENERGY CONSUMPTION USING WSN

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ABSTRACT

Recent advances in sensing modules and radio technology will enable small but smart sensors to be deployed for a wide range of environmental monitoring applications. They collect data from different environment or infrastructures in order to send them to the cloud using different communications platforms. These data can be used to provide smarter services. However, they are various issues and challenges related to the ubiquitous sensors that should be solved. In this paper we interest on analysis of wireless sensor network from an energy management perspective. The idea behind the energy-efficiency wireless sensor networks is that each node can only transmit to a limited number of other nodes directly. The limited resources of nodes imply that the transmission range is limited. In order to transfer the data to the final destination, the traffic must be relayed using intermediate nodes, creating a multi-hop route. The total energy consumption associated with an end-to-end transmission over such a route can be significantly reduced if the nodes are correctly configured. In this paper, underground mine monitoring system is presented with an overview of the related issues and challenges such as reliability, cost, and scalability.

INTRODUCTION

Wireless sensor networks (WSN) are one of today's most compelling emerging technologies. WSN is made up of a large number of inexpensive devices that are networked via low power wireless communications. It is the networking capability that fundamentally differentiates a sensor network from a mere collection of sensors, by enabling cooperation, coordination, and collaboration among sensor assets. Harvesting advances in the past decade in microelectronics, signal processing, wireless communications and networking, wireless sensor network technology is expected to have a significant impact on our lives in the twentyfirst century [1]. Unlike centralized networks, wireless sensor networks are working in ad hoc fashion. The self-configuring, selfhealing characteristics make WSN; and therefore allows them a significant advantage in a large number of situations. The development of this attractive network has many open doors for several numbers of "new and exciting" applications, in which flexibility, easy deployment, and configuration are essential properties. How can IoT help the mining industry? The general objectives can be summarized a as follows [2]-[3]: • Real time monitoring of gases and other parameters; • Monitoring equipment locations and operation statuses to improve productivity and reduce fatal collision accident; • Locating and tracking miners in case of disaster for emergency rescue operations; • Tracking and monitoring assets equipment; • Monitoring miner's unsafe practices and warning. • Automate maintenance and operations of machines – Leads to creation of newer collaboration models with OEMs for monitoring via cloud connectivity and networks. • Standardize processes – Helps build newer business models and highly agile processes at the operations level. • Improve traceability and visibility – Lets users automatically transfer and receive data over a network without requiring human intervention. Moreover, remote monitoring of

FAULT LOCATION IN RADIAL DISTRIBUTION SYSTEMS BASED ON OPTIMIZED ALLOCATION OF POWER QUALITY METERS

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ABSTRACT

One of the reasons for not achieving satisfactory indices of Power Quality (PQ) is due to the discontinuity of power supply in Distribution Systems (DS), usually caused by the occurrence of short-circuits. In this context, to characterize these occurrences, a database was compiled by simulations in the IEEE 34-bus DS using the ATP (Alternative Transients Program) software. In these simulations, the type, location and fault impedance were used as parameters. The voltages and currents of all three phases of the power quality meters optimally allocated in the DS were considered. Based on these measurements, the J48 decision tree algorithm was used to identify in which area of the 34-bus DS the single-phase faults occurred. In order to use the J48 decision tree, the WEKA (Waikato Environment for Knowledge Analysis) software was used. Promising results demonstrated the effectiveness of the proposed algorithm to locate the single-phase short-circuit situations considered.

INTRODUCTION

Power Quality (PQ) is an area of Electrical Engineering in which its scope is difficult to determine as it covers a wide range of aspects from generation to transmission and electric power distribution, as well as the end consumers of the product "electricity". Thus, as PQ affects all end users of the electrical system, power utilities should take into account the relationship between the system users equipment with the available voltage levels. The energy end consumers, mainly the industrial ones, should also respect the other users connected to the Distribution Systems (DS) by controlling the possible sources of disturbances associated with PQ and mitigating the problems that can arise when connecting their linear or nonlinear loads to the network [1].

As presented in [1], PQ is an important aspect for power systems, significantly affecting the operation, safety, efficiency and rehabilitation of the entire system. Among the various definitions, the term PQ has been generally used to express the quality of voltage supply according to pre-established standards. Taking this into account, PQ can be defined as