

COVID-19 Effect on Supply and Demand of Essential Commodities using Unsupervised Learning Method

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Abstract The affliction caused by the COVID-19 Pandemic is diverse from other disasters seen so far. Supply chain industries are facing unique challenges in fulfilling the essential needs of the people. The objective of the paper is to analyze the supply and demand of essentials during pre-pandemic and post-pandemic lockdowns using machine learning algorithms. This helps for supply chain industries in forecasting and managing the supply and demand of essential stocks for the future. Data are analyzed using prediction algorithms to check the actual and predicted values. The clustering algorithm along with rolling mean is used for half-yearly data of 2019 and 2020 to identify the sales of different categories of essential commodities. This paper aims at applying intelligence in predicting various categories of sales by providing timely information for B2B Industries during the time of disasters.

Keywords Pandemic · Essential data · Forecasting · Prediction · Business intelligence

Introduction

The pandemic is causing a high impact on the supply chain industries, which includes manufacturers, wholesalers, and retailers [1] all over the globe. Economically, affected countries are facing challenges related to the supply chain for transportation of essentials [2]. COVID-19 also affects the supply chain related to health care [3]. It causes suspension of retail trade, save for essential goods for sustainability (including medicines, food, and their supply chains) with financial, banking, and insurance services [4]. Industries are facing challenges in the supply chain for transportation of goods, especially essential grocery items during this COVID-19 and problem related to suppliers [3]. The challenging task faced by supply chain industries during a pandemic is predicting demand and supply, transportation issues, manpower issues, and government regulations. Managing these issues within and between the state has increased the attention of researchers toward the supply chain [5]. This type of disaster impacts mainly on customer behavior and preferences. Under this prevailing situation, customers are increasingly working out on what, where, and how the essential commodities are bought. Since the demand for essential commodities increases, industries are concentrating more on their supply chain for secure and immediate operations. At the same time, insight into the other categories of consumer needs also offers a preference on the consumer side.

A literature survey reveals that it is the consumer-driven business that needs to address from a supply chain perspective. Few facts to be engrossed for further analysis are summarized as follows.

1. *Demand and supply* During this pandemic, companies are started facing huge demand for essential

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GALA: A Gamified Approach to Learning Algorithms

Exploring Basics of Algorithmic Approach

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Abstract

In a typical Computer Science undergraduate programme, students take a two-course sequence in *Data Structures and Algorithms* (DSA). These courses build on an introductory programming course which usually offers only a light introduction to these topics (e.g., the *list* data structure implemented as an array, and simple algorithms such as *linear search* and *Bubble Sort*). Hence, the two-course DSA sequence is critical to help students to develop the skills necessary to create efficient algorithmic solutions to real-world problems. These skills are highly valued in industry, and the technical rounds in most job interviews evaluate these skills immediately after assessing the candidate's basic programming proficiency. Many students, particularly in institutions outside the top tier, fail to clear these hurdles because they have not been given enough opportunity to hone these skills. In this series of articles, we describe a new approach to address these shortcomings – a Gamified Approach to Learning Algorithms (GALA). We describe our approach in the context of the Algorithms course (typically the second in the 2-course DSA sequence). Student feedback (drawn from an institution outside the top tier) confirms that this approach enables students to grasp key concepts, and to develop a better understanding of how and why the algorithm works. Following the introduction of GALA, we are also starting to see improved student performance on job interviews.

Introduction

A recent report by Aspiring Minds [1] estimates that more than 90% of graduating engineers “do not have the desired programming and algorithm skills required to work in IT product companies”. Such companies expect graduates to have the ability to create an algorithmic solution to a real-world problem (and then implement this solution in code). The former task involves at least three key skills: *modeling* the concrete problem in abstract terms, *recognizing* opportunities (if any) to reduce this problem to one for which an efficient algorithm (using appropriate data structures) already exists, and (when necessary) *developing* an algorithm to solve this problem as efficiently as possible. Note that each of the three action verbs associated with these tasks (*modeling*, *recognizing*, and *developing*) are at the higher levels of Bloom's Taxonomy. However, in many of the Data Structures and Algorithms (DSA) courses we have reviewed at institutions outside the top-tier, the emphasis is on tasks at the two lowest level of Bloom's Taxonomy: Remembering (e.g., *memorizing* an algorithm or the detailed implementation of a particular data structure) and Understanding (e.g., *tracing* an algorithm's behaviour on a given input, or *tracing* the evolution of a data structure on a given sequence of operations). As the Aspiring Minds report [1] indicates, such courses do not prepare graduates adequately for industry needs.

This series of articles describes a pedagogical approach to teaching an *Algorithms* course that meets two simultaneous objectives:

- Objective 1: It hones the three key skills noted above.
- Objective 2: It is workable in institutions outside the top-tier.

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Experiential Learning of Networking Technologies: Understanding Traversal of a Packet in Internet

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Introduction

In this series of articles on Experiential Learning of Networking Technologies, we have discussed a number of network protocols starting from HTTP [7] at application layer, TCP [3] and UDP [1] protocols at transport layers that provide end to end communications, and IP addressing [2] and routing for packet delivery at network layer. We have defined a number of experiential exercises for each underlying concept which provide a practical understanding of these protocols. Now, we would like to take a holistic view of these protocols which we have learned so far and look at how all these protocols come into play when an internet user makes a simple web request, e.g., what happens from network perspective when a user enters `google.com` in the URL bar of a web browser [12]. From the perspective of user, web page of Google's search interface is displayed in the browser window, but inside the network both at the user's local network and the internet, a lot of network activity takes place. The focus of this article is to understand the traversal of packets in the network on triggered by any such user activity.

The Figure 1 depicts a typical setup and internet connectivity where a user accesses the internet. For example, this could be office network, academic institute or even a home user. In a home network setup, a user today is typically connected using wireless (Wi-Fi) (or using a cellular data network). When a user is connected via Wi-Fi access point (or a cell tower), the latter acts as a layer 2 switch, which in turn is connected to a router which in turn connects to the internet. This is shown in Figure 2.

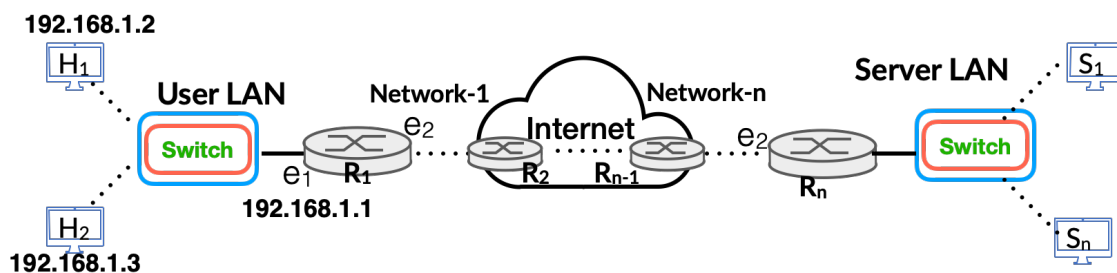


Figure 1: A typical network connectivity

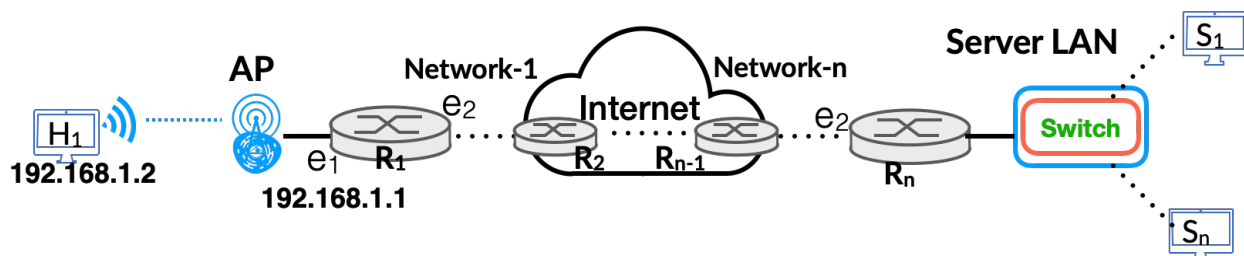


Figure 2: Network setup connectivity with WiFi

In general, the local network setup is connected to internet via an edge router, also referred to as broadband router or home router etc., which serves as the first hop and is connected using either fiber or DSL (Digital Subscriber Line - via a phone line) to the local ISP (Internet Service Provider). The ISP in turns carries user traffic to internet which consists of many network elements such as routers and switches, and

Experiential Learning of Networking Technologies: Understanding IP Routing

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In the previous article [1], we have studied assignment of IP address [2] to a host, and its role in connecting to internet and communicating with other devices. We explored concept of a network number which is determined using IP address and subnet mask. When network number of two hosts is same, then these two hosts belongs to same network else these hosts belong to different networks. Hosts within the same network communicate directly with each other whereas hosts belonging to different network communicate using one or more intermediate routers. A router connects two networks, and its main job is to receive packets from one network and forward it to another network so as to enable the packet delivery towards its final destination. When two hosts are connected by many intermediate networks, communication between these two hosts require that each of the intermediate router in the path forward the packet on to the network which is closer to the destination and router in the last leg of this path will deliver the packet to destination host. In this article, we will explore this concept of packet forwarding and the mechanisms used to achieve this packet forwarding.

Consider the connectivity of two networks, say Network-1 and Network-2, as shown in Figure 1. Each of these two networks consists of many connected systems (though as a representation only 2 are shown). Host H_1 and H_2 are part of Network-1, and Host H_3 and H_4 are part of Network-2. These two networks are connected via many intermediate routers, which we can consider as representing the internet. Host H_1 and H_2 belongs to same network $10.x.x.0/24$, and hence can communicate directly without requiring any intermediate router. Similarly, host H_3 communicates directly with H_4 as both belong to same network $10.y.y.0/24$. However, when H_1 needs to communicate with H_3 , the packets have to go through all the intermediate routers. When H_1 wants to send a packet to H_3 , it will forward the packet to router R_1 , which in turn will forward the packet to next router R_2 , and so on, and finally Router R_n will deliver the packet to host H_3 . Thus, communication between two hosts involves routing of packets and primary focus of this article is to explore the mechanism used in forwarding these packets.

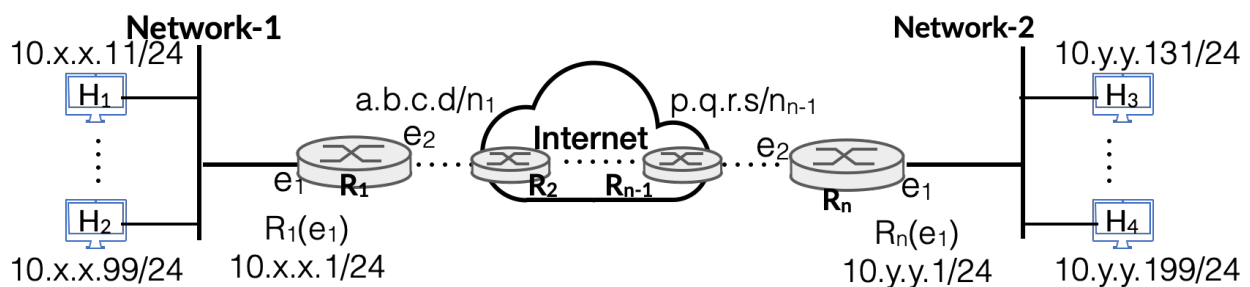


Figure 1: Connectivity of two Networks, each network having many systems in it

Whenever, a host needs to send a packet to another hosts, it must know the IP address of destination host. For example, when we use browser to search at google.com, the machine where browser is running, finds the IP Address of gogole.com and then sets up TCP connection using IP address of google.com. When sending a packet, a host consults its routing table (also called as forwarding table) and determine the next hop in the path to destination host. Entries in the routing table plays a crucial role in how a host makes a packet forwarding decision. The routing decision using the routing table is always required irrespective of whether the destination host is in the same network or a different network.

A SURVEY ON DISEASE IDENTIFICATION OF PLANTS AND CROPS USING IMAGE PROCESSING

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Abstract— This paper provides survey on different techniques that are used for plant and crop disease classification. A farmer cannot identify the symptoms causing to plants or crops by the naked eye. So, crop protection can be done by using computerized image processing technique that can detect diseased section of plants, fruits or crops. There are many classification techniques such as k-Nearest Neighbor Classifier, Probabilistic Neural Network, Genetic Algorithm, Support Vector Machine, and Principal Component Analysis, Artificial neural network, Fuzzy logic. Selecting among the classification method is always a difficult task because the result can vary for different types of input data. This paper provides an overview of different classification techniques used for plant and crop disease classification
Keywords— k-nearest neighbor, PNN, SVM.

I. INTRODUCTION

India happens to be one of the agricultural country, where in about 70% of individuals are dependent on agriculture. The agriculture not only provides necessary food for human existence and consumption but also is important for improvement in economy of the country. Our country happens to be leading producer of milk, pulses like red gram, chickpea, etc., and second leading in rice, wheat, spices and plantation crops. It is proved that the quality of the crop may be reduced due to various diseases affecting the crop. In a country like India an approximate of 18-20% crop yield is lost due to diseases found in crops. The crop disease is identified mainly with the help of infected portion observed on the part of crop; the infected portion may be leaf, stem, flower and pods. To overcome manual monitoring, a machine vision system is advantageous to identify the diseases of crop. Nowadays image processing techniques are being employed to attain automation in identification of the diseases affecting the crop. These techniques help in early identification of diseases and provide information about usage of pesticides at required time to maximize the yield of crop, and thus improve the growth in economy of agriculture in India.

II LITERATURE SURVEY

In this section describes the works related to identification of diseases affecting crops, fruits and vegetables are summarized in the following.

(Yan-Cheng-Zhang et al., 2007) paper titled “**Features selection of cotton disease leaves image based on fuzzy**

feature selection techniques”, have proposed a methodology for early detection of cotton diseases.

(Santanu Phadikar, Jaya Sil, 2008) paper titled “**Rice Identification using Pattern Recognition Techniques**” described a method for identifying diseases affecting rice plants using pattern recognition techniques.

(Dheeb Al Bashish, et al., 2010) paper titled “**A Framework for Detection and Classification of Plant Leaf and Stem Diseases**”, have proposed a framework of detection and classification of plant leaf and stem diseases. The method employs k-means clustering segmentation method and pre-trained neural network to detect and classify affected disease. The accuracy in detection and classification is 93%.

(B S Anami et al., 2011) paper titled “**Identification and Classification of Normal and affected agriculture/horticulture produce based on combined color and texture feature extraction**”, proposes identification of affected plant in agriculture/horticulture based on combined color and texture feature extraction and artificial network based classifier. The combination of features proved to be effective and the results were 86% for cereals and 80% for vegetables. The overall accuracy is 84%.

(P. Revathi, M. Hemalatha, 2012) paper titled, “**Classification of Cotton Leaf Spot Diseases Using Image Processing Edge Detection Techniques**” have introduced a work that concentrates on foliar fungal disease of cotton. The method employs color transformation, color filtering and edge detection techniques to detect cotton disease. The method gives around 98.1% accuracy.

(Sushma Huddar et al., 2012) paper titled “**Novel Algorithm for Segmentation and Automatic Identification of Pests on Plants using Image Processing**” have proposed a novel and unique algorithm to segregate and detect pests on plants. A distinct algorithm for detecting whiteflies affecting various leaves based on RDI (Relative Difference Intensity) algorithm is proposed. The algorithm gives around 96% of accuracy.

(LiJian, Wang Lijian, LiYi, 2012) paper titled “**The Identification System of Wheat Pests Based on PCA and SVM**”, proposed a system which identifies wheat pests using PCA (Principal Component Analysis) and SVM (Support

Cluster optimization in wireless sensor network based on optimized Artificial Bee Colony algorithm

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Abstract

Wireless sensor networks (WSNs) have emerged as a potential research area owing to their wide range of applicability in various fields. Critical application areas of WSN include defence and military surveillance, weather monitoring, health care monitoring, and Internet of Things. Extensive research efforts have been made to improve energy and data delivery performance in WSN with different bio-inspired optimized clustering methodologies such as particle swarm optimization (PSO), and the bacterial foraging algorithm for optimization (BFAO). However, most constrained solutions are limited to data aggregation performance and enhance the energy efficiency of the network to some extent. Therefore, balancing energy and data delivery performance to a greater extent is crucial because of design limitations imposed on existing hierarchical solutions. This article introduces a novel clustering paradigm, namely optimal clustering using the Artificial Bee Colony (OCABC) algorithm, which improves energy efficiency based on a simplified and robust ABC algorithm. The central idea is to increase the network lifetime of the WSN by optimizing the cluster formation process. The implemented structured module of OCABC attempts to overcome challenges encountered in existing baselines. The extensive numerical analysis with respect to significant performance parameters assists in benchmarking the OCABC compared with the PSO and BFAO.

1 | INTRODUCTION

The wireless sensor network (WSN) clustering paradigm has become popular and has made significant progress with data-driven computing solutions in a resource-constrained ad hoc environment. Current technological advancements in WSN have enhanced its capacity toward improving reliability and quality of services (QoS) aspects. The operational environment of a WSN is defined with a baseline theory of the clustering principle. A cluster head (CH) is usually composed of higher computational efficiency compared with its member nodes [1]. Here, the hierarchical clustering paradigm forms routes in multihop communication from node to CH and then CH to sink. The aggregated data finally get accumulated at an external sink computing system. A wide range of potential application areas of WSN exist including habitat monitoring, weather monitoring, and intrusion detection. Sensor nodes operate within a resource-constrained environment in which

operational factors such as power supply, bandwidth, central processing unit computing frequency and processing capacity are extremely limited. Hence, highly simplified structured energy-aware routing protocols need to be implemented with the ease of computing factors. Energy use and security are major issues in wireless networks [2–4].

The design principle of the Artificial Bee Colony (ABC) algorithm is mimicked in WSN in terms of the collective foraging behaviour of honeybees, which includes both the self-organization principle and the division of labour. The conceptual optimized clustering model is further validated and assessed considering numerical analysis in which the benchmarking is performed with respect to previously established optimization modelling such as particle swarm optimization (PSO) and the bacterial foraging algorithm for optimization (BFAO). However, the incorporation of hierarchical routing in optimal clustering using ABC (OCABC) to reducing energy consumption has enhanced network performance and data

Efficient Two-Layer Image Protection with Wavelet Transform Compression



M. Vaneeta, V. Sangeetha, and S. Swapna Kumar

Abstract The encoding complexity of an image format is a vigorously updating area of study in the field of two-layer protection with wavelet transform compression. In the proposed method, hybrid 2D-FDCT watermarking and RSA encryption for multispectral images predicted an efficient system. This approach satisfies the encryption security, robustness and classification accuracy retention of an algorithm. The two-layer protection of encrypted and embedded watermark image followed by wavelet transform compression minimizes the file size in the exhaustive process for encoding. An important merit is that encoding time is very much reduced in contrast to other security and compression mechanisms. The enhanced value of PSNR as well as trade-off of MES, normalized cross-correlation, the average difference and structural content improves the storage large file size medical image and improves bandwidth to an acceptable level.

Keywords Compression · DCT · Encryption · Image processing · Watermarking

1 Introduction

The Internet of things (IoT) is considered as the interconnection of computing devices such as in factory machinery, medical equipment or domestic appliances, enabling

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Fragile Watermarking Framework for Tamper Detection of Color Biometric Images

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ABSTRACT

Application of fragile watermarking on biometric images stored at a server or cloud ensures proper authentication and tamper detection when access to the servers was shared. In this paper, a hybrid domain fragile watermarking technique for authenticity of color biometric images, using hybridization of various transforms such as discrete cosine transform (DCT), fast discrete curvelet transform (FDCuT), and singular value decomposition (SVD) is proposed. The hybrid transform coefficients are modified according to the scrambled color watermark to obtain watermarked color biometric image. The security of this technique is strengthened with the usage of Arnold scrambling, and by using multiple secret keys. The proposed technique is analyzed on FEI Brazilian face database. The experimental results show that this technique performs better than the existing fragile watermarking techniques.

KEYWORDS

Authentication, Biometric, Color Image, Face, Iris, Server, Tamper Detection, Watermarking

1. INTRODUCTION

Today, the biometric based systems are used everywhere for individual recognition. The biometric systems overcome the limitation of traditional identification systems which are based on password, token, and identity card (Jain and Kumar, 2002). The biometric modalities can be physical or behavioral which includes face, fingerprint, iris, speech and signature etc. The drawback of this system is that it is possible that the biometric image or template can be modified by imposter at system database or while sharing (Ratha et al., 2001; Jain and Uludag, 2003a, 2003b; Jain et al., 2004; Jain and Uludag, 2002; Jain et al., 2002; Rege, 2012). Many information hiding approaches such as cryptography, steganography, and watermarking are used for protection of biometric images against such spoof attacks (Ratha et al., 2001).

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Difference expansion based reversible watermarking algorithms for copyright protection of images: state-of-the-art and challenges

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Abstract

In the last two decades, there is a widespread and quick growth in the online connectivity globally, which has led to a steady increase in the sharing of multimedia content online. Illegal copying of data and its misuse has become common, and hence there is a rapid rise in research interests of developing a variety of authentication and data protection techniques. Digital watermarking has been used for years to copyright protect the Intellectual Property and is still a domain with lot of scope for research to suit its applicability to sensitive fields such as medical, military, aviation, satellite imagery, advertising, navigation, and designs, which are of very high resolution and demands undegraded transmission and storage. Many Reversible Watermarking (RW) techniques were developed for protection of such sensitive signals, of which Difference Expansion (DE) based methods became popular. This paper presents an extensive survey of reversible watermarking techniques based on DE algorithms for their characteristics, considerations, performance with respect to complexity, embedding capacity, perceptual impact, and fragility, to find the applicability of those algorithms. The paper also outlines the open research problems and provides some future directions for the researchers working in the related domain.

Keywords Copyright protection · Difference expansion · Embedding · Extraction · Information security · Reversible watermarking

1 Introduction

Today, there is a huge growth in the digital media creation, publication, and usage, which has led to a rapid growth in malicious sharing, tampering and unauthorized copying of multimedia data (Quinn et al. 2012). To solve the issues related to copyrights of Intellectual Property (IP), digital watermarking techniques are developed, wherein a significant secret message called the ‘watermark’ or ‘secret information’ is inserted within the video/image/audio message is called Digital watermarking (Borra et al. 2017). The information regarding the ownership details, timestamp, or

any other information represents the watermark, and can potentially be in the form of text, image, audio clip etc. The watermark can later be extracted and is used to confirm true ownership in case of disputes related to false ownership claims and malicious use. The watermark or secret information can either be invisible or visible depending on the application (Borra et al. 2017). Companies or photographers use visible watermarking to highlight their logos or signature for promotional purposes. Invisible watermarking is used in cases where it is not desirable for the cover image to change significantly (Caldelli et al. 2010).

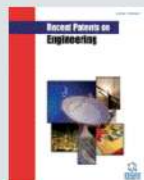
The embedding of secret information onto the host/cover image can be achieved by direct modification of few or all of the pixels (spatial domain) or indirectly by varying some coefficients in transform domain based on some criteria with respect to the watermark bits. While few applications ignore these slight alterations to the Intellectual Property, some critical applications cannot tolerate even slight modifications. Examples include military maps, satellite images, radiological images, forensic images, where in a minor modification, may miss crucial information, and thus may lead to wrong interpretations, decisions, and diagnosis ((Dey et al. 2012a;

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Review Article

A Survey on Prevention Techniques for Camcorder Video Piracy in Movie Theaters

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Detection and Classification of Leukocytes in Blood Smear Images: State of the Art and Challenges

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ABSTRACT

Manual analysis of microscopic blood smears by highly expert pathologists is labor-intensive, time-consuming, and is subject to inter-observer variations. Recent innovations in image processing and computer vision techniques have improvised digital pathology in terms of objectivity and reproducibility. Traditional computer vision-based methods of recognition of white blood cell (WBC) from a pathological blood smear image includes the process of detection, segmentation, and classification. This paper presents a review of state-of-the-art detection, segmentation, and classification techniques for white blood cell analysis. The goal of this work is to present an introduction to the field, provide enough information about the analysis methods developed so far, and to be an appropriate reference for the researchers looking forward in this field. The methods under review are classified into intensity and feature based. The crucial steps involved in these techniques, mathematical foresights, performance evaluation techniques, issues, and future directions are discussed.

KEYWORDS

ALL, Autoencoders, CLL, Convolutional Neural Networks, Deep Learning, Dice-Index, Machine Learning, Segmentation, Sensitivity, Specificity, WBC

1. INTRODUCTION

At present, computer aids have been rigorously emerging in digital pathology field, including segmentation, identification and classification of cell/ nuclei. The microscopic blood image analysis finds it usefulness in differential and complete count of White blood cells (WBCs) and components, hemiparasite and hematological diseases diagnosis, content-based image retrieval systems, medical decision support systems, computer aided diagnosis, treatment follow up, guided surgery, and many more.


When a doctor suspects any disease, firstly suggests a complete blood test or differential blood test based on the severity of symptoms. Complete blood test results in the total count of platelets, erythrocytes (red blood cells) and leukocytes (white blood cells). A Differential blood test classifies and counts the five major types of leukocytes. Two broad classifications of WBCs are Agranulocytes and Granulocytes. Agranulocytes are Lymphocytes and Monocytes. Granulocytes are Neutrophils, Basophils and Eosinophils. The WBCs is a vital component of the human blood system that develops

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Author(s): Surekha Borra*, Nilanjan Dey



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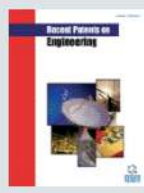
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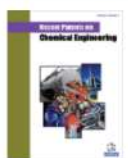
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Development of magnetic resonance image de-noising methodologies: A comprehensive overview of the state-OF-the-art

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Hybrid, blind and robust image watermarking: RDWT – NSCT based secure approach for telemedicine applications

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Abstract

Images frequently are helpless to burglary and copyright encroachment. There are numerous events where pictures were illegally copied from websites for utilization or monetary profit and were gotten away from equity, prompting misfortunes for the battled proprietors or innovators. Techniques for securing and recognizing digital pictures and their owners from adversaries are thus required. In this paper, a watermarking procedure in hybrid domain is proposed for copyright assurance of images. The strategy inserts watermarks in Non-Subsampled Contourlet Transform (NSCT) and Redundant Discrete Wavelet Transform (RDWT) areas to accomplish better invisibility, and robustness. The blind extraction of watermark can be performed associating the arbitrarily produced PN arrangements. The experimental results demonstrate that the combination of NSCT – RDWT improves the nature of watermarked image when tried on standard and medical images. The experimental results indicated that the proposed scheme provides good imperceptibility and robustness against various kind of watermarking attacks. The main strength of proposed scheme is that it provides good imperceptibility for watermarked images up to 58 dB along with good robustness for watermark image up to 0.99 against various types of attacks and equally works for various kind of images such as greyscale and medical images. Further, the performance of proposed scheme indicated that the quality of generated watermarked medical image has fulfilled all parameters and benefits for secure telemedicine applications.

Keywords Blind · Non-subsampled Contourlet transform (NSCT) · Medical image · Redundant discrete wavelet transform (RDWT) · Robustness · Watermarking

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An Optimum filter to suppress the noise in Abdominal CT images

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Abstract: In medical imaging, noise is an important factor which degrades the quality of an image. The importance of medical imaging is to view the internal structure of human anatomy. Due to the acquisition process, noise degrades the visual quality of medical imaging. This noisy image affects the visual evaluation, suppresses the edge and boundaries details. These factors limit computer system to discover diseases in medical images. To enhance the quality of an image and to suppress the noise, preprocessing is an essential step in Computer Assisted Diagnosis System. In this paper, we propose an optimum noise removal filters to suppress the noise in abdominal CT images. The optimum filter is a hybrid combination of bilateral and wiener filter. The proposed method helps o improve the segmentation and classification accuracy. For performance evaluation of optimum filter, various quality metrics are taken for analysis and compared with existing denoising filters.

Keywords —Acquisition process, Denoising filters, CT, Noisy Image, Optimum Filter, Quality metrics

I. INTRODUCTION

CT stands for Computed Tomography, which is also called as Computerized Axial Tomography (CAT). This imaging is a non invasive radiation based inspection procedure that generate three dimensional view of an image from massive series of two dimensional image taken on a cross sectional area of the human body. CT scan and Multi slice CT image [1] is shown in Figure 1. The word Tomography comes from Greek words “Tomos” and “Graphia”. The meaning of “Tomo” is slice or cut to or section. The word “Graphia” indicates writing or description. CT scan uses X-ray source and emits X-ray beam through the human body, in order to study the anatomical information of it.

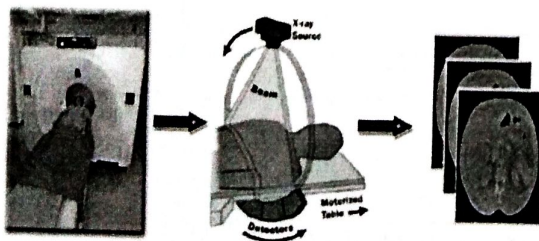


Figure 1:CT scan and multi slice CT image [1]

CT scanner has motorized X-ray tube, specialized metal detector and gantry. The X-ray tube is placed exactly opposite to a metal detector that rotates around the gantry. This tube shoots the beam of X-ray through the patient

body. These signals are picked up by a row of metal detector. The signal from a detector are then converted to an electrical signal and thus converted to digital by means of Analog to Digital Converter (ADC). On a CT film, dense tissue or hard tissue appears white. Whereas soft tissue like liver appears grey and lungs cavity that are filled with air space appear black.

CT abdominal images are collected from different sensors of CT scanner. These images are fully contaminated and disturbed with a different type of noises. The noise includes Gaussian noise, poisson noise, speckle noise and impulsive noise. The corrupted medical images are due to the following reasons:

- Presence of ambient noise from environment.
- Noises coming from the machine or equipment during the diagnostic examination process.
- Patient’s breathing motion.
- Noise due to the movement of internal tissue like fat and other organs.

Table 1: Occurrence of various noises

Noises	Possibilities of occurrence
Gaussian Noise	Acquisition process
Poison Noise	Transmission process
Impulsive Noise	Image capturing process
Speckle noise	Occurs during transmission and reception process



IOT based Ambulatory bag mechanical ventilator

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Abstract: Due to the damage caused by the deadly coronavirus, and its highly contagious and asymptomatic nature causing increased infections and deaths. Amidst this crisis, the fact of scarcity of ventilators in not just remote places but also in cities has made a prominent impact. The high cost of the mechanical ventilators in the market make sure to keep their prices high during this time of need. These costs in turn make holes in the pockets of the user. Thereby the affordability is only to the financially stable part of the population. The more makeshift of this complex mechanical ventilator is the Ambulatory Bag (AMBU bag). This works when a healthcare worker manually presses the bag to force in air to the patient who has difficulty in breathing. As manual pressing cannot happen for a long duration, a mechanical smart device is attached to this simple medical equipment for automating the process and to connect it to the internet making monitoring and diagnosis easy and also affordable.

This project has 2 main parts:

I) The automation of the simple AMBU Bag.

II) Making this device smart by connecting multiple sensors and connecting them to the internet.

Automation of the simple AMBU bag

The simple AMBU bag is connected to an electrical circuit that is controlled by a microcontroller. The movement of compression of the bag is obtained by wiper motor mechanism. The speed of the motor is controlled by the micro-controller there by having different operation states like Adult, child and Older people. This part of the entire project automates the AMBU bag.

IoT network

This part of the project deals with the connection of multiple sensors that acquire required parameters that help in monitoring and diagnostics. Multiple sensors are connected together in a network and the acquired data is then displayed to the healthcare worker in-charge of the patient. This enables accurate monitoring of many patient and connects them to their healthcare worker in real time. This task helps the healthcare team to organize their task and also gives them a heads up of the immediate future.

Keywords: Ambulatory Bag, IoT network, wiper motor mechanism, mechanical ventilators.

I. INTRODUCTION

A ventilator is a machine that provides mechanical ventilation by moving breathable air into and out of the lungs, to deliver breaths to a patient who is physically unable to breathe, or breathing insufficiently. Modern ventilators are computerized microprocessor-controlled machines, but patients can also be ventilated with a simple, hand-operated bag valve mask. Ventilators are chiefly used in intensive-care medicine, home care, and emergency medicine and in anaesthesiology.

Ventilators may also be equipped with monitoring and alarm systems for patient-related parameters (e.g., pressure, volume, and flow) and ventilator function (e.g., air leakage, power failure, mechanical failure), backup batteries, oxygen tanks, and remote control. The pneumatic system is nowadays often replaced by a computer-controlled turbopump.

A bag valve mask (BVM), sometimes known by the proprietary name AMBU bag or generically as a manual resuscitator or "self-inflating bag", is a hand-held device commonly used to provide positive pressure ventilation to patients who are not breathing or not breathing adequately. The device is a required part of resuscitation kits for trained professionals in out-of-hospital settings (such as ambulance crews) and is also frequently used in hospitals as part of standard equipment found on a crash cart, in emergency rooms or other critical care settings. Manual resuscitators are also used within the hospital for temporary ventilation of patient's dependent on mechanical ventilators when the mechanical ventilator needs to be examined for possible malfunction or when ventilator-dependent patients are transported within the hospital.

A Review on Media Forensics using Image Processing Techniques and Deep learning Tools

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Abstract: In the present generation, social media is a big advantage for an individual to grow. On the other hand, we can't neglect the fact that it's a huge platform for negativity too. With the rapid progress of recent years, techniques that generate and manipulate multimedia content can now provide a very advanced level of realism. The boundary between real and synthetic media has become very thin. On the one hand, this opens the door to a series of exciting applications in different fields such as creative arts, advertising, film production, video games. On the other hand, it poses enormous security threats. Software packages freely available on the web allow any individual, without special skills, to create very realistic fake images and videos. These techniques can be used to manipulate public opinion regarding anything and create chaos. In this paper, we would like to overview few major facts and figures regarding exceeding image forgery techniques that exists and propose a better way on how to detect these forgeries and fakes.

Keywords: GAN, ELA, deep learning, convolutional neural networks, Fake colorized image detection.

I. INTRODUCTION

Fake multimedia has become a huge problem in recent years since the development of many image processing and deep learning tools. With these tools, creating realistic so-called deep fakes and fake media is very much easy. These fake images are used to manipulate public opinion by fake news campaigns and also can be used for malicious purposes, like creating fake porn videos to blackmail people. Due to this, people are losing faith in journalism. Some fakes are easy to identify since they are made for fun and includes famous personalities. However, verifying digital integrity becomes much more difficult if the video portrays a less known person and only the manipulated version is publicly available. This scenario takes place, for example, if the attacker films a new video on his own, with a collaborative actor whose face is eventually replaced by the face of the targeted person. Governmental bodies, enforcement agencies, the news industry, and also the man in the street are becoming acutely aware of the potential menace carried by such a technology. The scientific community is asked to develop reliable tools for automatically detecting fake multimedia. Image manipulation has been carried out since photography was born², and powerful image/video editing tools, such as Photoshop® After Effects Pro®, or the open-source software GIMP, have been around for a long time. Using such conventional tools images can be easily modified, obtaining realistic results that can fool even a careful observer. In the literature survey below, many method have been proposed to detect these fakes and forgeries. Every image and video is characterized by numerous features. which depend on the different phases of its digital history: from the very same acquisition process, to the internal camera processing (e.g., demosaicing, compression), to all external processing and editing operations. Digital manipulations tend to modify such features, leaving a trail of clues which, although invisible to the eye, can be exploited by pixel-level analysis tools. Instead, semantic integrity is violated when the media asset under analysis conveys information which is not coherent with the context or with evidence coming from correlated sources. For example, when objects are copy-pasted from images available on the web, several near-identical copies can be detected, suggesting a possible manipulation. Moreover, by identifying the connections among the various versions of the same asset, it is possible to build its manipulation history. Despite the continuous research efforts and the numerous forensic tools developed in the past, the advent of deep learning is changing the rules of the game and asking multimedia forensics for new and timely solutions. This phenomenon is also causing a strong acceleration in multimedia forensics research, which often relies itself on deep learning.

II. LITERATURE SURVEY

[1] Quantization is the critical step in lossy compression which maps the DCT coefficients in an irreversible way under the quantization constraint set (QCS) theorem. In this paper, they first derive that a doubly compressed image no longer follows the quantisation constraint set (QCS) theorem and then propose a novel quantization noise model to characterize single and doubly compressed images. In order to detect double compression forgery, they further propose to approximate the uncompressed ground truth image using image restoration techniques. In this paper, they conduct a series of experiments to demonstrate the validity of the proposed quantization noise model and also the effectiveness of

VIDEO QUALITY IMPROVMENT IN 5G USING FUZZY LOGIC

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Abstract - As there is increase in the growth of video transmissions over wireless networks, an adequate mechanism to increase the resiliency to packet loss with QoE support is essential. The mechanism adopted should be able to provides the capability to enhance video transmissions in dynamic networks, and consequently, improving the video quality, without adding unnecessary network overhead and maximizing the QoE. As the resources in the network are already scarce, this approach leads to a better usage of the wireless resources for video delivery. It can be made possible by using the redundancy scheme which is based on key human visual system and video characteristics, namely, GoP size, frame type, and position, as well as the levels of motion activity in each video sequence. Besides that, the network state, i.e., packet loss rate, was also considered.

Key words - Network data analytics function (NWDAF), Fuzzy logic, MATLAB, Operation administration and maintenance (OAM), Long term evolution (LTE)

1. INTRODUCTION

Quality of Experience (QoE) for Internet Streaming Video is that the estimation of a provider's service quality from a customer's point of view. As 5G is predicted to support a number of service types, assured QoE across multiple users and repair types is extremely important. QoE values are used to monitor quality of a service and quantify the improvements to customer experience before they complain or leave. We address the matter of QoE for video streaming in 5G networks. The target is to be ready to address the difficulty of QoE for Video streaming during an LTE/5G heterogeneous network. The QoE is evaluated at the NWDAF node within the 4G/5G Network. QoE analysis at the NWDAF has got to affect a huge amount of knowledge collected at each network node and therefore the UE. We'd like a mechanism to filter data at each node and pass it to NWDAF entity. QoE maintenance is additionally complex because it depends on tons of parameter inputs which can not necessarily be available. Therefore, the order to supply the top user with the simplest quality of experience (QoE) for video streaming, this project has been developed and simulations are made.

2. PROBLEM STATEMENT

As 5G is expected to support a host of service types, assured QoE across multiple users and service types is very important. QoE maintenance is also complex as it depends on a lot of parameter inputs which may not necessarily be available. To handle qualitative aspects of user experience, in this paper we make use of Fuzzy logic algorithms to deal with user experience factors. The QoS / KPIs are used along with user experience factors to address the issues of QoE. The fuzzy algorithms will also address issues of possible information uncertainty at the NWDAF level given that the evolving NWDAF specifications does not provide all possible information about the radio access network. The two important video streaming parameters that will have to be controlled are

1. Video Rate
2. Freezing.

Some of the parameters that affect Video Rate and Freezing are the: -

1. Link Context (SINR, Bandwidth Availability)
2. 5G cell availability, number of handovers
3. Switching between LTE and 5G termed as mobility context (as the 5G cells will be sparse in the initial deployment)
4. Traffic Context
5. UE Context (Available Buffers etc.)

We do not consider the human factors (ex: tendency and frequency change in view angle). The above parameters are monitored and mapped to required video rates and possible Freezing probabilities to take corrective actions.

3. FRAMEWORK - NWDAF

The framework we use is the NWDAF (Network Data Analytics Function) framework. NWDAF is a new 5G core network function. The NWDAF provides analytics to 5GC NFs, and OAM. Analytics records are either statistical information of the past events, or predictive statistics. Distinctive NWDAF instances could also be present within the 5GC, with possible specializations per sort of analytics. The consumers decide about how to



Zero Contact Delivery for Faster and Safer Delivery Through IOT

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Abstract: As we know, the advancements in the Radio Frequency and Messaging technologies have made a platform to come up with various innovations reducing human effort. Since online shopping has become a part and parcel of common man's life, this is the right time to make use of existing technologies to simplify the procedure. The basic idea of the work is to introduce technology into our lives for monitoring issues which demand our personal presence. The aim is to provide a reliable and user friendly solution to problems incurred during online shopping. A stand alone box is designed which receives and stores the intended parcel so that the customer can retrieve it as and when required.

Keywords: SMART Locker, IOT network, Cloud, Sensors

I. INTRODUCTION

Intelligent and secure electronic locker systems for parcel delivery and collection. Enable your multi-family housing residents to collect parcels, with 24/7 access from any delivery source. The SMART locker is a modular and expandable solution developed especially for parcel collection. The functionality can be managed locally. Security of data is of primary concern and the system is fully compliant with all data protection standards. No resident data is stored locally thanks to the enterprise-level cloud-based control system. With the rise of e-commerce, there is an increasing need to manage online purchase deliveries effectively. Nowhere is this more apparent than within apartment complexes nationwide. During peak holiday times, parcel and package, deliveries can easily increase by a factor of five. As a multi-family housing unit owner or operator, this places an increasing demand on your staff to manage these packages until the time of collection. In addition to the time and effort it takes to manage this process, you are also taking responsibility for the package security.

SMART courier/locker is the newest delivery option available to customers whose appetite for online shopping is not only growing but also intertwines with the increased need for mobility. It is an easy solution for clients who do not want or cannot wait for the courier to address; they can organize their day schedule without considering their route and schedule. Lockers are located in 24/7 access places, so the parcel can be lifted at any time for 7 days. It is also a delivery solution for us, so our couriers do not have to return to the address several times to be able to deliver if at the first touch the customer was not found at the address or if he requested the delivery outside the courier working schedule.

The online shopping customer will have the SMART courier delivery option available on the partner's website and can option for this delivery solution by choosing the locker with the most convenient location. SMART Courier will introduce the drop off option, allowing customers to send packages or envelopes. The customer can choose the locker in the most convenient place to lift. Were we have already installed the first 10 near the entrance.

II. LITERATURE SURVEY

Common problems faced by customers while shopping online that glorious invention which allows people to buy things from the comfort of their homes. No more travelling to multiple stores to find the right product; no more having to deal with over-enthusiastic salespersons; no more standing in long lines at the checkout counter. The e-commerce boom has certainly changed the way we shop for the better. But, like everything else, the world of online shopping is not all roses. Despite all the efforts of e-commerce companies to alleviate them, there are a few problems that customers still have to face while shopping online. One of the major problems is delivery and logistics.

[1] With the increasing demand for express delivery, a courier needs to deliver many tasks in one day and it's necessary to deliver punctually as the customers expect. At the same time, they want to schedule the delivery tasks to minimize the total time of a courier's one-day delivery, considering the total travel time. However, most of scheduling research on express delivery focus on inter-city transportation, and they are not suitable for the express delivery to customers in



Lightweight Authentication Protocol for NFC Based Anti-Counterfeiting System in IoT Infrastructure

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Abstract: Counterfeit medications are known as the medications that were manufactured for the purpose of deceptively representing as authentic, effective and original in the market. Such medications cause severe health issues for patients. Counterfeited drugs have an inimical effect on the human health. The legal manufacturing companies also face threats to their revenue loss due to these counterfeited medicines. In this paper, we introduce a novel authentication protocol for anti-counterfeited drugs systems based on Internet of Things (IoT) to help checking the validity of drugs "unit dosage". Our protocol uses the near-field communication (NFC) as it is convenient for mobile environment. The protocol also offers reliable update phase for NFC. Furthermore, our scheme is complemented with performance evaluation along with the use of random oracle model for formal security analysis. We also evaluate our protocol broadly using PyCharm tool. Results show that proposed protocol resists most of common related flaws almost in equal computing cost with more added security features.

Keywords: NFC, IoT system, TomCat Server, Android, Eclipse Tool.

I. INTRODUCTION

The broad majority of business extensively utilizes the innovative technology of Internet of Things which is persuading almost every facet of the world. However, the nature of public communication over the Internet makes the objects and devices of IoT vulnerable to numerous cyber- attacks. Moreover, various standard solutions of security developed for enterprise systems are not efficient and implementable to IoT devices. This becomes even more serious in the case of sensitive and critical systems such as anti-counterfeiting which is constructed by the use of IoT infrastructure. As a result, the critical systems of IoT based anti-counterfeiting face various protection and security challenges. Therefore, it is crucial to observe IoT specific security attacks and develop a reliable, scalable, and secure mechanisms of security. WHO also estimated that the utilization of counterfeit products has caused almost 100,000 deaths in Africa in a year. According to the British "International Policy Network", there were almost 700,000 death cases in a year due to utilization of tuberculosis and malarial medicines. Counterfeiting can happen with local as well as branded products.

II. LITERATURE SURVEY

Several organizations of various countries are trying to overcome the problem of counterfeited drugs. According to Xinhua News Agency of China, China is utilizing the technology in which each medicine package that is sealed with anti-counterfeit labels are traced and recognized. The border posts and airports in African countries use hand-held spectrometer, known as True-Scan, for the detection of counterfeit drugs with the help of their chemical composition analysis. Counterfeit drugs are also being detected by the simple and free-text message technologies. Companies such as Sproxil and mPedigree Network developed a system in which the labels on medicine packages with an encrypted code is used by the legal medicine manufacturing companies. The label on the drug package is scratched-off by the user who wants to buy that drug and send the code to the company's system which checks the authenticity of medicine packet without any cost. After the verification of medicine packet, the system sends the response message to that user, whether the drug is fake or actual. Therefore, the drug package is known to authentic easily by the customer without any cost. But, the issue is that, this technique needs a lot involvement of user as it is not automated because users are required to remove the label and then to write the code and sending to the system [1]-[3]. Radio Frequency Identification (RFID) allows the identification of different items that use radio waves. A RFID reader usually communicates with RFID tags which have microchips containing the digital information [5]. To prevent counterfeiting, the anti-counterfeiting technology based on RFID has evolved as a powerful tool, because it has generally used anti-counterfeited approach (for example, chemical markers, finger-prints, shifting-inks, and colours). However, the automatic validation of authentic

PIPE INSPECTION ROBOT

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Abstract – Pipelines are very significant tool as they are used in many different industries for various applications such as transportation of gas, water, fuel, oils, etc. Over time, they are prone to aging, corrosion, cracks, mechanical damage etc and ignorance of these problems leads to accidents which incurs huge losses in terms of both economy and lives. This highlights the inevitable need to inspect pipes at a regular interval for the purpose of security and improved efficiency in industrial plants. Now there is many ways of inspecting pipes such as X-rays, magnetic particle inspection method etc, but these methods do not give a full proper internal inspection of pipes. This pipe inspection robot aims at detecting the exact location of leakage and clearing the blockages and thus removing human factor from labour intensive and dangerous work, thereby reducing the number of accidents that happen due to the lack of regular inspection.

Key Words: Pipelines, Pipe Inspection Robot, Leak Detection, Pipe Leakage, Water Distribution System.

1. INTRODUCTION

The growth of robots is tremendous in this technologically advanced era. Robots are conceptualized to eliminate the human factor from labour intensive or dangerous and inaccessible work environment. The use of robots is very common in this age of automation and it is no longer exclusively used by manufacturing industries. Since the dawn of industries, pipelines are tools for transporting oils, gases and other fluids. Many defects occur in pipelines and a majority of them are caused by aging, corrosion, cracks, mechanical damages due to improper installations. If ignored, these troubles translate into major chemical disasters which harm both human life and environment equally. Thus, the inspection of pipes is extremely important for improving the reliability and security of the industries. The pipelines are the major tools for the transportation of drinkable water, effluent water, fuel oils and gas. A lot of troubles caused by piping networks aging, corrosion, cracks, and mechanical damages are possible.

A significant amount of water is lost in the water supply system. Water leakage is been a major problem for many regions around the world. In some areas water loss due to water leakages in the supply network exceeds 40% of water in supply system. Leaks from pipes, plumbing fixtures and fittings are a significant source of water waste for many households. Research has shown that the typical home can lose 2,000 to 20,000 gallons (7.6 m³ to 76 m³) of water per year due to leaks. Some leaks are obvious, such as dripping faucets and leaking water heaters.

In many water distribution systems, a significant percentage of water is lost while in transit from treatment plants to consumers. According to an inquiry made in 1991 by the International Water Supply Association (IWSA), the amount of lost or "unaccounted for water" (UFW) is typically in the range of 20–30% of production (Cheong 1991). In the case of some systems, mostly older ones, the percentage of lost water could be as high as 50% (AWWA 1987). Leaks in pipelines, whether for oil, gas, or water, are a frequently occurring problem in infrastructure worldwide. Unfortunately, many leaks go undetected for years because the source of the leak is not visible. Currently, one of the most viable solution for inspection of pipelines are robots.

Pipe Inspection Robots are widely used in petrochemical, water supply and fluid transportation industries. Many researchers have done work to develop new pipe inspection robots to enhance various aspects of in pipe inspection robot like vision, control and motion of robot. Research work of these researchers are reviewed to find the design philosophy, capabilities and limitation of different types of robots. The inspection of pipes is crucial for improving the security in industrial plants. These specific operations such as cleaning, maintenance etc are expensive. Also, if ignored they lead to chemical catastrophes. However, using manual labour to inspect these pipelines is risky as there may be presence of toxic gases or insufficient amount of oxygen. Geometrical constraints may render those areas inaccessible. A design for a visual inspection system for the interior of pipelines with minimal service interruption is presented.



Lineman Safety

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Abstract: An electric shock from a current as low as 35mA is sufficient to cause fibrillation of the heart in the vulnerable individuals. Even a healthy individual is at risk of falling from a high structure due to loss of muscle control. Higher currents can cause respiratory failure and result in extensive and life-threatening burns. The lack of any visible sign that a conductor is energized even at high voltages, makes electricity a particular hazard. An electric field surrounds all the charged devices. Bringing a conducting object such as a human into that field can intensify the field enough for electrical breakdown of the air and an arc to jump from the equipment to earth via that person. The proposed system not only focuses on the safety of electrical linemen but also to provide the feasible system to control power lines. The main components of our project is the fingerprint scanner and RFID. In this proposed system if there is any fault in line the line man keeps his finger in fingerprint scanner, so that the main line is switched off after the completion of fault work the line man again has to keep his finger in scanner and switch on the electrical line. RFID uses electromagnetic fields to automatically identify and track tags attached to objects. RFID consists of microchip and coil. To recognize the identity of RFID tag, RFID tag sends the signal to reader, the signal is received by the coil and unique ID is identified by chip. The RFID is present on the shoes, gloves and helmets. If the lineman wears all these things then it will allow for further process. Thus it saves the life of lineman working on the electric line. The proposed system is fully operated on Arduino.

Keywords: RFID, Chip, Coil, Fingerprint Scanner.

I. INTRODUCTION

A world without electricity is hard to imagine. Electricity is now become a part of our daily life. Electricity plays major role in both homes & industries. Almost all devices at homes and industries are running because of electricity. As how, the electricity is important part in our life the electricians' life is also predominant one. They play the many roles in their field. A circuit breaker is an automatically operated electrical switch designed to protect an electrical circuit from damage caused by overload or short circuit. The main objective of this project is to save line man by making such a protective system controlled through fingerprint scanner. In this proposed system if there is any fault in line the line man scans his finger due to which main line is switched off after that he works on line solving the problem and after that again scans his finger and switch on the electrical line.

Nowadays, electrical accidents to the line man are increasing, while repairing electrical lines due to lack of communication between maintenance staff and electrical line man. This project gives a solution to this problem to ensure electric line man safety. It very simple to maintain so it is very useful for the line man. The parts which is required for our model is easily available in the market. The main goal of our project is to save the life of line man. The main component of our project is the fingerprint scanner which is required to sense the finger. At the time of repair, the electrocution to the lineman may happen. If the lineman wants to repair the power system then the maintenance staff turns off the respective power line in the main station. The main station and the fault detected power lines may be in different areas. Due to these the communication between the lineman and the maintenance staff may lack. Any other personnel in the main station or substation may mistakenly switch ON the power line without the knowledge of lineman while working on the power lines. This would tend to fatal electrical accident. This proposed system provides a solution that ensures safety of lineman. The control to turn ON/OFF the transmission lines will be maintained by the lineman only. The proposed system not only focuses on the safety of electrical lineman but also to provide the feasible system to control power lines. Now days, electrical accidents to the line man are increasing, while repairing the electrical lines due to the lack of communication between the electrical substation and maintenance staff. This project gives a solution to this problem to ensure line man safety. In this proposed system the control (ON/OFF) of the electrical lines lies with line man. Security is more important in our day to day life. Everyone needs more security as

Automatic Plant Watering System using Arduino

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Abstract - In day by day activities identified with cultivating or garden watering are the most significant social practice and the most labor-intensive task. No matter whichever climate it is, either hot, dry, cloudy or wet, you need to have the option to control the measure of water that arrives at your plants. Present day watering frameworks could be successfully used to water plants when they need it. However, this manual procedure of watering requires two significant viewpoints to be thought of, when and how much water. So as to supplant manual exercises and make work simpler, automatic plant watering framework is made. It utilizes the innovation to identify the moisture level of the soil and automatically water the plant when there is no moisture recognized in the soil.

Key Words: Irrigation, Moisture, Arduino, Sensor

1. INTRODUCTION

This Irrigation is the utilization of controlled measures of water to plants at required spans. Water systems assist with developing scenes, and revegetate upset soils in dry regions and during times of not exactly normal precipitation.

Water system likewise has different utilizations in crop creation, including frost security, stifling weed development in grain fields and forestalling soil consolidation. Water system frameworks are likewise utilized for cooling animals, dust concealment, removal of sewage and in mining.

1.1 Types of Automated Irrigation Systems

There are a few techniques for water system. They differ in how the water is provided to the plants. The objective is to apply the water to the plants as consistently as could be expected under the circumstances, so each plant has the measure of water it needs neither an excessive amount nor little.

1) Micro irrigation system:

Water is disseminated under low pressure through a channeled network, in a pre-decided pattern, and provided to each plant with little pressure.

2) Drip irrigation system:

In this framework, water was given drop by drop to plant roots directly. This technique can be the most water-efficient strategy for water system, if managed properly, evaporation and runoff are minimized. The field water

effectiveness of trickle water system is normally in the range of 80 to 90 percent when managed properly.

In current farming, dribble water system is frequently joined with plastic mulch, further limiting evaporation, and is the way of distribution of fertilizer. The procedure is known as fustigation. Deep percolation, where water moves beneath the root zone, can happen if a trickle framework is worked for a really long time or if the conveyance rate is excessively high. Dribble water system strategies run from exceptionally cutting edge and automated to low-tech as well as high-tech operations.

Lower water pressures are generally required than for most different kinds of frameworks, except for low vitality community turn frameworks and surface water system frameworks, and the framework can be intended for consistency all through a field or for exact water conveyance to singular plants in a scene containing a blend of plant animal groups.

3) Sprinkler irrigation system:

In sprinkler or overhead water system, water is funneled to at least one focal area inside the field and disseminated by overhead high-pressure sprinklers. A framework utilizing sprinklers or splashes mounted overhead on permanently fixed risers is frequently indicated as a strong set water system framework.

Higher weight sprinklers that pivot are called rotors and are driven by a ball drive, gear drive, or control instrument. Rotors can be intended to turn in a full or incomplete circle. Firearms are like rotors, except, actually they works at high weights of 275 to 900 kPa (40 to 130 psi) and streams of 3 to 76 L/s (50 to 1200 US gal/min). guns or firearms are utilized for water system not only for irrigation, but also for few engineering applications like dirt minimization and classification.

Sprinklers can be fixed on moving stages associated with the water source. Naturally moving wheeled frameworks known as moving sprinklers may water regions, for example, little area, sports fields, parks. As the tubing is twisted on the drum controlled by the water system water or a little gas motor, the sprinkler is pulled over the field. At the point when the sprinkler shows up back at the reel the framework stop. This sort of framework is referred to a great many people as a "water reel" voyaging water system sprinkler and they are utilized widely for dust concealment, water system, and land utilization of waste water.

IMPLEMENTATION OF VHDL/FPGA TO REALIZE FINGERPRINT VERIFICATION WITH OPTIMAL COMPUTATION

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Abstract : The concept of fingerprint verification is being used very vastly in the market and the current technology. Here we use the fingerprint verification system, and we are trying to get optimal computation using the addition of two extra features being the GFPU and the HW co-processor. We primarily use the step of fingerprint extraction from the fingerprint capturing unit and the fingerprint extraction using the MINDTCT algorithm of the NIST in the NFIS2. The fingerprint that is extracted is divided into minutiae and the minutiae extracted is made to pass through several steps for quality assessment and false minutiae removal and other steps. The obtained minutiae is again passed through the matching algorithm that is the BOZORTH3 of the NIST in the NFIS2. The algorithm matches the obtained minutiae with the pre-existing template set and the result is obtained. For optimal computation we attach the GRFPU and the HW co-processor to the integer unit of the Leon 2 soft core processor of the Spartan 3 family FPGA which gives 97.89 % execution time reduction is estimated (at 40MHz/4KB cache).

Keywords : sparten3 family FPGA, MINDTCT, BOZORTH3, HW co-processor, floating point unit

I. INTRODUCTION

Many systems require trusted mechanism for identification purpose in order to confirm or to identify person who requests for a specific service. This mechanism is used to ensure that provided a right person accesses service. One of the mechanisms is the biometric recognition system that used human biometric features to provide personal identification.

Biometric technologies are automated methods of verifying or recognizing the identity of a living person based on a physiological or behavioural characteristic. Typical biometric systems use pattern recognition that takes biometric data from specific individual and then extracts the features of these biometric data, which so called template, and comparing it with other features from the database as reference.

Fingerprint matching can be separated into two categories, which are verification and identification. It is the comparison of a claimant fingerprint against an enrolled fingerprint, where the intention is that the claimant fingerprint matches the enrolled fingerprint.

In order to prepare for verification, a person initially enrolls his or her fingerprint into the verification system. A representation of that fingerprint is stored along with the person's name or other identity. The person identifying him or her, and then applying the fingerprint to the system such that the identity can be verified authenticates each access. Verification is also termed, one- to-one matching. On the other hand, identification is a fingerprint matching where fingerprint of unknown ownership is matched against a database of known fingerprints to associate with an identity. Identification is also termed, one-to-many matching. In other ways, the objective of identification is to search that owns the current biometric data, while the verification is to make sure that biometric data belongs to specific person.

II. LITERATURE SURVEY

Raimond Thai uses crossing number method for pixel value representation '1' as presented in Raimond Thai, (2003), "Fingerprint Image Enhancement and Minutiae Extraction", Master's thesis, University of Western Australia. In his research, a post processing technique to remove false minutiae points was introduced. However, there were no clear explanations of how to obtain minutiae point parameters.

Sharat Cikkerur uses chain co de contour processing to detect minutiae points, which is translation variant. It can be made rotation invariant if relative direction is used. This method also uses trigonometry calculation and works with floating point calculation as it was described in Sharat Chikkerur, 2005. "Online Fingerprint Verification System", Master's thesis, State University of New York at Buffalo.



ZnO@MnO₂ nanocomposite modified carbon paste electrode for electrochemical detection of dopamine



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ABSTRACT

In this study, we have compared the performance of a bare carbon paste electrode (BCPE) against the ZnO@MnO₂ nanocomposite modified carbon paste electrode (MCPE) in the electrochemical determination of dopamine (DA). Chemical and structural features of the ZnO@MnO₂ nanocomposites were characterized using scanning electron microscopy (SEM), energy dispersive X-Ray analysis (EDX), transmission electron microscopy (TEM), X-Ray diffraction (XRD), thermo-gravimetric analysis (TGA) with differential thermal Analysis (DTA) and Brunauer-Emmet-Teller (BET) surface area analysis. The cyclic voltammetry (CV) measurement of the ZnO@MnO₂ nanocomposite MCPE showed better oxidative catalytic activity (3.6 μA) towards the DA than BCPE with higher efficiency (44.50%) in sensing the dopamine, making MCPE suitable for developing biosensors. The electrochemical studies were carried out in 5×10^{-5} M DA and obtained results were measured in the potential range of -0.2 to 0.6 V vs. saturated calomel electrode (SCE). The electrochemical performance of electrochemical impedance spectroscopy (EIS) and Tafel technique were measured for the BCPE and MCPE using 0.2 M phosphate buffer to maintain pH 7.2 with the scan rate of 50 mV/s. The redox peak current for MCPE Vs scan rate had good linearity with correlation coefficients of $R^2 = 0.9996$, which represents the diffusion controlled process was under controlled electron transfer reaction. It is expected that the good electrocatalytic behavior of MCPE can be utilized for the fabrication of biosensors.

1. Introduction

As an extracellular chemical messenger, dopamine (DA) is a crucial neurotransmitter for continuous functioning of central nervous, renal, hormonal and cardiovascular systems in the mammalian brain tissues [1]. It is suggested that neurological ailments such as schizophrenia and Parkinson's disease may be induced due to less amount of DA [2,3]. As ascorbic acid (AA), DA and Paracetamol (PAR), coexist in physiological fluids, including human urine and blood serum, their concentrations

must be accurately monitored through more responsive and selective sensors.

Various analytical techniques have been accounted for the measurement of a number of these biological molecules, including chromatography [4], spectrophotometry [5], chemiluminescence [6], capillary electrophoresis [7], Fourier-transform infrared and Raman spectrometry [8–11]. All of these methods have certain disadvantages, such as long analysis times, high costs, tedious sample preparation and low sensitivity and selectivity. Also, instruments involved in some of these analyses are

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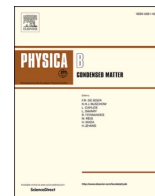
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Electrochemical sensor studies of dopamine using multiwalled carbon nanotubes by CVD technique

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ABSTRACT

The synthesized Multiwall carbon nanotubes (MWCNTs) structural conformation studies were carried out using the powder X-ray diffraction. Plane 002 shows the crystallinity of graphite hexagonal carbon structure. The Fourier transform spectroscopy shows the presence of C=C double bond which reveals the presence of MWCNTs. Morphology and Elemental analysis were studied by SEM-EDX analysis. HR-TEM and SAED pattern shows that the formation of MWCNTs and the same is matched with XRD pattern. In addition to that, the thermal stability of the MWCNTs was carried out using differential scanning calorimetry and thermo-gravimetric analysis. The UV-visible spectroscopy shows the strong absorption band at 357 nm and the corresponding energy band gap was found to be 3.34 eV. In the present study the synthesized MWCNTs used as bare carbon paste electrode (BCPE) and modified carbon paste electrode (MCPE) to study the electrochemical biosensor behavior of dopamine (DA) using the cyclic voltammetric technique. DA represents the oxidation peak is 0.1009 V and 0.1049 V and also the reduction peak is 0.1470 V and 0.1522 V at the BCPE and MWCNT/MCPE. Hence the oxidation and reduction peak range of DA at the modified MWCNTs were significantly higher. The electron transfer reaction of DA is shown by the effect of scan rate and the concentration of dopamine. The modified electrode's stability was investigated with the outcomes indicating it is relatively stable. The developed sensor had a high level of sensitivity, stability, and reproducibility.

1. Introduction

The Carbon nanotubes have persuaded very important attention due to their unique assortment of properties involving high mechanical strength, low density, high aspect ratios, large specific surface area, optical characteristics, electrical and thermal conductivity [1,2]. In present days, enormous attempts have been committed to the use of carbon nanotubes in a variety of applications such as batteries, energy storage [3,4], solar cells, transistors [5], electrodes [6,7] and nano electronic sensors [8,9]. Thin films consisting of carbon nanotubes includes significant interest and they are extensively working for super capacitors [10], pressure sensors [11], regulating cure performance of polymer composites [12], temperature sensors [13], and also strengthening of packing's in polymers [14–16]. Nanotubes are mainly categorized into single walled carbon nanotubes (SWCNTs) and multiwalled carbon nanotubes (MWCNTs). MWCNTs mainly display metallic

behavior and also it is more favorable than SWCNTs because of their stiffness, easier and cheaper to manufacture on a large scale.

Carbon nanotubes are produced through arc discharge, laser ablation, and chemical vapour deposition (CVD) over a catalytic material. Iron, cobalt, and nickel are normally used as a catalyst for the production of MWCNTs using the CVD method [17–20]. For the growth of carbon nanotubes, metal catalyst plays a vital role. Furthermore, considerable progress has been made in the development of carbon-supported materials at an affordable price. As a result, novel hybrid nanomaterials like gold, iron, silver, and cobalt nanoparticles can improve surface modification, electrode conductivity and electron transfer. In the present study, Co nanoparticle plays an important role in the synthesis of MWCNTs in order to improve efficiency [21–23]. The required condition to achieve the growth of good carbon nanotubes is to attain higher stability at a higher temperature.

Multiwalled Carbon Nanotubes are formed when the particles are

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THE PROPERTIES OF ONE PARAMETER POWER EXPONENTIAL MEAN AND ITS INVARIANTS

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Abstract

In this paper, studied and verified the properties, various kinds of Schur convexities of one parameter “Power exponential mean” and its invariants.

1. Introduction

The idea of Mathematical methods is presented and concentrated by Greek Mathematicians depending on extents and their significance in the fourth century A. D in the Pythagorean School. Later on a few creators contributed and built up this field considering applications to different parts of science and innovation. Lately, Loksha et al. gotten the connection among

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Keywords: Schur convexities, Properties, Invariant mean, One parameter Power exponential mean.

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The Ky Fan type inequalities for power exponential mean and its invariant

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Abstract: In this paper, the investigations on mathematical means are carried out for the arguments lying on linear and curved paths. Further, an inequality chain involving important means is established which is an extension as well as strengthening of the Ky Fan type inequality, by using Taylor series expansion.

Keywords: Ky Fan type inequality, linear and curved paths, means, Taylor series.

1. INTRODUCTION

The concept of Mathematical means is introduced and studied by Greek Mathematicians based on proportions and their importance in the fourth century A.D in the Pythagorean school [1, 4]. Later on several authors contributed and developed this field in view of the applications to various branches of science and technology. In recent years, Loksha et al. obtained the relation between series and important means [9], Greek Means and functional means [3, 5-7, 14, 22-27], introduced and studied Gnan mean in two and n variables [3, 11], studied homogeneous functions as an application obtained some inequalities involving means [8, 10], firstly studied Oscillatory mean, Oscillatory type mean in Greek means, properties of new means, its generalizations and several mean inequality results were found in [2, 9, 11,12]. In [15-21], Nagaraja et al. established good number of inequalities involving means. In [28] Zhen Hang yang, proposed the Power exponential mean of the form: $Z(a, b) = (a^a b^b)^{\frac{1}{a+b}}$.

Definition 1.1: [13] For non-negative real numbers $y \in \left(0, \frac{1}{2}\right]$ and $(1 - y) \in \left[\frac{1}{2}, 1\right)$ is represented as a function given below;

$$f(y) = \begin{cases} y, & \text{for } 0 < y \leq \frac{1}{2} \\ 1 - y, & \text{for } \frac{1}{2} \leq y < 1 \end{cases}$$

In the discussion of the popular inequalities due to Ky Fan, the following are the standard notations in n variables.

For given n arbitrary non-negative real numbers $y_1, y_2, \dots, y_n \in \left(0, \frac{1}{2}\right]$, the unweighted arithmetic, geometric and harmonic means are denoted by A_n , G_n and H_n respectively. Also, the arithmetic, geometric and harmonic means of the set of elements $1 - y_1, 1 - y_2, \dots, 1 - y_n$ denoted by A'_n , G'_n and H'_n respectively.