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Natural fiber-reinforced polymer composites: a comprehensive study on machining characteristics of hemp fiber-reinforced composites

2

Piyush Gohil[1], *Kundan Patel*[1] *and Vijaykumar Chaudhary*[2]
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2.1 Introduction

Nowadays, fiber-reinforced polymers (FRPs) have been widely used in many areas, such as research, industrial applications, etc. FRP materials are widely adopted by scientists, engineers, and researchers due to their superior properties. Due to their inherent superior properties, such as low weight, high strength-to-weight ratio, good corrosive and fatigue resistance, they can regularly replace conventionally used materials, such as metals and their alloys used in engineering applications [1].

In FRPs, synthetic and natural fibers are used as reinforcing material based on the desired applications. Composite material based on synthetic fibers possesses good mechanical and thermal properties and low water absorption capacity. Because of several environmental issues, disposal and recycling of synthetic fibers are dangerous and they can also create an adverse effect on the environment; in addition the cost of synthetic fibers is higher than that of natural fibers.

Natural fibers may play an important role in developing biodegradable composite materials to overcome environmental problems [2]. The composites made from natural fibers have many advantages, such as less weight due to low density, better mechanical properties than synthetic fibers such as glass, carbon, and Kevlar, etc. Due to the superior properties of composites made from natural fibers, they are used in aerospace industries, automobile applications, and construction industries and are also used in goods-packing industries [3].

Hemp fibers have been increasingly used as reinforcement in polymer composites. In particular, their composites show higher specific stiffness than glass fiber composites in both tension and plate bending and only slightly lower values than carbon fiber composites in plate bending. Moreover, hemp fibers possess a much higher vibration-damping capacity, making them excellent candidates for

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Chandra Venkataraman
Trupti Mishra
Subimal Ghosh
Subhankar Karmakar *Editors*

Climate Change Signals and Response

A Strategic Knowledge Compendium for India

Springer

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Urbanisation and Surface Urban Heat Island Intensity (SUHII)

Hiteshri Shastri and Subimal Ghosh

Abstract A complete understanding of urban environment becomes increasingly important in the present world where more than half of the human population resides in the urban areas. A warmer surface temperature exists in the urban area due to change in land cover and population density, indicated as urban heat island (UHI). Traditionally, UHI is linked with air temperature differences between urban and rural areas using pairs of in situ climatology data. The term surface UHI (SUHI) is used to explicitly distinguish UHIs measured using land surface temperature (LST). SUHII is a widely recognized surrogate index indirectly addressing the heat island effect. The urban climate largely differs from the non-urban or rural climate affecting not only the temperature but cloudiness, precipitation, water and air quality as well. The long-term monitoring of UHI is essential to better understand the urban climatology. Understanding the UHI behaviour has a concern primarily for the human health and energy consumption. The factors driving UHI is an important aspect of climate research. Several attempts have been made employing a range of methods to investigate the energy balance of global urban centres. India ranking at second largest urban population of the world is projected to have the highest urban growth rate in the next 30 years. The UHI studies in India have been undertaken mostly within individual cities using varied methodology. This chapter provides a concise compilation different studies characterizing UHI for urban centres of India. The chapter briefly reports results from the first assessment of seasonal and diurnal characteristics of SUHI overall large urban centres of India carried out by Shastri et al. in Sci Rep 7:40178 (2017).

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Lecture Notes in Electrical Engineering 618

Axaykumar Mehta
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Priyesh Chauhan *Editors*

Recent Advances in Communication Infrastructure

Proceedings of ICPCCI 2019

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Recent Advances in Communication Infrastructure

Proceedings of ICPCCI 2019

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- Axaykumar Mehta
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Introduction

This book gathers selected research papers presented at the International Conference on Power, Control and Communication Infrastructure 2019 (ICPCCI 2019), organized by the Institute of Infrastructure, Technology, Research and Management (IITRAM), Ahmedabad, Gujarat, India, on July 4–5, 2019. It presents technological developments in the fields of communications infrastructure which comprise of architecture, products, and network connections that allow for communications over the long distances. The book includes some innovative ideas in the field of communication infrastructure, specially satellite communication, navigation systems, artificial neural network, encryption techniques, and some other infrastructure-related developments. The solution approaches provided in this book encourage and inspire researchers, industry professionals, and policymakers to put these methods into practice.

Keywords

Identifying Plant Diseases Using Deep Convolutional Neural Networks

Sunny Desai, Rikin Nayak and Ronakkumar Patel

Abstract In this paper, we have discussed the design of the system that associates the Deep Convolutional Neural Network that can estimate the identity of the disease from the symptoms. Identifying the disease from plants and discovering the possibility that plant is either infected or not, will decrease the likelihood of risk due to such infection by taking appropriate steps against it. Proposed CNN is trained and build with higher precision and accuracy that associate the automatic detection of the disease from the plant leaves in preference of experienced human inspection. Designing the pure CNN that can identify the healthy plant species and infected plants with an accuracy of the 99% and which can avoid the significant loss of farmers. Proposed CNN includes the multiple layers that are trained intensely to identify the convoluted features of the images. The composition of the CNN model is done over the 35,000 training images with testing set from the same distribution with 4400 images. Detailed results are discussed in the paper.

Keywords Remote sensing · Deep learning models · Feature extraction image classification · Disease identification

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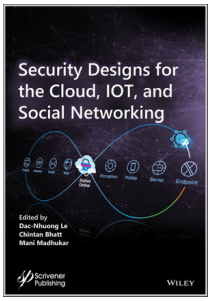

Security Designs for the Cloud, IoT, and Social Networking

Dac-Nhuong Le (Editor)(/en-us/search?pq=%7Crelevance%7Cauthor%3ADac-Nhuong+Le), Chintan Bhatt (Editor)(/en-us/search?pq=%7Crelevance%7Cauthor%3AChintan+Bhatt), Mani Madhukar (Editor)(/en-us/search?pq=%7Crelevance%7Cauthor%3AMani+Madhukar)

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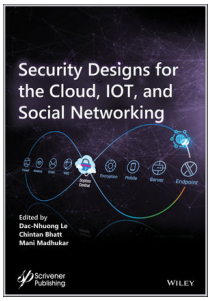

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ENABLING MOBILE TECHNOLOGY FOR HEALTHCARE SERVICE IMPROVEMENTS

Bhumi Dobaria, Chintan Bhatt

U & P U. Patel Department of Computer Engineering, Charotar University of Science and Technology, Changa, Gujarat, India
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Abstract

The availability of low-cost mobile phones and the current broad coverage of GSM networks in developing countries presents a huge opportunity to provide services based on information and communications technologies (ICT). Mobile applications are a very developed market. So, people have access to mobile signals in their day-to-day lives. Very popular android applications are constructed for various domains in the market. These domains include healthcare, business, shopping, food delivery, etc., but the healthcare domain is not properly constructed for mobile application for those in rural areas. So, I tried to provide a time-saving solution for people to decrease the ratio of those with diseases like heart disease, cancer, diabetes and stress-related health problems. Also provided are functionalities like communication between patient and doctor, timely reminders to take medication or be vaccinated, and time-saving use of short messages and video phones.

Keywords: Mobile health, mHealth, healthcare system in India, telecommunication, development drameworks

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3 Wearable electroencephalography technologies for brain–computer interfacing

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Chapter Outline

3.1 Introduction

The recent development of brain–computer interfaces (BCIs), which are devices that use brain signals as a nonmuscular communication channel [1] has provided an important element for the creation of systems capable of brain-to-brain (B2B) communication and precise brain stimulation. These advances have enabled production of noninvasive computer–brain interfaces (CBI). BCI and CBI technologies can be combined to realize the vision of hyperinteraction, noninvasive, computer-mediated B2B communication between subjects.

In B2B systems, the conscious transmission of information between human brains can be achieved through the intact scalp and without intervention of motor or peripheral sensory systems [2]. Pseudorandom binary streams encoding words have been transmitted between the minds of an emitter subject and a receiver subject separated by great distances. Grau et al. [2] have established that Internet-mediated B2B communication is possible via combination of a BCI based on

Wearable and Implantable Medical Devices. DOI: https://doi.org/10.1016/B978-0-12-815369-7.00003-3

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Assessment of Visual Servoing Techniques for Target Localization

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Abstract - Robotics is advancing rapidly in the research area of designing, controlling and building new robots for domestic, commercial and military applications. In addition to these, it also becomes easy to control objects in dangerous locations like bomb defusal, mines and exploring shipwrecks. Visual Servoing (VS) is a technique that controls a robot and gives the motion to achieve the field of technologies such as bionomics and security guard. In robotics, the most important part is to place cameras in the workspace such that each and every place is visible during the whole task. In Visual Servoing, the challenge is to achieve kinematics that gives ease to pick and place objects. This paper represents an overall idea, state of the art techniques and architecture for camera control techniques and robot control techniques. This paper also highlights examples related to forward kinematics and inverse kinematic using Matlab.

***Keywords*:** Visual Servoing, Position Based Visual Servoing, Image-Based Visual Servoing, Kinematics.

1. Introduction

Robotics is gradually upgrading manufacturing industry to engineer the environment so that it will simplify the detection and retrieval of the item. The vision that is primarily based on absolute control or visual servoing based is used as a solution in robot organization. This also helps to grow the dexterity and intelligence of the robot system. Visual servoing is a technique that controls the motion of the robot.

Visual servoing is used within the self-sufficient automobile systems, cellular robotics, pick and drop packages and to evaluate the reference frame with the streaming body [1]. Similarly, this approach is utilized in path finding algorithms, object tracking [2], monitoring and item reorganization [3].

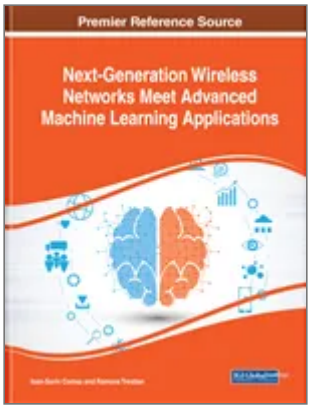
For any visual servoing technique there are two important aspects 1) Camera technique to be implemented for applying vision to robot 2) Control technique that helps required the object to reach the desired location.

2. Related Work

In visual servoing, the camera position is the most imperative part to make the object reach its destination. Similarly, this technique is also beneficial to reach the destination, based on the distance of an object with respect to the digital camera.

2.1. Camera Techniques

There are three primary methods to place cameras in VS: Eye-in hand, Eye-to hand, and Hybrid.



Next-Generation Wireless Networks Meet Advanced Machine Learning Applications

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Chapter 13
CHEERBOT:
A Step Ahead of Conventional ChatBot

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Tejas Nimeshkumar Pandit
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ABSTRACT

The objective of this chapter is to discuss the authors' interaction and involvement with technology and bots, opening a whole new and wide scope of possibilities while letting bots comfort us. The prevalence of bots and automation is increasing by every passing day – Cortana, Siri have been here for a long time and have now been overtaken by Alexa and other home automation systems that provide a two-way dialogue conversations. This chapter explores the possibilities of creating bots that can cheer us up when we are sad. Analyzing the semantics of our sentences and analyzing the pitch of our voice to identify our emotional state, and then providing an n-way dialogue conversation, relevant to the then existing context, instead of the mundane two-way dialogue conversation is the lucid content of this chapter. Summing it up, this chapter examines the possibility of creating bots that can serve as an emotional support to us humans.

INTRODUCTION

Our society is now being reshaped by rapid advances in information technology, leading towards the age of auto-intelligence. Over the past couple of years, we have been swarmed by various new kinds of bots. Bots are automated with software or hardware that are powered by the advances in Artificial Intelligence technologies. The two most appealing disciplines of AI are Machine Learning and Deep Learning. These

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HANDBOOK OF IoT and Big Data

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Vijender Kumar Solanki
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J. Paulo Davim

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Programming Language & Big Data Applications

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1. Evolution of Big Data:

Due to enhancement of technology, a lot of data is being generated. Fig 1 shows sources of the big data. Initially we had landline phones, now we have smart phones that are making our life smarter. Apart from that, we used bulky desktop for processing small amount of data (we used floppy and hard disk to store data but now we can store data on to the cloud). The generated data is not in the format that can be handled by Relational Database. Apart from that volume of data is also increased exponentially. IOT is another reason for the evolution of big data. For example, self-driving car is an example of IOT which connects physical devices with internet and makes the device smarter and for that a lot of data is generated from the different sensors. Another source for the big data is social media where data is generated in different format.

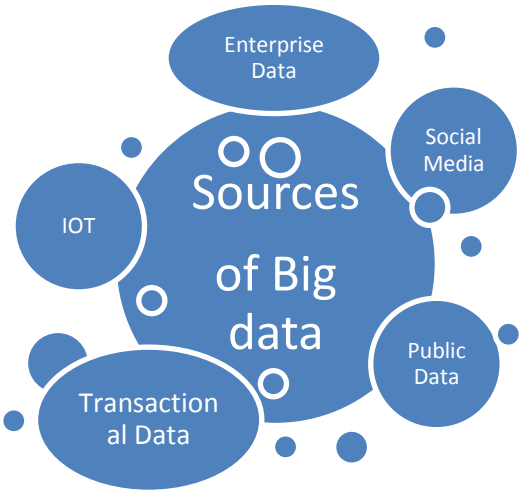

Fig 1. Different Sources of Big Data

1.1 Characteristics of Big Data:

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Contents

Algorithm Selection via Meta-Learning and Active Meta-Learning

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Abstract

To find most suitable classifier is possible either through cross-validation, which suffers from computational cost or through expert advice which is not always feasible to have. Meta-Learning can be a better approach to automate this process, by generating Meta-Examples which is a combination of performance results of classification algorithms on input datasets and Meta-Features. With the increasing number of datasets and underlying complexity of algorithms, makes even the Meta-Learning process expensive. So, Active Meta-Learning can help by optimizing the generation of Meta-Examples along with maintaining the performance of classification algorithms. Proposed work here provides a ranking of classifiers using SRR and ARR ranking method and compares Meta-Learning with Active Meta-Learning. In this work, evaluation methodology based on ideal ranking is presented, which shows that proposed method leads to significantly better ranking with reduced Meta-Examples. The executed experiments discovered a considerable improvement in Meta-Learning performance that supports nonexperts users in the selection of classification algorithms.

Keywords

Meta-learning Active meta-learning SRR (Success Rate Ratio) ARR (Adjusted Ratio of Ratio)

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Chapter 2
A Journey From Neural Networks to Deep Networks: Comprehensive Understanding for Deep Learning

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ABSTRACT

The chapter is about deep learning fundaments and its recent trends. The chapter mentions many advanced applications and deep learning models and networks to easily solve those applications in a very smart way. Discussion of some techniques for computer vision problem and how to solve with deep learning approach are included. After taking fundamental knowledge of the background theory, one can create or solve applications. The current state-of-the-art of deep learning for education, healthcare, agriculture, industrial, organizations, and research and development applications are very fast growing. The chapter is about types of learning in a deep learning approach, what kind of data set one can be required, and what kind of hardware facility is required for the particular complex problem. For unsupervised learning problems, Deep learning algorithms have been designed, but in the same way Deep learning is also solving the supervised learning problems for a wide variety of tasks.

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Arun K. Somani · Rajveer Singh Shekhawat · Ankit Mundra · Sumit Srivastava · Vivek Kumar Verma *Editors*

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Contents

Chapter 2
Performance Analysis of Network with Different Queuing Mechanisms in TCP/FTP and UDP/FTP Scenario

Nehal Patel and Radhika Patel

Abstract Implementation, performance analysis, and network management are the leading issues in the vast field of computer. The choice of the several queues completely depends on the requirement of the broadcast of data. Safe and reliable propagation of data is an elementary obligation of a computer network. In the present situation, there is a strong necessity of calibration, testing, and extensive deployment of queue organization patterns in routers, which is liable for the enhancement of today's performance of the Internet. Queues presentation calculation needs a tangible research effort in the measurement as well as utilization of router workings, which developments to guard the Internet from drifts that are not adequately amicable to notification of congestion. In this paper, we assess the act of Drop Tail, RED, SFQ, and FQ by varying the queue size. We are representing the detailed performance analysis and comparison of the various queues in terms of throughput and packet loss.

Keywords NS2 · Drop tail · RED · SFQ · FQ · Packet drop · Queue size · Throughput

2.1 Introduction

The importance of Computer Networks and Internetworking layer has been tremendously increased in the recent decade. In the digitalized era of computer networks, sharing of information is only possible through networking where end-devices are connected via various links. But the transmission of the data packet in the network is carried out with the help of transport protocols. Among various transport protocols,

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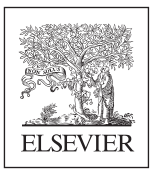

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Preface

The healthcare industry is undergoing histrionic transformation in promoting patient-centered services based on reasoning and analysis for healthcare delivery and patient treatment. Such a transformation requires Big Data analysis, which is mainly associated with data analytics that has a significant role and impact on healthcare, social networks, and manufacturing. This Big Data arises from increased reliance on the digital technologies in healthcare systems, the clinical environment, and many other systems and applications. Healthcare providers are transforming their data mountains from raw information into actionable insights. In the healthcare sector, there is rising interest in effective healthcare data acquisition, analysis, and processing across different healthcare organizations. Efficient data management plays an imperative role in refining the performance of the healthcare systems in hospitals/clinics. Gathering, analyzing, interpreting, and evaluating healthcare data for specific performance measures assists healthcare professionals to make corrective adjustments, to identify accurate treatment plans, and to track outcomes. Several difficult puzzles face the providers in diagnostics and treatment, leading to the emergent need for advanced clinical decision support tools to leverage these new information resources. In addition, due to the central role of the electronic medical records in all aspects of healthcare, various organizations struggle with how to make their electronic medical records (EMRs) more secure, with easy access and sharing of the patient's data and records. In order to solve such challenges, the oncology domain, which is undergoing vast changes due to precision medicine techniques, is considered an active tool in medical healthcare data analysis for easier access to large EHR data sets, for increasing the decision support system capabilities.

This book contains 11 chapters covering the following studies. In Chapter 1 Dutta and Upadhyaya present the challenges faced by today's healthcare systems and analyze how to overcome these with the help of pervasive healthcare. They present an assessment of the current and future IoT healthcare market along with a listing of the key players in the IoT healthcare market. In Chapter 2 the challenges and analysis of data migration techniques are introduced. Tomar et al. also present the technology background, applications, and challenges in NoSQL cloud-based technology. In Chapter 3 Tabari et al. establish a sophisticated platform in an attempt to develop a decision support system with a multiobjective programming model for an efficient allocation in the Iranian Ministry of Health and Medical Education. Shirisha developed a novel algorithm that uses a large key that offers higher security against attacks on data confidentiality with lower computational costs than the conventional ones, to provide security and privacy to large data sets at rest as well as during transmission, in Chapter 4. A large key bunch matrix is chosen with 2048 bits and the block cipher is developed, although the size of the key is further expandable with very trivial changes in the computational costs that would be incurred, in spite of using a lower configured computing system. The relaxation of the key-size constraints was realized, thus paving the way for using the keys with a large number of bits in the cryptosystem and enhancing the security, without overburdening the system with complex and time-consuming

computations involved in the encryption and decryption procedures. Then, a comparative analysis of the semantic framework in healthcare is conducted by Shah and Thakkar. In Chapter 5 the authors analyze the data effectively for making an automatic decision regarding a patient's health risk level, whether the patient is at low risk, moderate risk, or high risk. In Chapter 6 a smart ambulance system using the concept of big data and Internet of Things is proposed by Dumka and Sah. A novel approach is proposed with a smart ambulance equipped with IoT technology to disseminate the information to a main center or hospital, where doctors can treat a patient using equipped nurses in the ambulance through wireless body sensor technology (WBSN). In Chapter 7 Gospodinov et al. present the use of mathematical methods for the analysis of electrocardiographic data, specifically based on an essential diagnostic parameter, such as heart rate variability (HRV). In Chapter 8 Dumka et al. illustrate the role of body sensor networks in medicine and healthcare applications to collect information about the patients, generating their needful database, connecting payment gateways, and insurance providers along with a cadaver implementation system, including legal formalities within a single proposed platform. The proposed system uses an implantable wireless body sensor for transmission of information on the body part to the main station through a wireless sensor. The proposed system is integrated with wearable devices, wearable body area network (WBAN), near field communication (NFC), narrowband Internet of Things (NBIoT), and long range low power wireless platform (LoRa) integrated on a single monitoring system through a customized user interface. In Chapter 9, Banerjee et al. include a generic set of designs and libraries of data structure towards design methodologies. The features of sensing capacity of a sensor, preciseness, persistence, and data acquisition can be used as a core statistical model and thus an emerging machine-learning model is proposed to solicit a generic design methodology for IoT design. In Chapter 10, Parah et al. propose a reversible and secure Electronic Patient Record (EPR) embedding technique, using histogram bin shifting and RC6 encryption. Finally, in Chapter 11, Parah et al discuss a secure and reversible data hiding scheme for healthcare system using magic rectangle and a new interpolation technique.

This volume is anticipated to disseminate cutting-edge research that delivers insights into the analytic tools, opportunities, novel strategies, techniques, and challenges to researchers, engineers, and developers for handling big data and data analytics and management in healthcare. We the editors have a great appreciation for the authors' high-quality contributions as well as for the respected referees for their accurate, detailed, and timely review comments. Special thanks go to our publisher, Elsevier. We hope this book will stimulate further research in healthcare data analysis and management.

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CHAPTER

Comparative analysis of semantic frameworks in healthcare

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CHAPTER OUTLINE

Healthcare Data Analytics and Management. https://doi.org/10.1016/B978-0-12-815368-0.00005-1

Scope of Chapter:

In the recent years many users have surfed the online web documents for the health related information. This indicates the high demand of putting updated and high quality data of healthcare which can be accessible to patients as well as many healthcare stack holders. This chapter seeks to help satisfy that demand by analyzing health data and designing framework based on semantic methods powered by open source technologies JADE, WADE, RDF and ontologies. Framework discussed in this chapter accept the data from the various healthcare standards like HL7 (Healthcare Level 7) and FHIR (Fast Healthcare Interoperability Resource). Initially framework convert the data to the standard format RDF (Resource Description Framework) using syntactic transformation methods and finally by applying semantic transformation you can analyze and find the accurate meaning of data. Apart from frameworks, this chapter also discusses the various software tools like PACS (picture archiving and communication system), DICOM (Digital Imaging Communicating Medicine) and RIS (Radiology Information system). These tools are used to change the traditional healthcare practice of maintaining all the records within file and some hard storage with the high risk of stolen data or crashing of hard data by converting and managing everything digitally. So the main aim of this chapter is to analyze the data effectively for taking automatic decision regarding patient's health risk level whether the patient is at low risk, moderate risk or high risk.

1 INTRODUCTION

More than seven thousand languages are spoken around the globe [1]. Despite the fact that individuals speak distinctive languages, they find a way to communicate by either agreeing on the same language or by utilizing a translator. This basic concept is known as interoperability. Broadly speaking, we must have a common platform or system through which every individual or organization is able to work together to achieve a common objective [2]. This concept plays a very important role in our daily lives as well. It was initially defined in the information technology (IT) field for exchanging or sharing information [3]. We can take the example of the World Wide Web, which is a large interoperable network of documents whose standards are defined by the World Wide Web Consortium (W3C) [4].

Similarly this concept is applicable in healthcare, where a need exists to develop a semantic-based framework and a multiagent system to retrieve and exchange information among the different hospitals and medical institutions. According to a survey made by the World Health Organization (WHO) in India, only 5% of individual doctors and 12% of hospitals are participating in the exchange of health information (Fig. 1). These numbers are very small compared to other countries like the United States and the United Kingdom. To achieve interoperability is the biggest challenge in healthcare, because every hospital stores data in its own format and to communicate between each electronic health record (EHR), we must have a common system or framework that allows us to retrieve meaningful patient information in a secure

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U-Healthcare Monitoring Systems

Volume 1: Design and Applications

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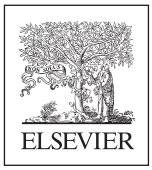

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CHAPTER

Medical image diagnosis for disease detection: A deep learning approach

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CHAPTER OUTLINE

1 INTRODUCTION

Before recent decade healthcare data availability was very hard, if it was available at that time the size of the data was very small. But in the current world, those issues are gone. Because of the incredible development in image procurement devices, the data is quite large, which makes it more applicable and effective for image analysis. This express progress in biomedical digital images and modalities involves widespread and monotonous efforts by the experts of medical domains such as radiologists, general physicians, etc. Especially for digital image analysis that includes human error,

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required huge analysis and diagnosis variations depending on subject experts. To solve these kinds of issues, machine learning (ML) techniques provide automated diagnosis solutions; however, traditional ML methods are not appropriate to handle complex problems. Collaboration between high-performance computing (HPC) and ML gives us promising results in terms of complex problems. HPC and ML collaborations ultimately lead to Deep Learning (DL), and this will give ultimate results on large medical image datasets. This will give accurate analysis and diagnosis results. DL provides us automated feature selection furthermore it does not only identify the disease but also quantify prognostic goal and delivers tortuous estimate models to increase the diagnosis ability of medical experts.

Machine Learning is a most important field that is mainly helpful to make decision-making systems, recommendation systems, image analyzing systems, web searching, and so on. Several ML algorithms such as Artificial Neural Network (ANN), Random Forest (RF), the Hidden Markov Model (HMM), SVM (Support Vector Machine), Gaussian Networks (GN), etc., are applied in the fields of biomedical image processing.

Medical image processing comes under bioinformatics research. Medical digital image processing is one of the data modalities of bioinformatics. Apart from medical images, there are two more data modalities: omics (mostly sequential data) and biomedical signaling. Over the last few years, the use of such advanced DL techniques applied in the fields of medical image processing has grown rapidly. The current evidence of such systems is IBM's WATSONS [1] and GOOGLE DeepMind [2]. These projects have used DL algorithms to solve several bioinformatics problems. IBM's Watson use the ontology of patient health specification records collected by doctors for finding optimal solutions [1]. Google's DeepMind created a DeepMind health system for solving heath-related problems and terminology [2]. Medical imaging domains contain raw data that may not be applied to the traditional algorithms of ML. The reason behind that is structure of medical images same times very complex (number of features are very high). So, handcrafted feature selection (ML) approaches not good for Medical Image analysis. These traditional algorithms that are mainly responsible to extract the feature Vector among such input sequences, for analysis the imaging.

Neural network architecture mainly needs feature vectors for input data. Medical image domain data needs to process the raw data images for feature vectors to give this input to such neural networks. Preprocessing of such raw data is much more expansive and quite more time consuming to do. A Deep Neural Network (DNN) helps to solve these problems through DL. Bioinformatics is broad domain to explore the DL phenomena. A beautiful definition by Merriam-Webster calls "bioinformatics as a collection of data, to do classification make prediction using feature extraction by analysis of biochemical properties and biological information using the computers." Research domains in bioinformatics are protein structure prediction, Gene expression regulation, protein classification, and anomaly classification [3–6]. Data availability in the fields of bioinformatics fall into these

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Chapter 7
Big Data, Privacy, and Healthcare

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ABSTRACT

In the era of big data, large amounts of data are generated from different areas like education, business, stock market, healthcare, etc. Most of the available data from these areas are unstructured, which is large and complex. As healthcare industries become value-based from volume-based, there is a need to have specialized tools and methods to handle it. The traditional methods for data storage and retrieval can be used when data is structured in nature. Big data analytics provide technologies to store large amounts of complex healthcare data. It is believed that there is an enormous opportunity to improve lives by applying big data in the healthcare industry. No industry counts more than healthcare as it is a matter of life and death. Due to rapid development of big data tools and technologies, it is possible to improve disease diagnosis more efficiently than ever before, but security and privacy are two major issues when dealing with big data in the healthcare industry.

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Lecture Notes in Computational Vision and Biomechanics

Volume 30

The research related to the analysis of living structures (Biomechanics) has been a source of recent research in several distinct areas of science, for example, Mathematics, Mechanical Engineering, Physics, Informatics, Medicine and Sport. However, for its successful achievement, numerous research topics should be considered, such as image processing and analysis, geometric and numerical modelling, biomechanics, experimental analysis, mechanobiology and enhanced visualization, and their application to real cases must be developed and more investigation is needed. Additionally, enhanced hardware solutions and less invasive devices are demanded.

On the other hand, Image Analysis (Computational Vision) is used for the extraction of high level information from static images or dynamic image sequences. Examples of applications involving image analysis can be the study of motion of structures from image sequences, shape reconstruction from images, and medical diagnosis. As a multidisciplinary area, Computational Vision considers techniques and methods from other disciplines, such as Artificial Intelligence, Signal Processing, Mathematics, Physics and Informatics. Despite the many research projects in this area, more robust and efficient methods of Computational Imaging are still demanded in many application domains in Medicine, and their validation in real scenarios is matter of urgency.

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Contents

A Novel Hybrid Method for Time Series Forecasting Using Soft Computing Approach

Arpita Sanghani, Nirav Bhatt and N. C. Chauhan

Abstract Improving the forecasting accuracy of time series is important and has always been a challenging research domain. From many decades, Auto-Regressive Integrated Moving Average (ARIMA) has been popularly used for statistic forecasting however it will solely forecast linear half accurately because it cannot capture the nonlinear patterns. Therefore here, we have projected a hybrid model of ARIMA and SVM. As Support Vector Machine (SVM) has demonstrated great outcomes in solving nonlinear regression estimation problems and to utilize the linear strength of ARIMA. Comparison with other models using different datasets has been done and the results are very promising.

1 Introduction

Time series prediction is an endlessly growing analysis domain. The accuracy of prediction is the main goal to realize. Prediction future is the best exploitation by time series prediction. With the statistic prediction, past data assortment of the constant variable is used to build a model to forecast long-term accessibility of those data. Then established model is utilized thus on extrapolate the statistic into the longer term. This modeling approach is very useful once little information is obtainable regarding past variables and no different things are thought [1–5].

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Lecture Notes in Networks and Systems 93

Simon Fong
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ICT Analysis and Applications

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Internet of Things Driven Gesture Mimicking SMART Robotic Palm

Jignesh Patoliya, Dhruvang Shah, Uzma Shaikh, Kandarp Rastey and Mohammad Tausif Shaikh

Abstract SMART Robotic Palm is developed to mimic the motion of a human thumb, fingers, and palm. This paper proposes embedded technology-driven electromechanical setup capable of imitating human palm gestures and movements with the use of electronics. This setup is capable of generating voltage corresponding to motion of fingers and then feeding it to the controller in the transmitting glove, which translates the voltage values to angles (in degrees). The angle values (or the value change) are transmitted to the Cloud-based Internet of Things platform using transmitter controller's Wi-Fi capability via the Internet in form of data packets. The receiver end or the artificial robotic palm's controller receives these angle values in real time to duplicate and replicate this motion or imitation. The SMART Robotic Palm's dexterity and its finesse in imitation of motion is achieved using linear potentiometers, NodeMCU DEVKIT 1.0 as the Internet of Things platform which consists of ESP8266EX as its microcontroller and the servo motors in the robotic palm's fingers actuating motion. More precise control and motion shall be useful in numerous applications especially in the health sector for performing surgeries remotely in critical and/or emergency situations.

Keywords Internet of Things · Imitation · Embedded technology · SMART Robotic Palm · Linear potentiometers · Servomotors

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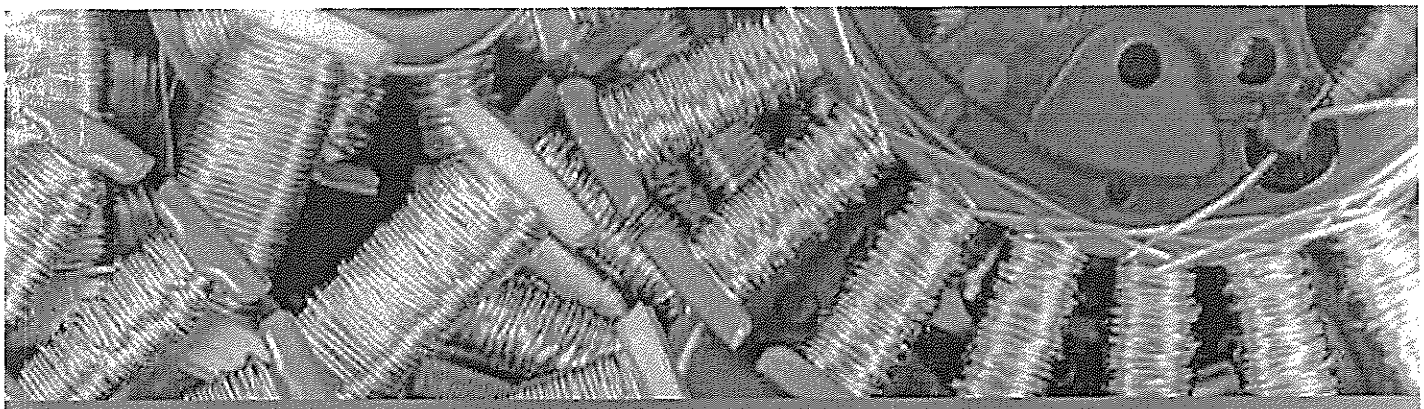

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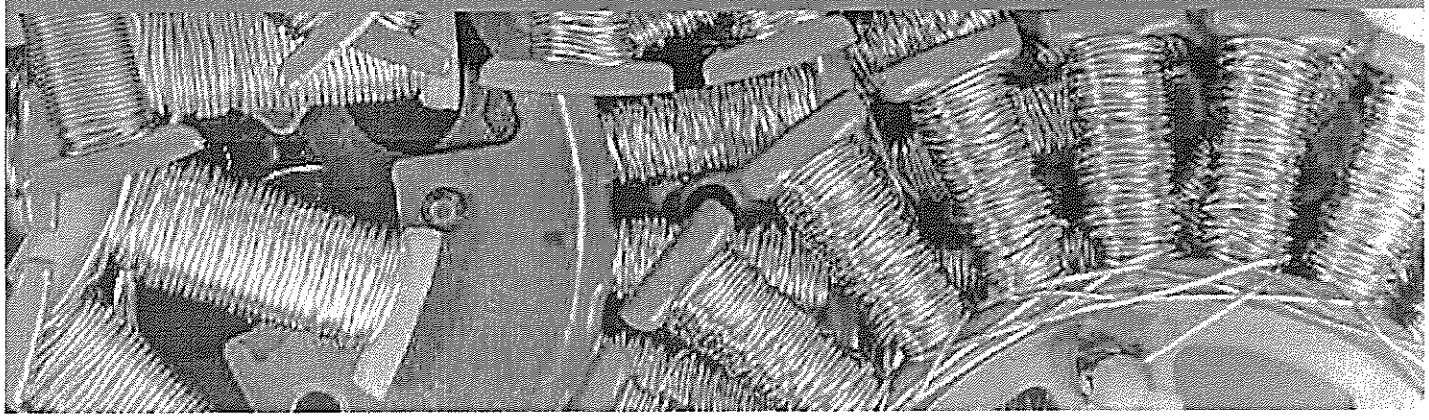

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Chapter 5

CMOS Active Inductor and Its Applications

Dhara Pinkesh Patel

Abstract

Electronic industries always drive to add more functionalities to the devices. Tunability and compactness have become thrust parameters for the microelectronic researchers. In wireless communication, capacitor and inductor are the most significant reactive components for frequency selection. Out of these two reactive components, inductor occupies significant size of entire chip area. As a result, any circuit containing passive inductor such as voltage-controlled oscillator (VCO), low-noise amplifier (LNA), filter, and power dividers consume wider chip size. To meet the requirement of microelectronics industries, passive components have been replaced with active ones. In this chapter, passive inductor has been substituted with CMOS based active inductor.

Keywords: active inductor (AI), compact, gyrator, tunability, trans conductance

1. Passive Inductor

A passive spiral inductor is an electrical component comprising of coil or wire which is associated with the magnetism and electricity as current passes through the coil. It stores electrical energy in the form of magnetic field. The current passing through the inductor lags inductor voltage by 90° **Figure 1** shows the signal flow diagram of passive inductor.

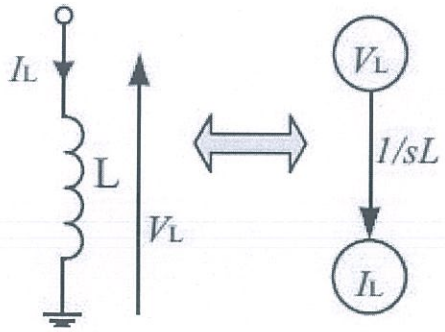

Figure 1.
An ideal spiral inductor and signal flow graph representation.

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Vijay Janyani
Ghanshyam Singh
Manish Tiwari
Antonio d'Alessandro *Editors*

Optical and Wireless Technologies

Proceedings of OWT 2018

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Contents

Performance Evaluation of Transparent and Non-transparent Flexible Antennas

Maitri Kantharia, Arpan Desai, Parthesh Mankodi, Trushit Upadhyaya and Riki Patel

Abstract Performance evaluation of transparent and non-transparent flexible wearable antennas using different substrates is analysed and presented over here. Substrate in the form of PET and jeans is used, whereas conductive materials like AgHT-4 and Copper sheet are used as patch and ground, respectively. Performance evaluation in terms of S11, gain and radiation pattern is presented. PET which is transparent in nature is embedded with AgHT-4 to make a flexible transparent antenna. Jeans is used with copper sheet to design a non-transparent antenna. The electrical conductivity of copper is higher compared to AgHT-4, which leads to higher gain and return loss but it has a disadvantage of being non-transparent. The transparent flexible antenna resonates at 2.42 and 3.88 GHz making it suitable for its use in WLAN and WiMAX applications.

Keywords Flexible · Transparent · Non-transparent · Wearable · Antenna · Wireless applications

1 Introduction

In any communication systems, antennas are useful where electromagnetic wave is to be radiated or absorbed [1]. Wireless communication has seen new trends in antenna design such as metamaterial antennas [2, 3], fractal antennas [4], ultra-wideband (UWB) and flexible antennas [5, 6]. The addition of flexibility to such antennas makes sure that it can be used on the surfaces, which are not having planar geometry. In defence, the antennas can mainly be used in the form of wearable ones [7]. Body-centric communications play important role and presents wide variety of applications. Development of wearable low power device has increased the requirement of solution

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Dual-Band Graphene Based Planar Antenna for WLAN Communication Applications

Ronak Vashi[1(✉)], Trushit Upadhyaya[2(✉)], Arpan Desai[2], and Riki Patel[2]

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Abstract. Graphene-based antennas are artistic concept for wireless communications. In this paper, a Dual Band antenna using Graphene and FR4 is proposed. Graphene is used a patch and ground plane whereas FR4 is used as a substrate material. The graphene antenna is evaluated in terms of return loss, radiation pattern and current distribution. The radiation pattern of Graphene antenna shows omnidirectional pattern with no null. The simulated impedance bandwidth of the graphene-based antenna is 5.06% (2.43–2.30 GHz) and 3.80% (5.52–5.12 GHz), which makes the antenna suitable for Dual-Band Wireless Local Area Network (WLAN)/WiMAX communication.

Keywords: Dual band · Flexible · Graphene antenna · WLAN

1 Introduction

In the new era of wireless communication; the demand for small size, robust, efficient and flexible antenna working in the range of wireless local area network (WLAN) is increasing. Due to impressive properties like electrical and thermal conductivity, strength, stiffness, and toughness enable a whole new diversity in the applications. This is one of the prime reasons Graphene-based antennas are the qualifying technology for a wireless communications system. As Graphene is a two-dimensional (2D) honeycomb lattice with monolayer crystal carbon atomic structure. Graphene material provides 15 to 20 times more mechanical strength and 5 times lighter than copper. Graphene is also zero band gap semiconductor material as the electric field is applied to this material electron and holes carriers emerged, which allows the control of conductivity and surface resistance, and controlled by doping and electric field biasing method [1]. Graphene, Young's Modules (E) (Tensile Elastic Capacity) in the range of 1000GPa, and copper have only 110–130 GPa. With this Graphene have moderately low resistance approx. 35 to 50 Ω/sq, 80–90% optical transparency, carrier density of 2to 6 × 1011 holes per sheet and a mobility of 200 to 1900 cm2/V-s [2]. Aeronautics & Automotive industries are already shifted metal to Carbon based materials due to its lighter structure, high durability, and energy-harvesting properties. These will push the Graphene to "Metal Replacement" goal in the wireless field. However, high electrical conductivity is required; metals are still preferred to Carbon base material.

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Design of Dual Wideband Planar Antenna for Wireless Applications

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Abstract— The novel antenna design resonating at the centre frequencies of 1.9 and 3.2 GHz for PCS and WiMAX application has been presented. Comb shaped slots in the circular patch which is further placed in the hexagonal slotted rectangular patch. This paper aims to obtain dual band operation with reasonable gain and bandwidth. The impedance bandwidth (- 10 dB) of 34 % and 14.2 % at 1.9 and GHz were obtained respectively. High frequency simulation software (HFSS) was utilized for designing and analyzing the novel design presented in this paper. The design was manufactured and the results of the hardware was compared with the simulation results obtained. Good Match has been observed between the results.

Keywords— Dual band, wideband, surface mountable, WiMAX Antenna, PCS

I. INTRODUCTION

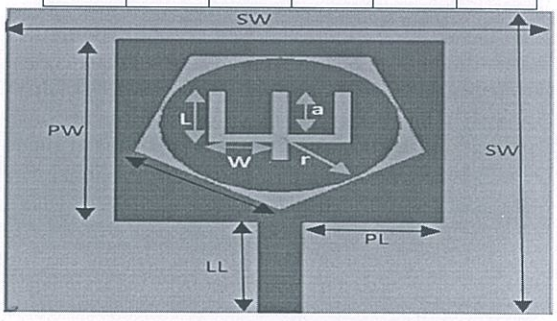
Microstrip patch antennas has various pros such as conformal planar shape, small size and better radiation characteristics. Even though the patch antenna has multiple benefits, there are few limitations such as less gain, narrow bandwidth and low efficiency. Various solution has been proposed in the literature to get rid of these impediments. Size reduction of antenna by using the innovative slotted ground was proposed in [1].Inverted L antenna was proposed in order to achieve multiband operation was proposed in [2].Circular polarization with multiband was proposed in [3]. Microstrip patch antennas pros, cons and application were discussed in [4]. Metamaterial based multiband antenna had been proposed in [5].Wideband was achieved using negative refractive index loaded patch was proposed in [6]. Folded planar loop antenna in order to achieve multiple band in PCS and WiMAX frequency range was proposed in [7]. A compact planar antenna resonating in PCS and WiMAX frequency range was proposed in [8].Internal folded loop antenna for mobile communication with tuning notches were proposed in [9] Various methods has been proposed in literature to obtain compact planar antennas [10-15].

II. PROPOSED MODEL AND DESIGN

Fig 1 presents the antenna design. Fig.1 (a) depicts the patch design (Top View) and Fig1 (b) depicts the view of the ground plane (Bottom view). The dimensions used to design the antenna in the simulator are as illustrated in Table 1. The design has been fabricated on the FR-4 (Flame Retardant) glass epoxy sheet. The sheet has a relative permittivity of 4.4 and loss tangent of 0.02. One of the drawback of using FR-4 as substrate is that it is very lossy in the GHz range. However the cost of it is very less compared to other substrate available in the market such as RT Duroid, etc.The maximum dimension of the substrate is 50 × 50 mm2. The ground has been modified in order to attain the dual band. The slots of comb shaped has been enhanced using full wave simulation software so as to obtain the targeted resonance frequency. The inset feed mechanism has been used in order to feed the patch. The length and width of the feed line has been calculated so as to match the desired 50 ohm impedance of SMA connector.

Table 1. Design parameters (All dimensions in mm)

SW	PW	LL	PL	W	L
50	30	15	13	5.75	8.5
a	r	GL			
7	11	10			



(a) Top View (Patch Design)

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Analysis of Flexible Textile Antenna Design and Their Application for Wireless Communication: A Survey

Abhishek Agarwal ,Riki Patel , Arpan Desai , Trushit Upadhyaya ,Shubham Patel,
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***Abstract*:- In the recent years, the Textile antenna design has become an attractive research area to its persistent healthcare applications. Wearable antennas are becoming widespread and their demands are significantly increasing in the sense of their use in smart clothes in wireless communications. The use of fabrics in flexible antennas necessitates description of their properties. However, very less evidence can be establish on the electromagnetic possessions of consistent textiles. In addition, textile fabrics are porous, aelotropic and compressible materials that thickness Low pressure may change density. Consequently, it is imperative to recognize how these appearances affect the performance of the antenna to minimalize adverse effects.**

Keywords:- Textile Antenna; Flexible; Application; Wireless communication

I. INTRODUCTION

In wearable antenna, Flexibility and robustness are main and also critical properties for electronics devices because that works in atmosphere where the change in the shape such as deformation occurs. Nowadays growth of wearable textile antenna in electronics devices is increasing very fast [1-5], indicates an anticipated export over 550 million devices by the year 2021. Example of the applications were wearable devices are includedBut not limited to health care, sports, child monitoring, defense/emergency, smart home, internet of things, etc. In past the fabrication of the flexible antenna is carried out with the help of conductive ink [6-8], conductive fabrics [9-11], copper tape [12, 13], etc. Now they have make a example of wearable antenna by means of self-adhesive copper adhesive tape which is verified expending scalar network analyzer. Antenna that are integrated in clothing should be small in size, light weighted, robust less and also, flexible. Antenna should have satiability and exhibit innocent to person fitness when integrated close to person body. [14]. Antenna is considered as the main elements to design the body centric wireless communication. Different types of textile flexible antennas are designed in recent years and they satisfactorily transfer power between various nodes located on a human body. Antennas which are used in Body-Area Network (BAN) need to be compact in size, light weight and feasibly allowing antenna to be integrated with the clothes. An antenna which is designed to work between 400MHz to 10MHz in close proximity with the human body experiences radiation, change in desired frequency and may change in impedance and efficiency [15].

Textile flexible antennas which are used to make system lighter with the help the material like rubber ,plastic paper, jeans and other material. Antenna made of this type of material is low cost manufacturing, ease of fabrication availability of material and any more. One of the main features in examination areas in antennas are for body-centric communications that is wearable, fabric-based antennas. Mostly, wearable antenna should be light in weight, low cost almost maintenance free and no installation require because of the modern devices. There are number of specialized occupation segments that apply body centric communication system, for example, paramedics, fire fighter, and military. On the other hand, wearable antennas can also be applied to teenagers, the matured, and the athletes aimed at the use of health monitoring. Designing textile antenna one should have knowledge electromagnetic properties of material (Substrate) For example, the dielectric constant and loss tangent of a particular Textile material. Conductive textiles (such as Zelt, Flectron and pure copper polyester taffeta) are commonly used as radiation components, while non-conductive textiles (such as silk, felt and wool on the other side) are also used as substrates. The electromagnetic property of such textiles is not readily available. Dimension of the electromagnetic belongings of textile substrate is been carried out by using two different method that is transmission method and reflection waveguide method. [16]

The characteristic of the material are really important for the working behavior of the antenna. For instance, the permittivity and also the wideness of the dielectric substrate play a vital role in determining the bandwidth and the efficiency performance of the planar textile antenna and also, the conductivity of the ground plane and the patch is also the very imperative factor in the effectiveness of the antenna and it must be as high as possible [17] . Textile materials for antennas have become commonplace and readily available, and may be materials for wearable textile antennas designed for in vivo and in vivo local area networks (BANs). Their electrical and electromagnetic properties are critical to the design of antennas [18]. Therefore, specific electro textile is designed that are commercially available in market and also have been successfully used in fabricating previous antennas [22–27]. Ordinary textile fabrics are used as a dielectric substrate. Usually human body consists of water Includes dielectric constant and conductivity. Metal base structure antenna is placed on skin, it gets reflected back from the body. When electromagnetic waves come in contact with the skin, then there will be change in its resonant frequency. The electromagnetic interference (EMI) between the human body and the antenna is given by the specific absorption rate (SAR), which is the heat generated by the antenna and is induced as heat on the surface of the human body. A high dielectric constant results in an increase in surface wave loss and an antenna bandwidth that reduces the impedance bandwidth [28]. The general picture centered on the wireless human body is isolated, in vivo and in vivo. In this review, in-vivo and

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17:20 Strengthening Particle Swarm Optimization for Solving Traveling Salesman Problem
Cheng-Hsiung Tsai (National Kaohsiung University of Science and Technology); Po-Jui Chiang (National Kaohsiung University of Science and Technology); Cheng-Hong Yang (National Kaohsiung University of Science and Technology); Tien-Tsorng Shih (National Kaohsiung University of Science and Technology); Jau-Ji Jou (National Kaohsiung University of Science and Technology); Chih-Hsueh Lin (National Kaohsiung University of Science and Technology); Chien-Hsiang Huang (National Sun Yat-sen University); Chien-Kun Wang (National Kaohsiung University of Science and Technology); Shuo Hsien Wang (National Kaohsiung University of Science and Technology); Nai-Hsiang Sun (I-Shou University);

17:40 Time-domain Analysis of Heat Conduction Using Fast Inverse Laplace Transform
Shohei Nishino (College of Science and Technology Nihon University); Soichiro Masuda (Nihon University); Seiya Kishimoto (Nihon University); Shinichiro Ohnuki (Nihon University);

18:00 Substrate Integrated Waveguide (SIW) Based Highly Selective Filtering Power Divider for Radar Applications
Keyur Mahant (Charotar University of Science and Technology); Hiren Mewada (Charotar University of Science and Technology);

Session 1P6a
FocusSession.SC5: Applications of Microwave Remote Sensing in Terrestrial Hydrology

Tuesday PM, December 17, 2019
Room 6 - Banyan 2

Organized by Steven K. Chan, Rajat Bindlish
Chaired by Steven K. Chan, Rajat Bindlish

13:10 Soil Moisture Experiment in the Luan River Supporting the Terrestrial Water Resource Mission
Tianjie Zhao (Aerospace Information research Institute, Chinese Academy of Sciences); Jiancheng Shi (Aerospace Information research Institute, Chinese Academy of Sciences); Liqing Lv (Shanghai Academy of Spaceflight Technology); Hongxin Xu (Shanghai Academy of Spaceflight Technology); Deqing Chen (Information Center of Ministry of Water Resources of China); Qian Cui (Information Center of Ministry of Water Resources of China); Thomas J. Jackson (USDA (retired));

13:30 Development of a Consistent Soil Moisture Decadal Data Record from Multiple Satellites
Steven K. Chan (NASA Jet Propulsion Laboratory, California Institute of Technology); Rajat Bindlish (NASA Goddard Space Flight Center);

13:50 Soil Moisture Variability Monitoring by a New Physically-based Soil Moisture Index from Passive Microwave Observations
Jiangyuan Zeng (Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences); Kun-Shan Chen (Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences); Chenyang Cui (Suzhou Industrial Park Surveying, Mapping and Geoinformation Co., Ltd.);

14:10 Numerical Solutions of 3D Maxwell Equations of Vegetation Using the Hybrid Method with 3D Vector Cylindrical Wave Expansions for Remote Sensing of Soil Moisture
Huanting Huang (University of Michigan); Weihui Gu (University of Michigan); Leung Tsang (University of Michigan); Andreas Colliander (California Institute of Technology); Simon H. Yueh (California Institute of Technology);

14:30 L-band Surface Soil Moisture Retrieval by Inverting Radar Scattering Models for Crops
Seung-Bum Kim (California Institute of Technology); Tien-Hao Liao (California Institute of Technology);

14:50 Development of a High Resolution Soil Moisture Using SMAP Estimates
Rajat Bindlish (NASA's Goddard Space Flight Center); Pang-Wei Liu (NASA's Goddard Space Flight Center); Bin Fang (University of Virginia); Venkat Lakshmi (University of Virginia); Peggy O'Neill (NASA's Goddard Space Flight Center); Zhengwei Yang (National Agricultural Statistics Service);

Substrate Integrated Waveguide (SIW) based highly selective filtering power divider for Radar applications

Keyur Mahant[1*], Dr. Hiren Mewada [2]
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ABSTRACT

In this paper, novel Substrate Integrated Waveguide (SIW) based filtering power divider is proposed, which is having the power dividing as well as filtering functionalities. Bandpass response is achieved by combining SIW structure with high-pass characteristic, parallel *LC* resonant response of complementary split ring resonator (CSRRs) and band rejection characteristic of the dumbbells shape defected ground structure (DGS). The proposed structure reduces the cost and the size of the system, as the structure performs the function of power divider as well as function of filter. Simulation of the proposed structure is carried out using commercial software Ansoft High Frequency Structure Simulator (HFSS), which is a three-dimensional full wave solver utilizing the finite element method (FEM). In order to verify the functionality of the proposed power divider, structure is fabricated and tested. The measured return loss is -25.94 dB with 3 dB fractional bandwidth (FBW) of 2.85% at 14 GHz. Moreover, the proposed structure has insertion loss of 1.07 dB, isolation of more than 15 dB; maximum amplitude and phase imbalance are 0.12 dB and 1.42° respectively within operating frequency band.

Index terms: Substrate integrated waveguide (SIW), complementary split ring resonator (CSRR), defected ground structure (DGS), stepped frequency continuous wave (SFCW), fractional bandwidth (FBW)

INTRODUCTION

Radio detection and ranging (RADAR) is a system which generally uses the electromagnetic signals to determine the speed, distance and position of an object. Traffic radar was proposed by Brown, Bryce K., et al [1] in 1982, which can measure the speed of the target vehicle by detecting the change in the frequency of reflected electromagnetic signal produced by Doppler Effect. Currently, police uses X, Ku, K and Ka band frequencies for the detection of the speed of the target vehicle [2]. In the proposed system, stepped frequency continuous wave (SFCW) Ka-band radar is operating at the center frequency of 28 GHz. System Configuration of the proposed system is shown in figure 1. In the transmitter sub-system frequency synthesizer is utilize for the generation of the electromagnetic signals with the center frequency of 7 GHz. This is further given to the frequency multipliers to achieve the desired center frequency of 28 GHz. Proposed SIW based filtering power divider is highlighted by red dotted lines in figure 1, which is operating at the center frequency of 14 GHz.

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Axaykumar Mehta
Abhishek Rawat
Priyesh Chauhan *Editors*

Recent Advances in Communication Infrastructure

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Contents

Identifying Plant Diseases Using Deep Convolutional Neural Networks

Sunny Desai, Rikin Nayak and Ronakkumar Patel

Abstract In this paper, we have discussed the design of the system that associates the Deep Convolutional Neural Network that can estimate the identity of the disease from the symptoms. Identifying the disease from plants and discovering the possibility that plant is either infected or not, will decrease the likelihood of risk due to such infection by taking appropriate steps against it. Proposed CNN is trained and build with higher precision and accuracy that associate the automatic detection of the disease from the plant leaves in preference of experienced human inspection. Designing the pure CNN that can identify the healthy plant species and infected plants with an accuracy of the 99% and which can avoid the significant loss of farmers. Proposed CNN includes the multiple layers that are trained intensely to identify the convoluted features of the images. The composition of the CNN model is done over the 35,000 training images with testing set from the same distribution with 4400 images. Detailed results are discussed in the paper.

Keywords Remote sensing · Deep learning models · Feature extraction image classification · Disease identification

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Dual Band Planar Antenna For Wireless LAN and X-Wave Applications

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***Abstract*— A low profile compact planar monopole antenna for Wireless Local Area Network and X-wave applications is demonstrated in the article. The commercial design of electrically compact resonators needs to consider design tradeoff of size, production cost, radiation performance and ease in fabrication. The resonator has a surface dimension of 0.33λ x 0.55λ at the lower center frequency. The fabrication of the resonator is developed on FR4 substrate having a thickness of 1.6mm. The engineered slots in the patch improve the resonance bandwidth, however, it marginally reduces the gain. The resonator has a maximum gain of 2.15 dBi and 2.38 dBi at 4.6 GHz and 5.5 GHz frequencies respectively. It offers utilization in WLAN and X-WAV wireless communication devices.**

Keywords*— *Electrically Compact Antennas, Slotted Antenna, WiFi, WLAN,X-Wave

I. INTRODUCTION

To cater to the rapidly advancing techniques of wireless communication, there is a vital requirement for an electrically compact antenna having multiple resonances. Many communication application utilizes surface mountable microstrip patch antennas. The microstrip patch antenna has a dominant mode of TM100, a secondary mode of TM200 and third resonance mode of TM300. The TM200 and TM300 modes are not utilized in the practical application due to broadside null and grating lobe patterns respectively [1]. There are lot of developments in surface mountable antenna research such as metamaterial-based antennas [2-7], Flexible antennas[8-10], electromagnetic bandgap antennas [11-13], electrically compact antennas[14-22], MIMO antennas [23-25], transparent antennas[26-28], On-chip antennas[29-30], fractal antennas[31-34] to name a few. The proposed antenna offers dual-band operation by the introduction of slots in the surface of the patch antenna. Because of this surface currents shall be tweaked and lower resonant frequency operation shall be generated. The slots shall significantly improve the resonance bandwidth however the antenna gain shall be sacrificed against it. The design tradeoff between bandwidth and gain is crucial while designing the patch antenna for target applications.

II. DESIGN AND RESULTS

The slotted dual-band antenna is illustrated in Figure 1. The ground plane is having the same dimensions of the substrate to improve the directivity of the antenna. The antenna is designed in FEM based High-Frequency Structure Simulator Software. The antenna is fed with 50 Ω impedance matched microstrip transmission line and connected through SMA connector. The slot dimensions are optimized to achieve target frequencies. Two separate slots of similar dimensions near the non-radiating edges of patch create resonance at nearby frequencies, causing wideband to appear at first resonance The antenna fabrication is carried out on FR4 dielectric material which is having an effective relative permittivity of 4.4. Fabricated antenna setup is illustrated in Figure 2.

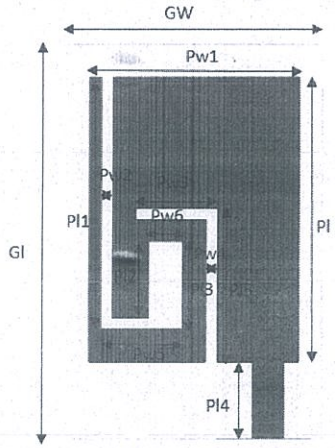

Figure 1: Antenna Configuration

TABLE I. ALL DIMENSIONS ARE IN MM

GW	Gl	Pw1	Pl	Pw2	Pw6	Pw4
22	36	18	26	1	2.9	1
Pl2	**Pl3**	**Pl4**	**Pl5**	**Pl1**	**Pw5**	**Pw3**
7	8	7	14	23	7	7

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Metaheuristic Optimization Algorithm for Day-Ahead Energy Resource Management (ERM) in Microgrid Environment of Power System

Dharmesh Dabhi and Kartik Pandya

Abstract The day-ahead Energy Resource Management (ERM) problem with the aim to backing the functioning decisions of Virtual Power Player (VPP) in the microgrid environment. The aim of the VPP is to manage the available distributed energy resources as practically as possible with the objective of minimizing the operational cost and maximizing profits by reducing the need to buy energy from the external supplier or electricity market at high prices. The day-ahead ERM is executed the day before the energy trades are due. Typically, the considered trades periods are one-hour corresponding to 24 scheduling periods. A vital input to the ERM is each hour forecasting demand, which can be done using correct forecasting methods. VPP can aggregate the all types of energy resources like, DGs, PV, electric vehicles, energy storage, demand response and electricity market. The use of Vehicle to Grid (or G2V), PV, and energy storage technology can help to increase the penetration of non dispatchable uncertain renewable based DGs. The drawback of large DERs penetration is that the optimal scheduling problem turns into a complex optimization problem and becomes hard to be addressed by deterministic techniques, because these techniques can take a large execution time for obtaining the optimal solution. On the other hand, the VPP has its own optimal scheduling related time constraints. For these reasons, metaheuristic techniques are very useful to support the VPP in the computation of a good solution with a low execution time. This paper proposed the new metaheuristic algorithm called Cross-Entropy Variable Neighborhood Differential Evolutionary Particle Swarm Optimization (CE-VNDEPSO) for addressing the Energy Resource Management (ERM) problem of 25-bus microgrid systems. The effectiveness of CE-VNDEPSO algorithm is finding out by comparing its performance with the well-known optimization algorithms like, Variable Neighborhood Search (VNS), Differential Evolutionary Particle Swarm Optimization (DEEPSO), Particle Swarm Optimization (PSO) and Differential Evolution (DE).

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Optimal Utilization of Reactive Power Capability of Renewable Energy Based Distributed Generation for Improved Performance of Distribution Network

Praghnesh Bhatt, Chao Long, Bhinal Mehta and Nilay Patel

Abstract Increasing penetration of distributed generation (DG) in distribution networks (DNs) may increase the voltage level beyond the statutory permit. Normally, DGs operate at unity power factor (UPF) and does not contribute to reactive power generation. In this work, the reactive power capability of DGs has been assessed to mitigate the overvoltage problem in DN due to increased penetration of DGs. Two objective functions, minimization of energy loss of a DN and minimization of average voltage deviation of all bus bars, are proposed by optimizing reactive power of DGs as control variables. It is shown that DGs with reactive power support can enhance the performance of DN. Particle swarm optimization with time series power flow solution is used to optimize the control variables of wind- and solar-based DGs.

1 Introduction

Presently, the electrical power systems are facing tremendous changes in power generation, operations, and controls. In this scenario, renewable power generation is expected to play a significant role for environment and climate change [1, 2]. The integration of distributed generations (DGs) in distribution networks (DNs) has proved to be a promising solution to fulfill these ambitions of reducing carbon emissions and enhancing energy security and affordability. The penetration of DGs

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Distributed Energy Resources in Microgrids

Integration, Challenges and Optimization

Book • 2019

Edited by:
Rajeev Kumar Chauhan and Kalpana Chauhan

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- Includes examples of control algorithms adopted during integration

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About the book

Description

Distributed Energy Resources in Microgrids: Integration, Challenges and Optimization unifies classically unconnected aspects of microgrids by considering them alongside economic analysis and stability testing. In addition, the book presents well-founded mathematical analyses on how to technically and economically optimize microgrids via distributed energy resource

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Key Features

- Addresses the challenges related to the integration of renewable energy resources

CHAPTER

18

An analysis of the current- and voltage current–based characteristics' impact on relay coordination for an inverter-faced distributed generation connected network

Krutika R. Solanki[1], *Vipul N. Rajput*[1], *Kartik S. Pandya*[2] *and Rajeev Kumar Chauhan*[3]

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18.1 Introduction

An assembly of distributed generations (DGs) to the distribution power system includes several benefits such as clean energy, high consistency, and improved quality of power [1]. These DGs can be either nonrenewable types (fuel cell, gas turbine, reciprocating engines, etc.) or renewable types (wind turbine, photovoltaic generation, etc.) [2]. Furthermore, the presence of DGs into the distribution networks brings some challenges to the protection systems due to low fault current level and bidirectional power flow. The inverter-faced distributed generation (IDG) contributes a small amount of fault current (1–2 pu) compared to DGs with rotating machines (5 pu) [3]. This small fault current contribution by IDGs causes the mis-coordination of protective relays. Therefore the protection of an IDG connected network is still a very critical issue.

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Emerging Heuristic Optimization Algorithms for Expansion Planning and Flexibility Optimization in Sustainable Electrical Power Systems

Jigar Sarda, Kartik Pandya and Margi Shah

Abstract The expansion planning and flexibility optimization of sustainable electrical power systems are facing higher complexity introduced by massive integration of variable renewable generation, the increasing need of facts and HVDC devices for flexibility in highly interactive energy markets, responsive demand and multi-energy sector coupling. Therefore, the expansion and flexibility management problems involved in investments decision-making and operational planning need consideration of more accurate models such as non-linear models, probabilistic models and a large number of decision variables. As the problem is difficult to tackle using classical optimisation tools, metaheuristic methods are depicted to solve it. The paper is based on three benchmark systems to evaluate the feasibility and effectiveness of optimization algorithms in systems of different characteristics and size. Also, the paper presents the results and statistical comparative evaluation of the performance of different emerging heuristic optimization algorithms.

Keywords Mixed-integer linear programming · Power flow control · Transmission expansion planning

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IoT: Leading Challenges, Issues and Explication Using Latest Technologies

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***Abstract*— Internet of Things (IoT) is ever growing domain for communication & sharing data to and from the real world objects like Sensors, Actuators, Machines, RFIDs etc. where every object has a unique framework for communication, information sharing and information processing. IoT implants brilliance in internally associated objects for communication, sharing information, decision making and for providing serviceability as per requirement. Today billions of things (objects) are connected together using different mediums, generates data with different formats and follows different standards to offer different services. Thus, the heterogeneity of architecture, network protocols used by things and data generated by things leads to the several issues such as standardization, security and privacy issues, scalability, complexity in network etc. This paper provides the brief idea about various issues & challenges of IoT as well as leading technologies which can be associated with IoT to provide solution to these issues.**

Keywords*——*IoT, IoT architechture, network layers, standardization, sensors, security and privacy, energy consumption, Identity management, Interoperability, scalability, Blockchain, Bigdata

I. INTRODUCTION

Change is the only thing which is constant in this world. A little change in technology changes human life and their lifestyle. For example, when there were no telephone devices, people were used to communicate or share information with each other through letters. When the invention of telephone was done, human life changed. People can communicate easily from their house and then comes the invention of mobile phone, through which people can communicate with each other from anywhere. In similar way, today to make human life easier and comfortable, new emerging technology which is very much popular in this era is IoT – Internet of Things.

Kevin Ashton proposed the term "Internet of Things" for the first time in 1998 where he mentioned that "The Internet if Things has the potential to change the world, just as the Internet did. May be even more so"[9]. After that, the MIT Auto-ID center introduced their IoT vision in 2001. Today we can see the use of IoT in day to day life. For example, wearable can intimate the humans about their fitness by analyzing heart beats, no of kms the person walking by analyzing steps etc. In nearer future, health issues will be diagnosed by using phones, cameras, wearables, special kind of sensors etc. Thus, health care services will be available 24/7 at any location of world [1].

The name of the technology itself says that it is used to connect different things together to offer higher level of services to the society and business. Thus, by connecting different devices with each other, IoT provides a platform for devices not only to communicate with each other but also facilitate to sense, process and perform computation at anytime from anywhere. IoT provides different kind of applications like smart home, smart city, smart transportation, smart parking, etc. which can be used in different fields such as home automation, healthcare, agriculture, transportation, factory, etc.

IoT offers number of benefits and makes human life easier and more comfortable but it also increases the numbers of challenges with the growth of connected devices in network. Increasing rate of connected devices leads to energy consumption which increases the emission of CO2 in environment, network complexity, connectivity issues, security and privacy of shared data, interoperability of connected devices, standardization of different devices manufactured by different firms and communication protocols used by them, heterogeneity of data etc. which provides direction to many researchers to work for it.

Text Extraction from Book Cover Using MSER

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ABSTRACT

Detecting text from natural images is an ongoing field of research. In this paper, we propose a text-extraction and detection algorithm pipeline for obtaining information about a particular book by using computer vision. Features of the book such as its reviews, rating and, the price can be displayed to the end user, thus helping people make an informed decision about the book on which they are going to spend time reading. The text detection algorithm uses edge-enhanced Maximally Stable External Region for identifying the text-blob segments accompanied by various non-text area filtering algorithms to find the bounding boxes. These bounding boxes are then chained together and undergo OCR, performed by the Tesseract engine. The results of the extracted text are further improved by performing post-processing NLP techniques such as domain-based OCR and typo correction. The method proposed in this paper has extended use cases in different areas of text detection from natural images.

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1. Introduction

There goes a very famous saying that, “don’t judge a book by its cover”; but often, before choosing a book to read or refer to, we wish to know if the time spent on reading the book will be worth it. Many times, we like to physically examine the book by visiting a bookstore or a library before buying it rather than online purchase. The solution can be achieved by developing an app, we just need to point the camera of our device at the book and it would then display ratings, reviews, and price of the book!

The solution to this problem can be achieved by making use of Computer Vision technology. CV (Computer Vision) combined with Natural language processing and Optical character recognition can extract the important features of a book to yield the desired results. We first make use of CV to detect the ROI (Region of interest) by making use of some blob detection and specialized algorithms such as MSER. Once, the area of significance is detected, we apply various OCR methods to extract the meta contents of the book such as the book title, author etc. and then apply natural language processing algorithms on it to further refine and improve the text detection efficiency and accuracy. All the extracted text information is then processed and used to find the ratings, reviews and, the price of the book off the internet.

This system can further be extended to build an autonomous robot capable to generate a statistical report of all the books currently present in a new unorganized library or may be used in segregating the books back to their respective shelves in a library environment instead of existing human intervened segregation process which is very tedious and demanding.

2. Related Work

Computer Vision started its development in the late 1960s with the goal of mimicking the human visual system, so that the computer could, “describe what it saw”. Many advances have been made in this field since then. Today, many feature-based methods are being used combined with machine learning techniques and more complex algorithms.

Chirag Patel in their work on “Optical Character Recognition by Open Source OCR Tool Tesseract: A Case Study” concluded that the Tesseract engine is a better choice for certain use cases of OCR when compared to Transym. It was also found, that Tesseract engine, in general, is faster when

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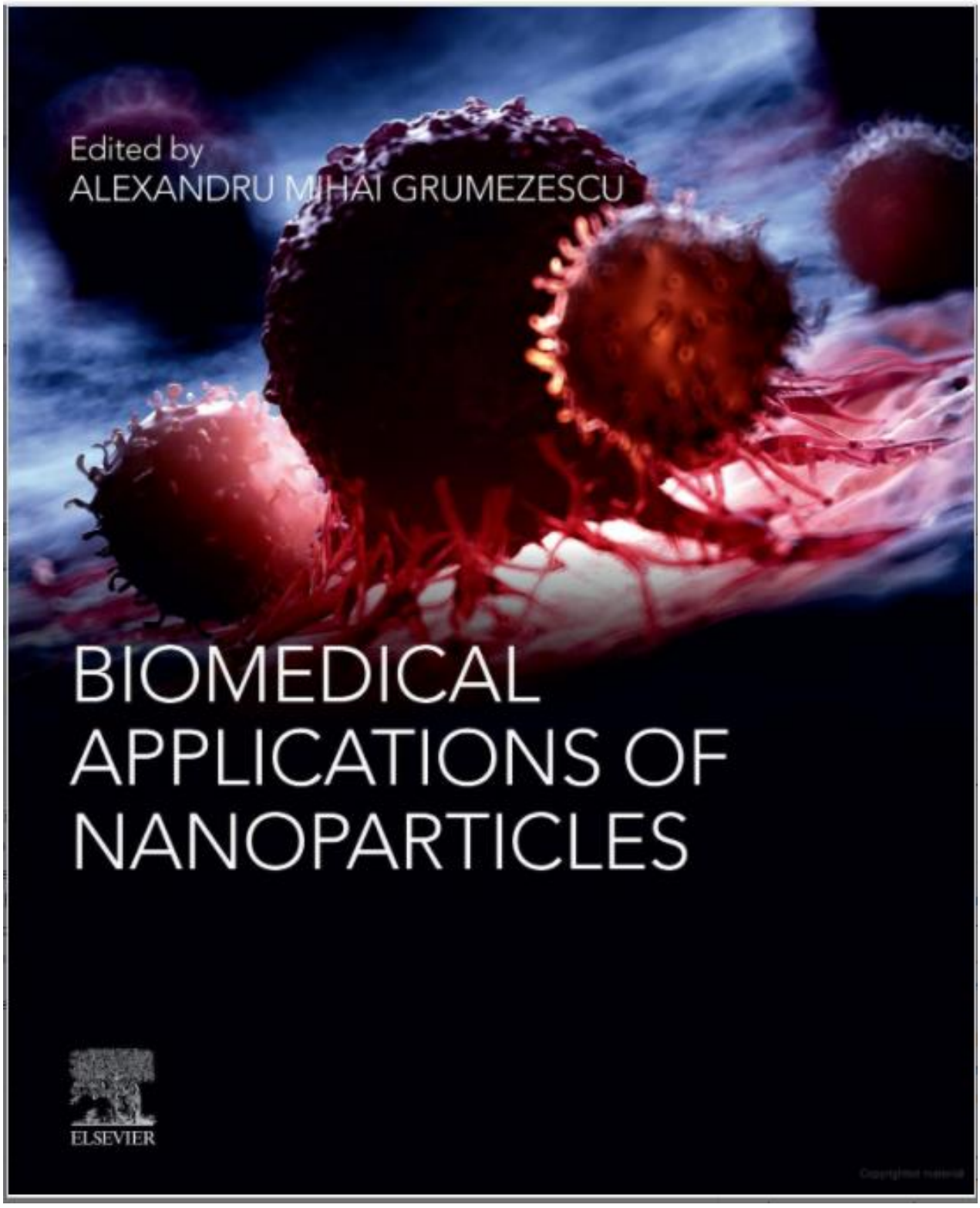
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CHAPTER

Targeting aspects of hydrogels in drug delivery

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Gayatri C. Patel*, **Sachin A. Joshi**†

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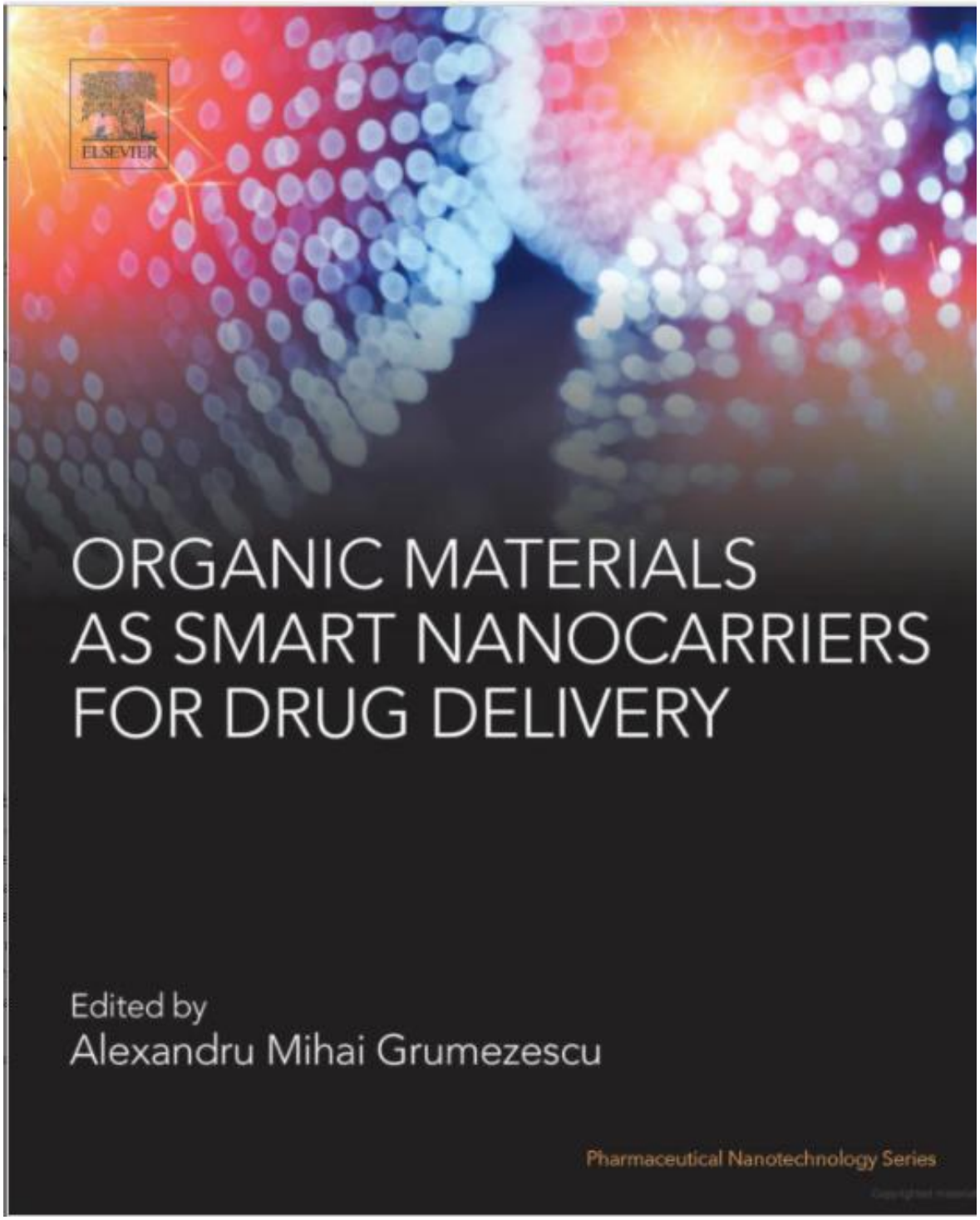
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Chapter 4 - Polymeric nanofibers for controlled drug delivery applications

Gayatri C. Patel, Bindu K. Yadav

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Abstract

In recent years, researchers have used polymeric nanofibers for various drug delivery and tissue engineering scaffold applications. Nanofibers exhibit a range of unique features and properties, such as the simplicity of their fabrication, the diversity of materials suitable for processing into fibers, possession of high surface area, and a complex pore structure. Nanofibers with effective drug-loading capability, slow release, and good stability have attracted much attention for their potential application in locally controlling drug release. This chapter provides a review of polymeric nanofibers for controlled drug delivery applications and their future prospectives.

Previous Next

Keywords

Nanocarriers; drug delivery; electrospinning; polymer; tissue engineering; surface area; porosity

5e

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Part 2

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Abstract

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Arun Kumar; Supriya.P. Panda
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Supervised Learning Algorithm: SVM with Advanced Kernel to classify Lower Back Pain

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***Abstract*—Lower Back Pain (LBP) is not a disease, but it is condition of spine, and now days it becomes very common irrespective of age. An Expert System (ES) is an intelligent tool used in medical field for various roles like prediction, diagnosing, interpreting. LBP can be caused by so many reasons and its identification in early stage will make the management of it very effective and also prevent it to become chronic. In this research, an Advanced Kernel is designed in Support Vector Machine (SVM) – Supervised Learning, gives more accurate results. After that the efficiency is compared with effectiveness of the different attributes from the dataset.**

Keywords*—Lower Back Pain (LBP), Expert System (ES), and Support Vector Machine (SVM).

I. Introduction

It is observed that amongst most affected diseases, lower spine problems ranks first and its affection rate is higher than Human Immuno Deficiency Virus, road accidents, tuberculosis, and lung cancer as per in Global Burden of Disease Study 2010 [1]. The back pain from lower lumbar can be caused by any body part such as connected network of spinal cord, nerves, bones, discs or tendons in the lumbar spine. Typical circumstances of LBP include: a) The irritation in the joining nerves from spine nerve to legs b) small nerves that supply the lower back may be irritated c) spine muscle might be strained d) the damage in bones, ligaments or joints may be one of the reason [2]. These different reasons behind LBP leads to various types of diseases like, spondylolysis, spondylolisthesis, stenosis, herniated disc etc. Varieties of reasons behind LBP make the identification of them difficult which leads to a gap management of it, and this gap make the LBP chronic. So it is very much important to identify the cause of LBP in the early stage which will prevent to become it chronic.

II. Related Work

Approach to computational reasoning is emerged and Artificial Neural Network (ANN) exhibits the behavior with integrity of correctness which makes it most reliable in medical science [3]. ANN is famous for its learning and generalization behavior and it simulates the human brain to carry out such characteristics.

An Expert System is an application of Artificial Intelligence (AI) in which domain knowledge is feed into the system, interpreted by knowledge engineer and is inferred to an answer regarding the query in that domain. Eleven types of Expert Systems were reviewed for its different types of applications [4].

In the medical field, an ES is playing various roles amongst which, diagnosing and classification are significant, when it is implied with Artificial Neural Network, it gives best results in many cases like, Cardiovascular Diseases, Diabetes, Cancer [5].

A Decision Support System is developed for clinicians to diagnose Lower Back Pain [6], which is based on knowledge base.

Peter O. Sullivan has compared different models available for classifying Chronic Lower Back Pain (CLBP) and he made an observation that they would not be sufficient, as 85% of CLBP disorders are still not labelled, as these group of disorders are due to 'tissue strains' and 'sprains' [7].

III. Proposed Work

A. Expert System

An Expert System (ES) is one of the application areas of Artificial Intelligence, which have expert knowledge of particular domain and it use this knowledge to respond properly - here domain refers to the area of interest in which the task is being performed. It is designed to aim coping the uncertainty, of the situation where the required data is not known precisely and then also system will give output with significant accuracy. It automates the process of decision making using extensive knowledge of domain expertise. An ES can take mainly four interactive roles, diagnosing, interpreting, predicting and instructing, in various application areas like medical field, education, agriculture etc. Various components of an ES are: knowledge gathering system, knowledge base, inference mechanism, explanation subsystem, and user interface. Here an ES is designed to classify the spine condition whether is normal or abnormal from the standard Lower Back Pain dataset having twelve numeric attributes.

B. Learning as capabinility of Artificial Neural Network

- Network of neurons in human brain is simulated in neural network with its information processing elements, responsible to process input data, simulated from our brain neuron network to process information. As ANN simulates the human behavior, it possesses great capabilities of learning and generalization. Its learning capability is categorized in two ways: Supervised Learning and Un-supervised Learning.

- Under computational reasoning ANN gives best results. Neural diagnostic systems are having more capabilities than human diagnostics [8].

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A Comprehensive Analysis of Convolutional Neural Network Models

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Abstract. *Deep learning is an emerging field of machine learning that has been grown rapidly and applies to many domains with high success frequency including image processing, speech recognition and text processing. Experiments shows its high applicability and significant performance compared with traditional machine learning approaches. Deep learning algorithms are mainly an inheritor of artificial neural network architecture with higher number of hidden layers, therefore known as deep neural networks. A type of feed forward network, Convolutional Neural Network (CNN), is one of the most widespread deep neural network models. This paper presents a brief survey of well-known and established CNN models. It also contains comparative evaluation of these models by considering different parameters.*

Keywords: *Deep learning, CNN Models, Convolutional Neural Network*

1.1 Introduction

In recent years, there is a rapid growth observed in the field of Artificial Intelligence (AI) and Machine Learning (ML) and they are successfully implemented in many domains including image analysis, object detection, natural language processing robotics and many more [1]. Machine learning algorithms develops computerized models that makes machines to act like human expert. To uncover the basic patterns among data and to build prediction models, machine learning algorithms depends on training data [2]. Deep learning algorithms are a part of a wider family of machine learning and possesses a capability that makes machine "to learn" based on experience to perform the assigned task. Deep learning algorithms are mainly inheritor of artificial neural network architecture with higher number of hidden layers, therefore known as deep neural networks. The popularity of deep learning methods and approaches are due to the availability of GPU units (machines with increased chip processing abilities), cost reduction in computer hardware, and advancements in the field of machine learning algorithms [3]. In the area of machine leaning, deep learning considered as one of the established technique as it applied in many areas including image classification and processing, speech and text processing and object detection with very promising results [4]. Deep Learning uses multilayer and normally feed forward back propagation neural network to exemplify the abstraction of data and for generating a computational model. It follows supervised and unsupervised methods for performing various tasks and acquired varied representation and features in hierarchical manners. Though deep learning is a part of machine learning family, there are many differences between these two variants. Deep learning algorithms only work well on large amount of data. For smaller amount of data, machine learning approaches should be used. Moreover, in machine learning, features are required to identify by expert and it is hand-designed. Deep learning algorithm are capable to extract the features by them salves. They normally do not require human intervention in this process. Also, deep learning algorithms required high-configured machines, normally GPUs as they require long time to be trained. There are major three architectures available used to create deep learning models: Convolution Neural Network (CNN), Deep Belief Network (DBN) and Recurrent Neural Network (RNN). Deep belief network (DBN) is made up with multiple layers of restricted Boltzmann machine (RBM) and represents as a graphical model. The noticeable use of Deep Belief Networks (DBN) is in the field of Natural Language Processing (NLP) [5]. Recurrent Neural Network (RNN) is an architecture of deep learning that is mostly used to process sequential data and widely applicable in the area of Natural Language Processing, text and speech recognition [6]. Convolutional Neural Network (CNN) basically uses neural network architecture and mostly applied for image classification as it eliminates manual feature extraction process. It is capable to perform an entire task like classification of images without manual intervention [7].

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Leveraging New Developments in Dairy Sector for Increasing Income of Milk Producers

EDITORS

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Department of Dairy Business Management
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CHAPTER – 60
BLOCKCHAIN – TODAY AND TOMORROW: STRATEGICTRANSACTIONAL REVOLUTION IN DAIRY SCIENCE

KEVAL B SHAH[1], JAIMIN N UNDAVIA[2] & NILAY M VAIDYA[3]
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60.1 Abstract

An increasing income as well as number of transactions in the field of dairy science worldwide demands needs awareness in digital transactions and also requires awareness in digital currencies. A distributed database of different transactions or e-events or any other transactional log that have been executed and communicated amongst different participating parties across the globe is typically been identified as a blockchain. Each of these transactions are being verified in each of the participating systems across the world and cannot be erased. Bitcoin is the most popular example that uses this technique and follows the process of the blockchain. This paper describes blockchain technologies and some exciting emerging applications in different sectors of industries. This paper also describes few applications area as well as the future perspectives of blockchain. Although it is too early to predict the future of the blockchain but it expected it will revolutionize the digital experience of many individuals as well as many industries around the globe.

Keywords: blockchain, bitcoin, dairy science, digital currencies, distributed databases, e-event, transaction

60.2 Introduction

In the digital world, one of the most popular digital asset is cryptocurrency which provides more secured environment in financial transactions. Expansion of business and business activities bring world closer; this requires transparent, immutable, and decentralized approach to perform financial transaction; which is being provided by a broad concept called blockchain. Bitcoin is one of the most known and widely used cryptocurrency.

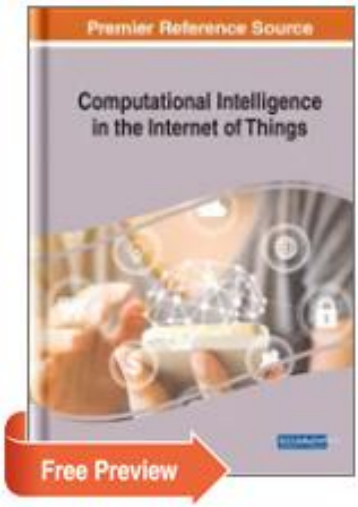
Gradually bitcoin attracts society and also attracts B2B foreign exchange payments by multinational companies since 2018. As per the Piester, if any organization do not have dedicated blockchain implemented or still not have planned for it then they are already lacking behind their competitors in the market.

Industry and academia specially in the field of IT facing some severe changes and enhancement frequently. Cryptocurrency is one of the most recent advancement in the field of Information Technology. Over 5000 developers are working in making the global network of blockchain solutions. Bitcoin – a cryptocurrency has enjoyed a huge success and reaching to 10 billion dollars by 2016. To maintain this cryptocurrency, a core technology blockchain was introduced in 2008 and was implemented in 2009. This blockchain is designed effectively to store data with effective data storage and transactions without need of any third party application.

In the simplest word, blockchain is considered as a public ledger where committed transactions are stored as list of blocks. Adding new blocks results in growing of chain and this chain continues to grow with chained structure.

- **Working:**

Dealing value of blockchain is easy and effective means to migrate data from A to B in a machine controlled mechanism that provides security and safety. Party creates a block tc initiate method and thousands of nodes distributed across the web verify the block. The verified block is value-added to a series, that is being kept over web, making not simply a singular record, however a singular record with a singular history. Disproof one of recorc would mean disproof the complete chain in extensive instances. Bitcoin uses this model fo financial transactions; however, it will be deployed in several different ways. The enormou quantity of knowledge is collected and maintained by an education establishment. Thi information is employed by associate degree educational institute for the predictior classification, clustering, etc., for the improvement of overall system. In this competitiv setting, the upper education establishments will solely be ready to solve the key challenge



Computational Intelligence in the Internet of Things

Hindriyanto Dwi Purnomo (Satya Wacana Christian University, Indonesia)

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In this chapter, data mining approaches are applied on standard IoT dataset to identify relationship among attributes of the dataset. IoT is not an exception; data mining can be used in this domain also. Various rule-based classifiers and unsupervised classifiers are implemented here. Using these approaches relation between various IoT features are determined based on different properties of classification like support, confidence, etc. For classification, a real-time IoT dataset is used, which consists of household figures collected from various sources over a long duration. A brief comparison is also shown for different classification approaches on the IoT dataset. Kappa coefficient is also calculated for these classification techniques to measure the robustness of these approaches. In this chapter, standard and popular power utilization in household dataset is used to show the association between the different intra-data dependency. Classification accuracy of more than 86% is found with the Almanac of Minutely Power Dataset (AMPds) in the present work.

Chapter 3

Machine Learning Applications for Anomaly Detection.....49

Teguh Wahyono, Satya Wacana Christian University, Indonesia
Yaya Heryadi, Bina Nusantara University, Indonesia

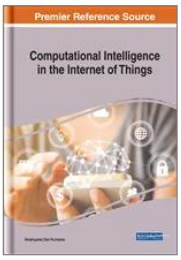
The aim of this chapter is to describe and analyze the application of machine learning for anomaly detection. The study regarding the anomaly detection is a very important thing. The various phenomena often occur related to the anomaly study, such as the occurrence of an extreme climate change, the intrusion detection for the network security, the fraud detection for e-banking, the diagnosis for engines fault, the spacecraft anomaly detection, the vessel track, and the airline safety. This chapter is an attempt to provide a structured and a broad overview of extensive research on anomaly detection techniques spanning multiple research areas and application domains. Quantitative analysis meta-approach is used to see the development of the research concerned with those matters. The learning is done on the method side, the techniques utilized, the application development, the technology utilized, and the research trend, which is developed.

Chapter 4

Distributed Computing for Internet of Things (IoT).....84

Dharmendra Trikamlal Patel, Smt. Chandaben Mohanbhai Patel Institute of Computer Applications, India

In recent years, internet of things (IoT) has expanded due to very good internet infrastructure everywhere. IoT has the ability to create a network of physical things that use embedded technologies in order to sense, converse, cooperate, and team up with other things. IoT-based applications require scalability and fault tolerance, which is very difficult to implement in centralized systems and computing environments. Distributed computing is an ideal solution to implement IoT-based applications.



Distributed Computing for Internet of Things (IoT)

Dharmendra Trikamlal Patel (Smt. Chandaben Mohanbhai Patel Institute of Computer Applications, India)

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Abstract

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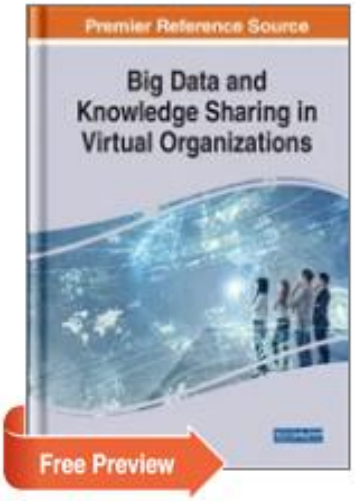

Big Data and Knowledge Sharing in Virtual Organizations

Albert Gyamfi (Aalborg University, Denmark) and Idongesit Williams (Aalborg University, Denmark)

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Nirali Nikhilkumar Honest (Smt. Chandaben Mohanbhai Patel Institute of Computer Applications, India) and Atul Patel (Charotar University of Science and Technology, India)

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Abstract

Knowledge management (KM) is a systematic way of managing the organization's assets for creating valuable knowledge that can be used across the organization to achieve the organization's success. A broad category of technologies that allows for gathering, storing, accessing, and analyzing data to help business users make better decisions, business intelligence (BI) allows analyzing business performance through data-driven insight. Business analytics applies different methods to gain insight about the business operations and make better fact-based decisions. Big data is data with a huge size. In the chapter, the authors have tried to emphasize the significance of knowledge management, business intelligence, business analytics, and big data to justify the role of them in the existence and development of an organization and handling big data for a virtual organization.

Introduction

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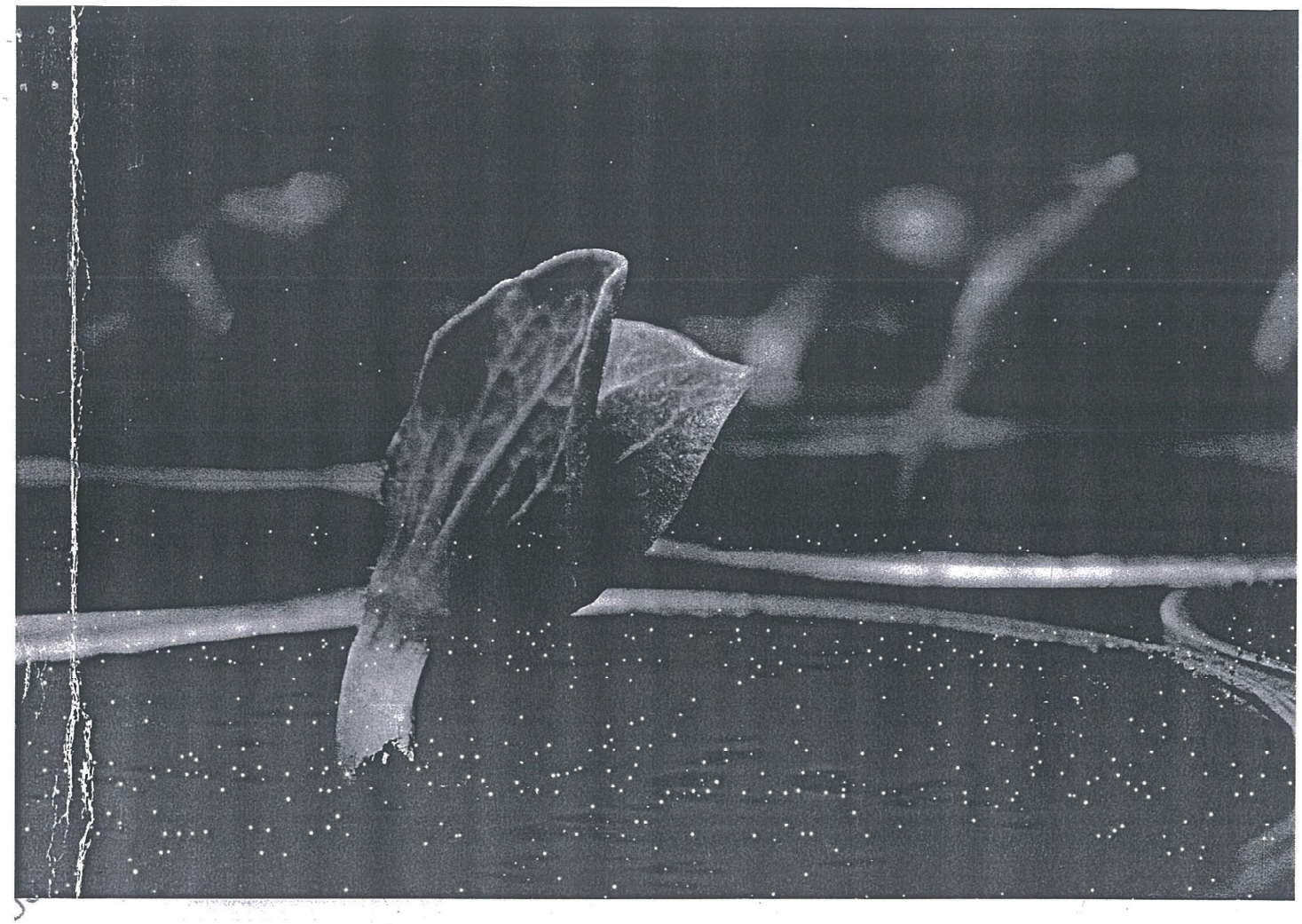

Lipi Acharya

Diaspora Concerns in V. S. Naipaul's Half a Life and Magic Seeds

With Reference to Half a Life and Magic Seeds

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Index

V. S. Naipaul - an ever controversial name from the treasure of Indian Djaspora Writers - has made a significant mark in the history of Indian English Literature. The book talks about all the major Diaspora Elements of the two of his legendary work: Half a Life (2001) and Magic Seeds (2004). Magic Seeds (2004) is sequel to Half a Life (2001) and both the narratives talk about the life span of the protagonist - Willie Somerset Chandran. His life in India, England, the Portuguese Colony in Africa, Berlin and again back in India, constantly swings around various Diaspora consequences such as identity crisis, role determination, to cope with new cultures, uprooting himself from his native culture, conditioning of mind and so on. This book talks about such elements in detail and establishes cause and effect relationship of the major incidents of the two respective novels.

Ms. Lipi Acharya is presently working as a lecturer at CHARUSAT University, Gujarat, India and has five years of teaching experience. She is keenly interested in the interaction with students on Communication Skills and Literature.

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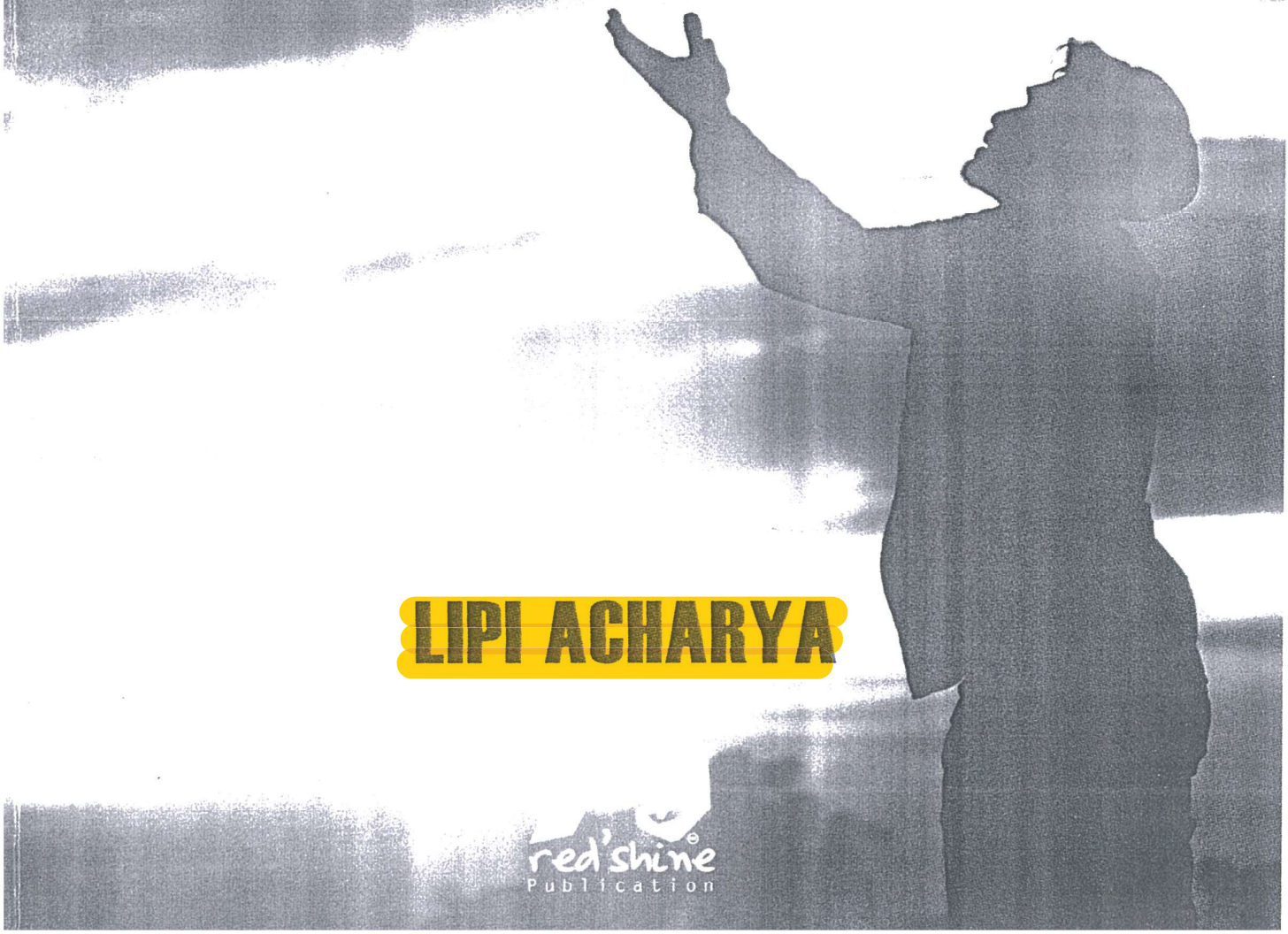
RELIGION AND PSYCHOLOGY
IN O. V. VIJAYAN'S SELECTED NOVELS



LIPI ACHARYA

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About the Author

Dr. Lipi Acharya has been working at Charotar University of Science and Technology for the last two years. She has done her doctorate (English Literature) from Gujarat University (2018) on a topic related to Indian English Writing that covers various aspects such as psychology, politics, history and religion. She has teaching experience of more than six years, dealing with the students of Engineering, Pure, Applied and Paramedical Sciences, Pharmacy, Business Administration and Arts. Teaching to and interacting with young minds and especially discussing aspects such as the interwoven relationship of literature with life and various aspects of Communication Skills are the chief areas of her interest in reading as well as in writing.

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INTERRELATION OF

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IN THE SELECTED NOVELS BY O. V. VIJAYAN

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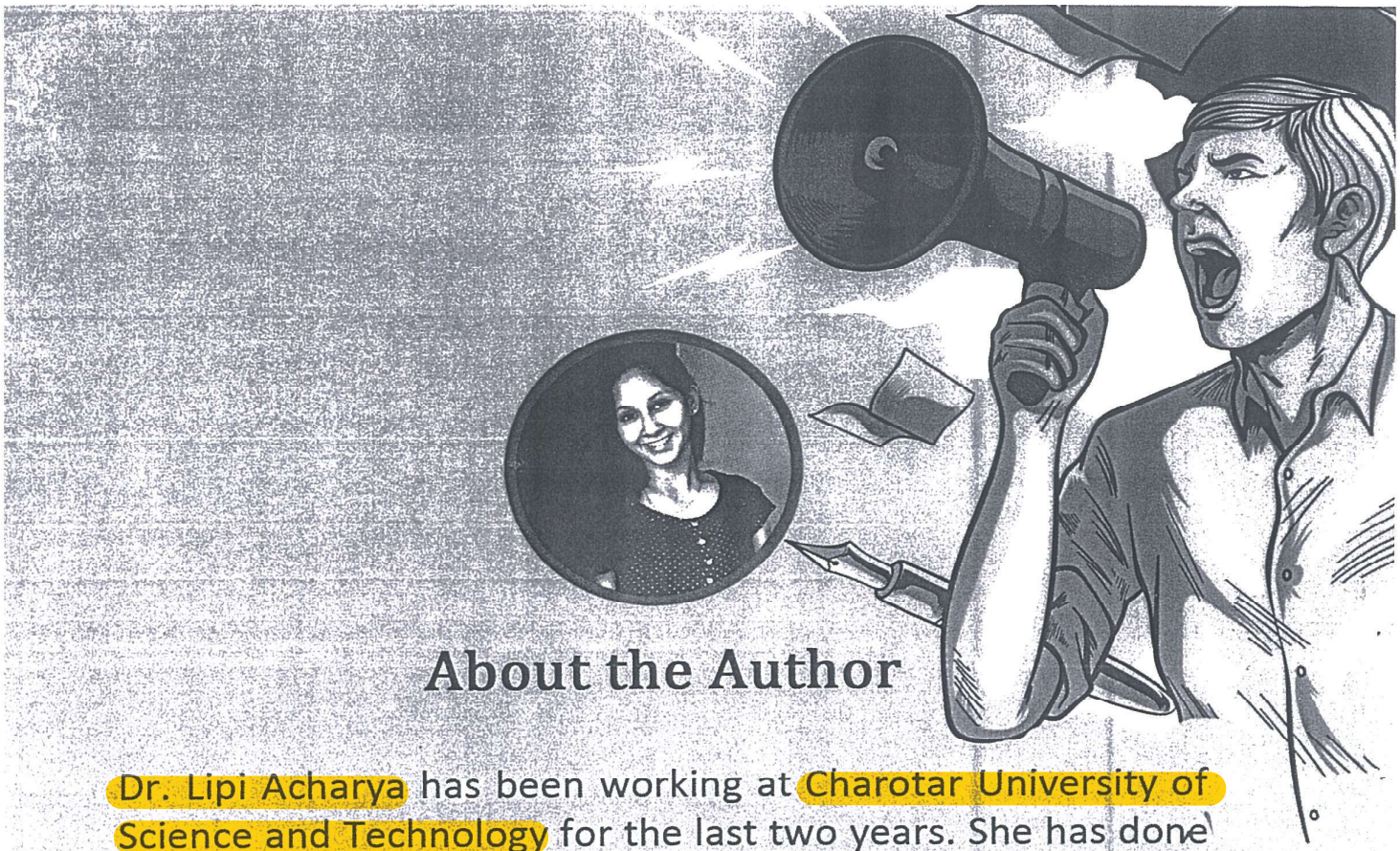

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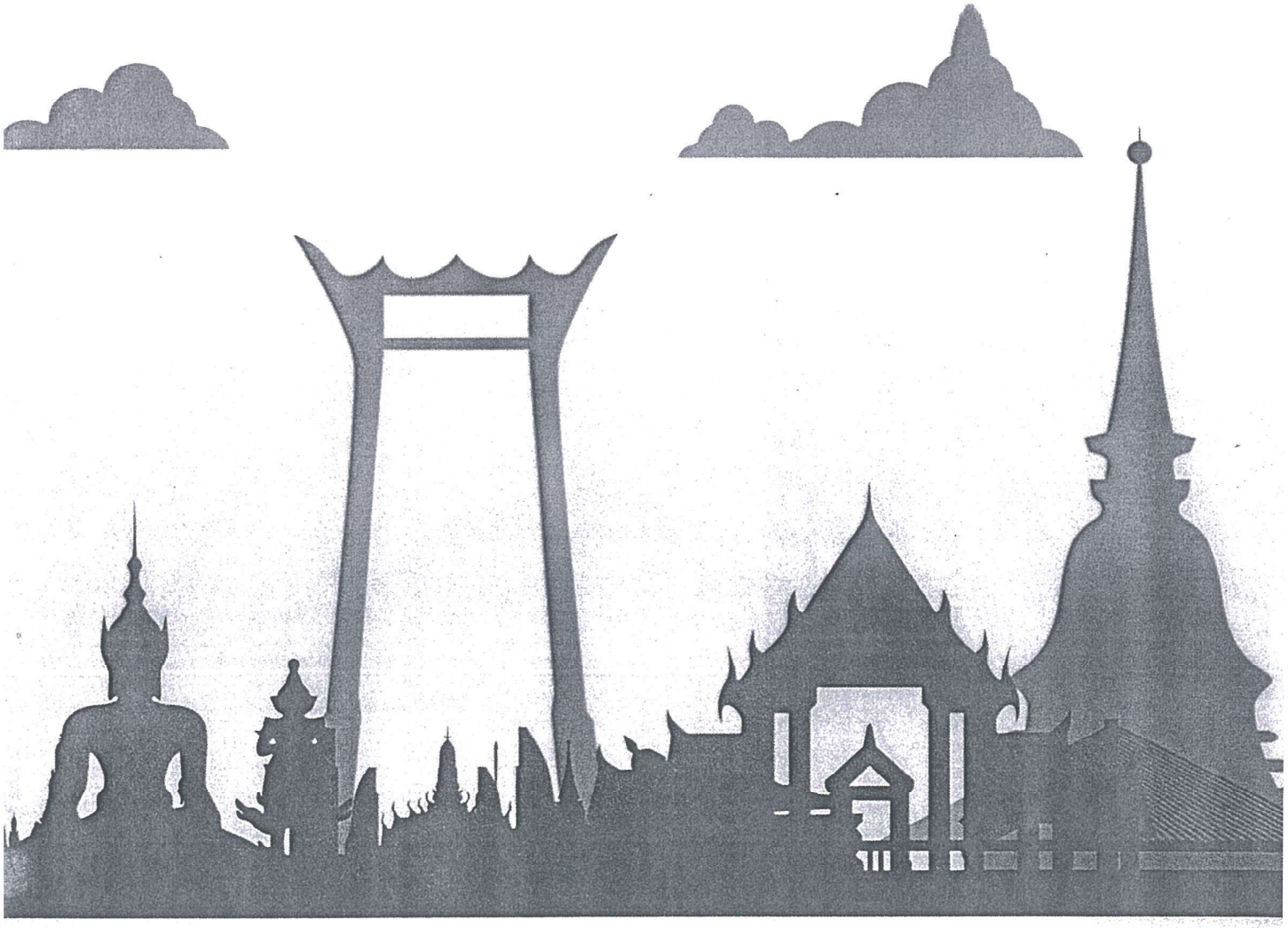

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Chapter 6

Role of Transcriptomics, Proteomics, and Metabolomics in Linking Genome and Phenome; Importance of Understanding the Phenotypes for Expiating the Outcome of Genomic Technologies-Knockout Mutant Studies and High Throughput - Phenotyping

Abhinandan S. Patil[1], Viralkumar B. Mandaliya[2], Kirankumar G. Patel[3] and S.A. Patil[4]

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ABSTRACT

Three omics are derived from the field of biochemistry and involves the analysis of small-molecule metabolites and polymers such as nucleic acid, protein, starch. Although this field is relatively new, there have been significant recent advances and there is scope for many direct applications in plant biotechnology. Metabolomics might be considered to be the key to integrated systems biology because it is frequently a direct gauge of the desired phenotype, measuring quantitative and qualitative traits such as starches in cereal grains or oils in oilseeds. This chapter discusses importance of understating the phenotypes for expiating the outcome of genomic technologies like knockout mutant studies and high throughput phenotyping. Application of transcriptomics, proteomics, and metabolomics, gene knockout techniques, and high-throughput techniques are a handful to plant and animal biologist for exploiting them in the well-being of human beings.

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Chapter 16

Molecular Mechanism of Drought Resistance in Plant

Abhinandan S. Patil[1], Viralkumar B. Mandaliya[2], Kirankumar G. Patel[3] and S.A. Patil[4]

[1]Plant Sciences Institute, Agricultural Research Organization, Rishon Lezion, Israel
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[4]Deptt. of Zoology, Smt. Kasturbai Walchand College, Sangli, Maharashtra, India
e-mail: agrilstar25@gmail.com

ABSTRACT

Despite the many genes that have been identified in association with drought stress, much of the data is descriptive, with the functions of only a few of the encoded proteins established. The production of mutants using an antisense- RNA approach is a powerful technique that should continue to elucidate certain aspects of stress tolerance, but it has been most successful only with well-characterized areas of plant metabolism. It is also difficult to devise screening procedures for useful dehydration-tolerance mutants, because of the array of processes simultaneously affected by drought. Another valuable approach may be to identify those metabolic steps that are most sensitive to drought stress (a technique used to genetically dissect salt stress in yeast). Little progress has been made with the cloning and analysis of drought-related transcription factors, although a biochemical approach and use of the recently established yeast one- and two-hybrid systems should produce new insights. The complexity of drought tolerance apparent throughout this review points to control by multiple genes, and thus the identification of quantitative-trait loci (QTLs) for drought resistance may well be an effective analytical tool. The approach has just begun to be applied to the environmental-stress responses of plants and is particularly promising considering that saturated DNA–marker maps are now available for both genetic model plants and crop plants. The use of novel approaches combining genetic, biochemical, and molecular techniques should provide exciting results in the near future.

Keywords: *Draught, Drought-related transcription factors, Resistance, Genetics and Drought biochemical.*

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Chapter 3

Integrating the Role of Computational and Imaging Methods in Crop Protection and Management: Insights in a New Age of Precision Agriculture

Gayatri Dave

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Charotar University of Science and Technology, Changa, Gujarat - 388421
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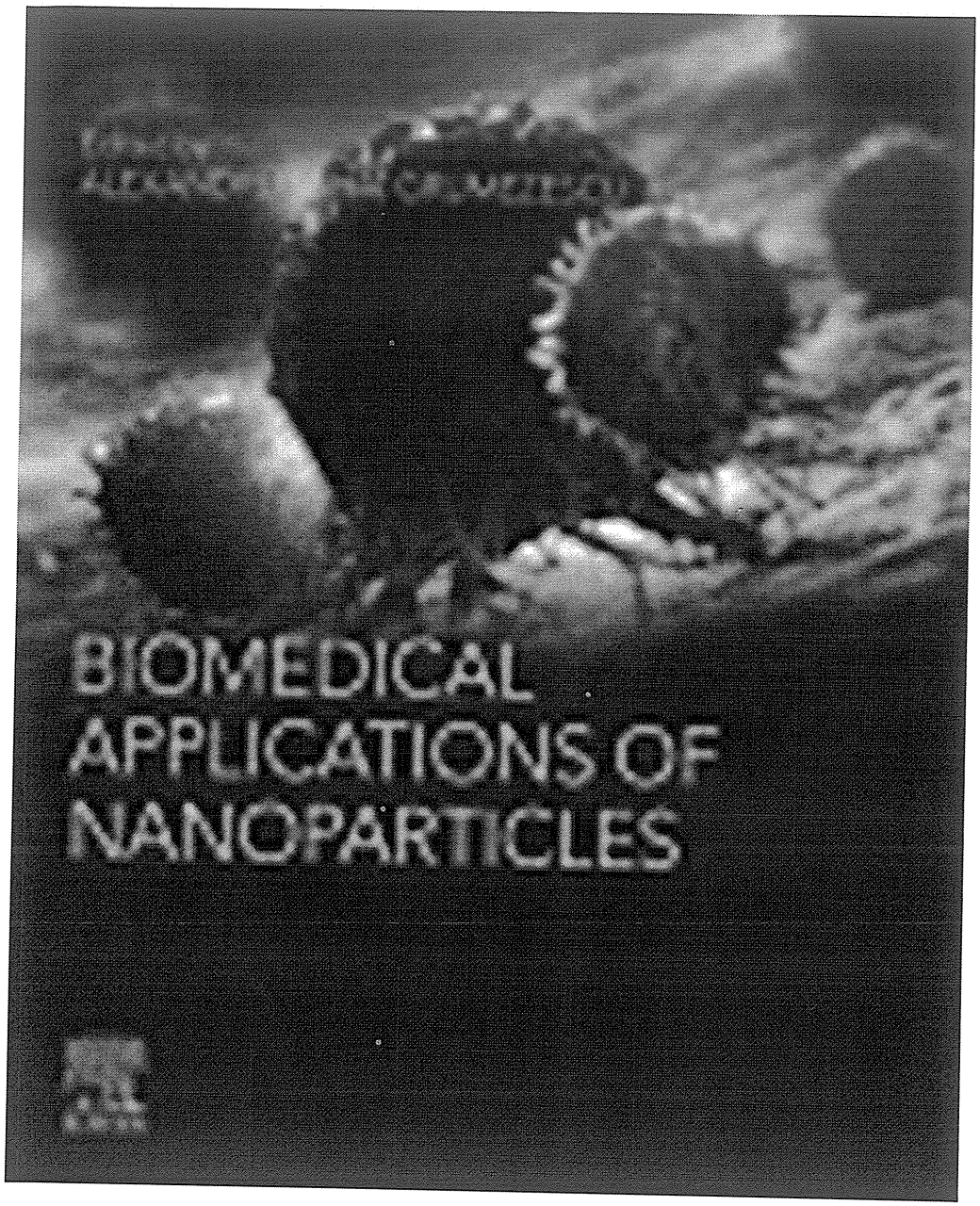
ABSTRACT

Precision farming integrates the technologies like remote sensing, global positioning system and geographical information system with traditional agriculture practices. It can be define as the location specific, time-specific and plant specific agriculture practice for sustainable development of agriculture. It works through obtaining the images from satellites, these images are further transformed to geographical coordinates and subsequently used to guide the farmers. It is more than simple image processing practice, the cameras are allied with variety of sensors that captures the sensor-guided images. This allows the real-time monitoring of the dynamic field condition through sensors. Proximal and non- proximal sensors are common types of sensors that usually used in precision agriculture. Principally, it detects the difference between the absorbed and reflected light for object under study. In further advancement, these sensors can be mounted on farming vehicles that embarks the access to the larger field. It provides the real time information on plant pathogens, weeds distribution and location, nutrient stress, nutrient burden, water stress and other soil parameters such as soil salinity. This precision farming practice is an eco-friendly way that reduce the burden on environment through reducing the nutrient and pesticide over-load.

Keywords: Precision agriculture, Global positioning system, Sensors.



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Chapter 8 - Targeting aspects of hydrogels in drug delivery

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Chapter 8 - Targeting aspects of hydrogels in drug delivery

Gayatri C. Patel and Sachin A. Joshi

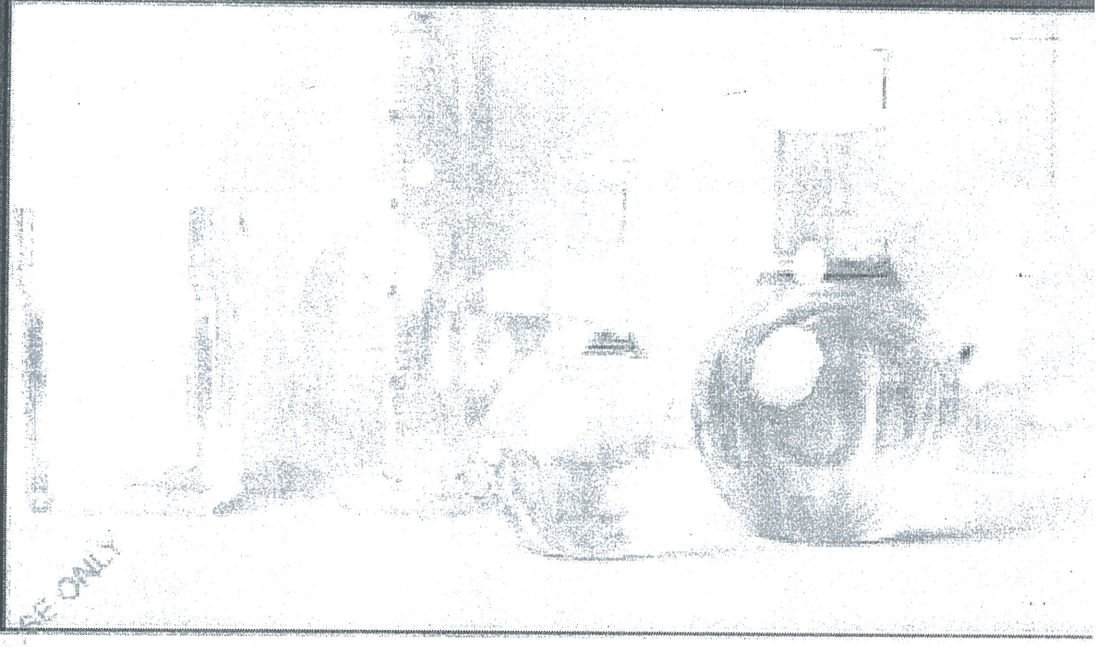
Pages 195-231

Abstract

Hydrogels are fascinating three-dimensional soft matrix having biopolymers in and as their backbone. Because of its flexibility, biocompatibility, soft tissue-like morphology, easy to synthesize approach, and sensitivity, this material is widely used as macro- and nanoparticles, slabs, sheets, films, coatings, etc. in numerous biomedical applications such as tissue engineering, regenerative medicine, scaffolds, and drug delivery applications. Sensitivity toward various physiological stimuli such as pH, temperature, electrolytic conditions, light, and ultrasonic radiations has made these materials the first choice in drug delivery applications.

The present chapter elaborates hydrogels in drug delivery and other biomedical applications, with their stimuli responsiveness, target specificity, and cellular and physiological biocompatibility, and also focuses on futuristic challenges and approach to engineer this matrix in tailor-made fashion for very specific drug delivery applications.

This textbook presents an account of different view for acids and bases and also different reactions taking place in non-aqueous solvents like liquid ammonia, sulphur dioxide and hydrogen fluoride. not only this but it also covers the chemistry of the elements of carbon family, carbides and nitrides of main group elements. In carbon family, group trend, some properties of elements, compounds of these elements have been discuss. In carbides and nitrides, some important compounds manufacture, properties and special applications have been discuss.



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ACIDS AND BASES

1. Arhenius Concept (The Water Ion System):

According to this theory, any substance is acid or base if it gives H^+ or OH^- respectively in aqueous solution respectively. Thus HCl is an acid and NaOH is base neutralization reaction can be represented by following reaction.

$$HCl \xrightleftharpoons{H_2O} H^+ + Cl^-$$

$$NaOH \xrightleftharpoons{H_2O} Na^+ + OH^-$$

$$H^+ + OH^- \longrightarrow H_2O$$

Utility:

(i) Since the neutralization process involves combination of H^+ and OH^- ions, molar heat of neutralization would be expected. The constant heat of neutralization of strong acid and strong base is readily understandable in terms of this concept.

(ii) This concept has offered a means of correlating catalytic behavior with concentration of the H^+ ion.

Limitation:

- HCl is regard as acid only when dissolved in H_2O and not in some other solvent like C_6H_6 or when it exists in gaseous form.
- It can not account for acidic or basic character of materials in non-aqueous solvents, e.g. NH_4NO_3 in liq. NH_3 act as acid, though it does not give H^+ ions.
- The neutralization process is limited to those which can occur in aqueous solution only, although reactions involving salt formation do occur in many other solvent.
- Theory can not explain acidic character of certain salts such as $AlCl_3$ in aqueous solution.

Bronsted-Lowry theory (The proton donor accepter system):

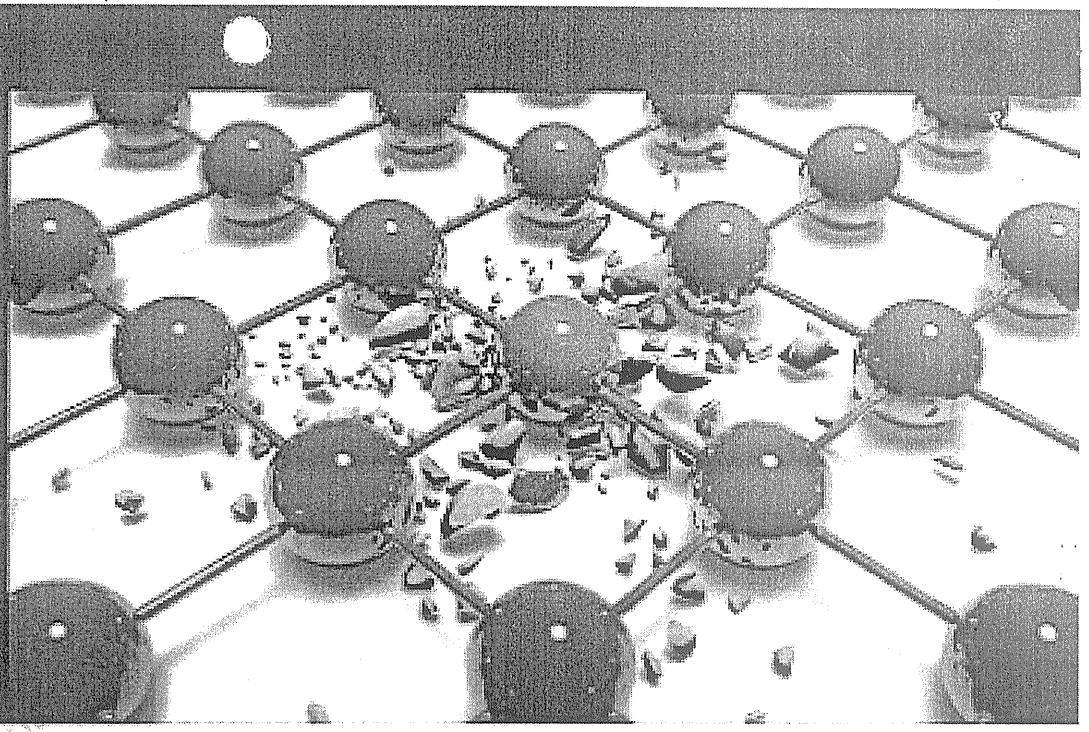
According to this theory, an acid is define as hydrogen containing materials that can release a proton to any other substance, where as a base is any substance that can accept a proton from any other substance. In other word, an acid proton donor and base is proton accepter.

Bronsted acids: Molecular: $HCl \rightarrow H^+ + Cl^-$

Cationic: $[Al(H_2O)_6]^{3+} \rightarrow H^+ + [Al(H_2O)_5(OH)]^{3+}$

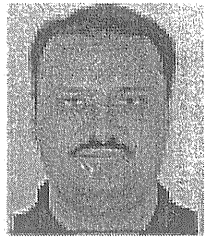
Anionic: $HCO_3^- \rightarrow H^+ + CO_3^{2-}$

This Book give detail information of some aspects of physical chemistry. The aspects: Polarography, Evaluation methods for polarography, Phase equilibrium, Polymorphism and Surface Phenomenon and Adsorption that will beneficial for upcoming under graduate students. In addition to this, the book also build bridge for physical chemistry students to understand root cause of each and every concepts.



Bhavin Patel
Miteshkumar Harishbhai Patel
Sanjaykumar Panjabi

Some Aspects of Physical Chemistry



Dr. Bhavin V Patel is working as an assistant professor in N.V. Patel college of pure & Applied sciences Vallabh Vidyanagar since 1997. His specialization is in Physical chemistry and has done PhD in the field of Schiff base. His area of interest is polymer synthesis. He has written number of chapters in various books.

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Bhavin Patel
Miteshkumar Harishbhai Patel
Sanjaykumar Panjabi

Some Aspects of Physical Chemistry

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POLAROGRAPHY

Introduction

Polarography is based on the electrolysis of a minute fraction of a solution by using a cell that consists of a 'polarizable' micro electrode such as a dropping mercury electrode and a 'non-polarizable' current carrying electrode such as a calomel electrode. The data are obtained by measuring the current as a function of the applied voltage. The current voltage curve is called a Polarogram. In Polarography, the rate determining step in the discharge of ions is essentially diffusion.

Basic Principle

Polarographic reaction is an electrolytic process in which compound dissolved in a solution is subjected to electrolysis. The active species which undergo reduction reaction at electrode (cathode) can reach electrode

1. Due to attractive force and
2. Due to concentration gradient in an ordinary electrolytic cell.

In polarography, the migration of active species towards cathode by electrode attraction is eliminated by using a supporting electrolyte under such condition. Ions reach electrode only due to concentration gradient. The concentration of the ions in a small volume around cathode is zero (Co) and in the bulk of solution, it would be initial concentration (C). As a result the current passing through the solution is due to diffusion of ions from the bulk of solution to the solution having zero concentration of ions around cathode. Therefore, this current becomes proportional to the concentration of the ions in the solution. This current is known as diffusion current id.

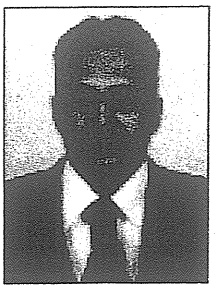
$$\frac{dS}{dt} = \frac{AD}{\delta}(C - Co) \ldots\ldots\ldots\ldots (1)$$

Above discussion is expressed mathematically by Fick's Law as

Where $\frac{dS}{dt}$ = rate of diffusion

A = Area of electrode surface on which reaction occurs
D = Diffusion coefficient of ions
C = concentration in bulk of solution
Co = concentration of the ion in the vicinity of electrode surface
δ = thickness of hypothetical diffusion layer about the micro electrode

Polarography is an instrumental technique which consists the measurement of potential difference as current flow through the solution and the result obtained can be interpreted in



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Dr Sanjaykumar H Panjabi
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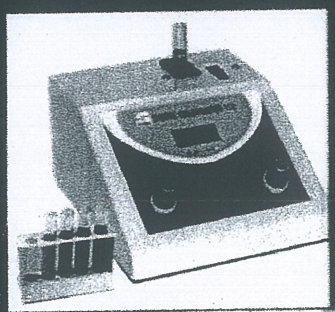

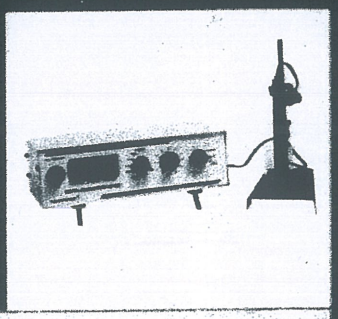

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PREFACE

This book is designed for post graduate students of chemistry in India. This book enrich with experiment discussion of the theory associated with the objective involved. This theoretical discussion will provide a link between the theory and practical of physical chemistry. It is advised by the authors that student should refer other theoretical books for additional information. This is the compilation of several practical's of Physical Chemistry in this regard we are indebted to the authors of other textbooks whose resources we have composed in this book and attributed by acknowledging their endeavors.

The book covers the some practical of physical chemistry based on instrumental techniques and non-instrumental techniques. Which consists of experiments related to the instrumentation includes pH meter, potentiometer, conductometer, refractrometer, colorimeter, spectrophotometer, etc.

In short, this book has been written to facilitate experimental work in the physical chemistry laboratory at every stage of a student's career. It is hoped that by following this manual the student will gain confidence in his ability to perform a physical chemistry experiment and to appreciate the value of the experimental approach.

We would like to express our thanks to all individuals who supported us for accomplishment of this task. We are indebted to a number of our colleagues for the contributions given by them.

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1.

SpectroPhotometry: Colorimeter (PART-01)

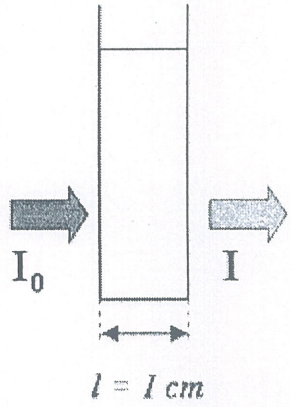
Aim: To find the unknown concentration of colour compounds using spectrophotometer.

Introduction: This experiment is based on the Beer-Lambert Law which gives the linear relationship between absorbance (A) and concentration (c) of an absorbing species. The general Beer-Lambert law is written as:

$$A(\lambda) = \varepsilon(\lambda)\, l\, c \text{ ---------- } (1)$$

where A is the measured absorbance, $\varepsilon(\lambda)$ is a wavelength-dependent absorptivity coefficient, l is the path length, and c is the concentration.

Experimental measurements are usually made in terms of transmittance (T), which is defined as: T = I / Io where I is the light intensity after it passes through the sample and Io is the initial light intensity. The relation between A and T is; A = -log10 T = -log10 (I / Io) = log10 (Io/ I)



Stock Solutions:

1. Potassium Permanganate ($KMnO_4$) 0.02 M
2. Potassium dichromate ($K_2Cr_2O_7$) 0.02 M
3. Solvent: Dilute H_2SO_4 / Distilled Water (DW)

Jagdev Singh · Devendra Kumar ·
Hemen Dutta · Dumitru Baleanu ·
Sunil Dutt Purohit
Editors

Mathematical Modelling, Applied Analysis and Computation

ICMMAAC 2018, Jaipur, India, July 6–8

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Contents

Introduction to Class of Uniformly Fractional Differentiable Functions

Krunal B. Kachhia and Jyotindra C. Prajapati

Abstract In this paper, authors introduced new concept of uniformly fractional differentiable functions on an arbitrary interval I of R by using Caputo-type fractional derivative instead of the commonly used first-order derivative. Their interesting properties with few illustrations have been discussed in this paper.

Keywords Uniformly differentiable functions · Uniformly continuous functions · Uniformly fractional differentiable functions · Caputo fractional derivative

Mathematics Subject Classification (2000) 26A33 · 34A08 · 34A12

1 Introduction

The fractional calculus is a theory of integrals and derivatives of arbitrary order, which unify and generalize the notions of integer-order differentiation and n-fold integration. We shall explain the result connected to classical analysis, namely uniformly differential functions given by Patel [1], can be extended to fractional calculus, i.e they can be generalized by replacing the first order the first derivatives and integrals, respectively, by derivatives and integrals of non-integer. The uniformly differentiable function can be defined as:

Definition 1 Let I be an interval in R. A differentiable function $f : I \to R$ is uniformly differentiable, if for any $\epsilon > 0$, there is a $\delta > 0$ such that for any $x, y \in I$ satisfying $|x - y| < \delta$,

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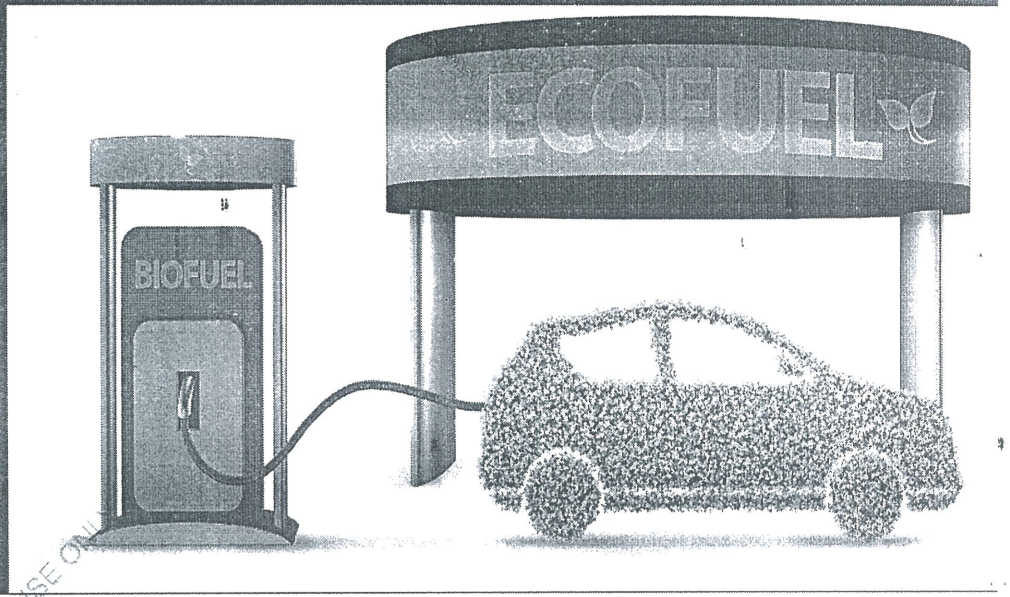
Biofuels are inevitably needed in the present day scenario. We have isolated 9 marine halophilic bacteria from the Gulf of Khambhat. Among, 4 were screened as potent cellulase producers. Further, screening shown that Pal-3 was most potent ethanol producer as compared to others.
We have used corn cob for bioethanol fermentation by Pal-3.The data exhibited some interesting trends highlighting conventional yeast based approach. This data were also compared with the consolidated bioprocessing approach .Our trend revealed that the Pal-3 could ferment ethanol more efficiently from cellulose waste as compared to consolidated bioprocessing approach. This point out commercial applicability of the strain and process.



Bhavtosh Kikani

BIOETHANOL PRODUCTION: BACTERIA VERSUS YEASTS

Biofuels

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Chapter – 1

Introduction

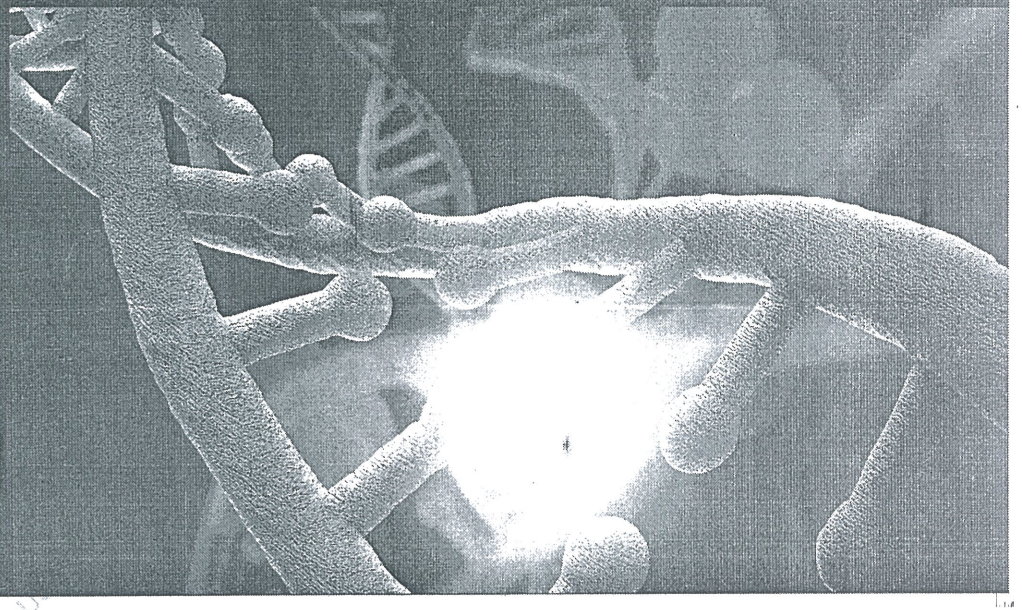
Chapter – 1
Introduction

The world's current economy is greatly reliant on fossil fuels which are still the major non-renewable energy source because they contribute more than 80% of the world's energy. There are various fossil fuels in which oil is highly consumed (38%), followed by coal (26%) and natural gas (23%) for transportation, commercial, household and industrial purposes and Oil prices increase due to the excess use of fossil fuels by the world's population (Sriroth et al., 2010). Excess usage of the fossil fuels led to environmental pollution, global warming and other related hazards along with this of fossil fuels are the major contributor to increasing the level of CO2 in the atmosphere (Wakade et al., 2015). The rapid increase in oil prices and finite nature of fossil fuels leads to the generation of alternative cheap renewable energy sources and this alternative fuel must be environmentally acceptable, economically competitive, readily available and technically feasible (Balat, 2011). Numerous potential alternative fuels have been proposed including bioethanol, liquefied petroleum gas (LPG), solar energy biodiesel, natural gas (Sarkar et al., 2012).

Biofuels also known as biomass (mainly the lignocellulosic biomass) based fuels are being considered to be one of the finest alternatives to petroleum for transportation fuel. Lignocellulosic ethanol is obtained from low cost and plentiful feedstocks. It has broader flammability restrictions, high octane number, high heats of vaporization and higher flame speeds than compared to gasoline. (Gnansounou et al., 2005) It represents a closed carbon dioxide cycle after burning and environmentally friendly and ethanol obtained from the biomass is the only liquid transportation fuel which does not contribute to greenhouse gas effect. These are the main reasons for the greater development of bioethanol (Puttaswamy et al., 2016).

In 2001 world bioethanol production was 31 billion litres, in 2006 it was 39 billion litres and shot up to 85 billion litres in 2010 and expected to reach 100 billion litres by 2015 (Sarkar et al., 2012). It has been estimated that 491 billion litres can be obtained from total crop residues, wasted crops and 442 billion litres can be produced from lignocellulosic material (Sarkar et al., 2012). The greater bioethanol growth scenario targets to replace 15% of gasoline production with biofuels by 2015 and 20% by 2020

The halophilic bacteria, isolated from Gulf of Khambhat, Gujarat, India. It's were characterized and diversified using the conventional approaches; colony characteristic, Gram reaction, cell morphology. The bacteria were Gram positive, rod shaped and catalase positive. Effect of incubation temperature, pH, NaCl were checked. Amylase, protease and lipase production was carried out. Majority of them produced lipase and protease, indicating their ecological a biotechnological significance. The bacteria were further categorized on the basis of the amplified ribosoma DNA restriction analysis (ARDRA) patterns, generated by a tetracutter RE, HaeIII. As a polyphasic taxonomy approach, the isolates were clustered into 9 different groups, based on the ARDRA patterns. As the studied habitat was not earlier explored for the bacterial diversity, the findings would significantly add to the knowledge of the cultivation based microbial diversity.



BHAVTOSH KIKANI
Asra Dosani

Diversity of haloalkaliphilic bacteria from the Gulf of Khambhat

EXTREMOPHILES

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&

REVIEW OF LITERATURE

1. Introduction & Review of Literature

1.1 Extremophiles

The life of extremophiles exist with very extreme condition like salinity, acidity, alkalinity, temperature and pressure which increase the ability of extremophile to survive in the harsh conditions (Kikani et al, 2015). In addition to survival in very extreme conditions, extremophiles have various biotechnological and commercial significances too. They adapted themselves to survive in extreme condition and they evolved unique properties, some of them can have commercial significance as well (Dodia et al, 2006; Margesin and Schinner, 2001). Among all extremophile, the halophiles, the microbes flourish well in high NaCl conditions are frequently isolated from soil and water near coastal region and salt pans.

1.2 Halophiles

Halophiles are referred to those microorganisms that require salt (NaCl) for survival, and that they may be determined in all 3 domain names of existence: Archaea, Bacteria, and Eukarya which encompass a excellent variety of organisms, including cyanobacteria, sulphur-oxidizing microorganisms, heterotrophic microorganisms, anaerobic microorganisms, archaea, protozoa, fungi, algae and multicellular eukaryotes too. They can be found in hypersaline environments which are widely distributed in various geographical areas on earth, such as saline lakes, salt pans or salt marshes. Halophiles can generally be partitioned into two classes: Class I – Extreme halophile that thrives well at

BHAVTOSH KIKANI

Production and Characterization of Bacterial Thermostable Cellulase

Project Report

GRIN

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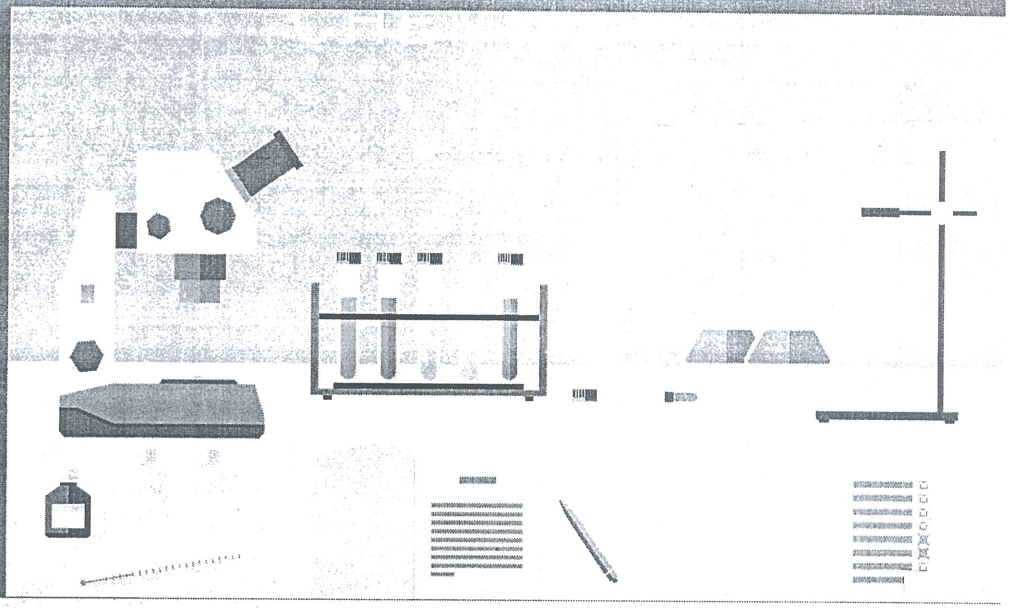
Life thrives well in range of adverse environmental conditions, for example extremes of salinity, acidity, alkalinity, temperature or pressure. It always fascinates the scientific fraternity to explore the microbial diversity and phylogeny under these inhospitable habitats. Their possible adaptive measures may provide clues to various evolutionary pathways (Austin, 1988; Herbert and Sharp, 1992; Singh, 2006). Among them, the thermophilic bacteria are common in soil and volcanic habitats with limited species composition. Yet, they possess all the major nutritional categories similar to their mesophilic counterparts. Among, the genus *Bacillus* and related genera are widely distributed in the nature, including thermophilic, psychrophilic, acidophilic, alkaliphilic and halophilic bacteria, which can be able to utilize a wide range of carbon sources for the heterotrophic or autotrophic growth (Claus and Berkeley, 1986; Nazina *et al.*, 2001).

On the other hand, cellulose is the most abundant biomass on Earth, being the primary product of photosynthesis in the terrestrial environment and the most plentiful renewable bioresource. Cellulases, a group of enzymes commonly breaks cellulose, are produced by several microorganisms, mainly by bacteria and fungi. They are inducible enzymes which are synthesized by microorganisms during their growth on cellulosic materials. The complete enzymatic hydrolysis of cellulosic materials needs different types of cellulases: namely endoglucanase (1,4-β-d-glucan-4glucanohydrolase), exocellobiohydrolase (1,4-β-d-Glucan glucohydrolase) and β-glucosidase (β-d-glucoside glucohydrolase). The endoglucanase randomly hydrolyzes β-1,4 bonds in the cellulose molecule, whereas the exocellobiohydrolases in most cases release a cellobiose unit, showing a recurrent reaction from chain extremity. Lastly, the cellobiose is converted to glucose by β-glucosidase.

Bacteria, having quite higher growth rates as compared to fungi contribute significantly in cellulase production. Cellulase yields rely on various factors, mainly inoculums size, pH, temperature, presence of inducers, medium additives, aeration, growth time, and so on. Enormous cellulosic wastes are getting accumulated day by day. Therefore, it is of considerable economic interest to develop the processes for effective treatment and utilization of cellulosic wastes as inexpensive carbon sources.

The cellulose-degrading enzymes can be used, for example, in the formation of washing powders, extraction of fruit and vegetable juices, and starch processing. Cellulases are used in

Synthesis and properties of PbS/polymer nanocomposites (NC) have attracted considerable attention due to applications as solar cells, photo detectors, non-linear optical devices, photo refractive devices and high refractive index materials. These NC consists of PbS nanoparticles (NPs) or quantum dots (QDs) embedded in host polymers. PbS is a low band gap (0.41 eV) semiconductor with has large excitionic Bohr radius of 18 nm and hence NPs have tunable band gaps from 0.4 to 3.5 eV for larger sizes as compared to other semiconductors. Even though use of different host polymers, such as, semiconducting conjugated, co-polymer and insulating polymers has been examined there is no systematic study on how size and concentration PbS NPs and interaction of host polymer affect the properties of NC.



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Preparation and Characterization of PbS / Polymer Nanocomposites

Dr. Miteshkumar Harishbhai Patel did his Doctorate degree in chemistry from Charusat university in subject of Chemistry. His area of research is inorganic-organic nanocomposites, fibers, semiconducting material for solar cell, Lithium ions battery and inkjet printing.

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3.4.6.
19-20

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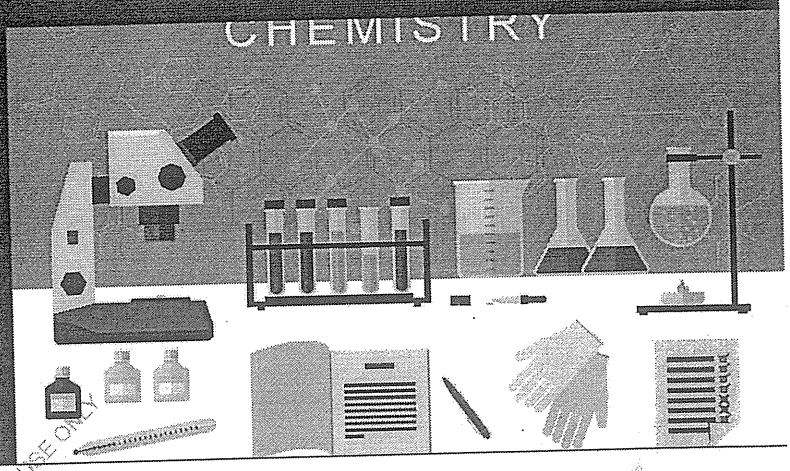

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Miteshkumar Harishbhai Patel
Vaibhav K. Patel
Tapas K. Chaudhuri

Preparation and Characterization of PbS / Polymer Nanocomposites

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Chapter 1

Preparation of Inorganic / Organic Nanocomposite films

1.1 CLASSIFICATION OF SYNTHESIS APPROACH FOR NC

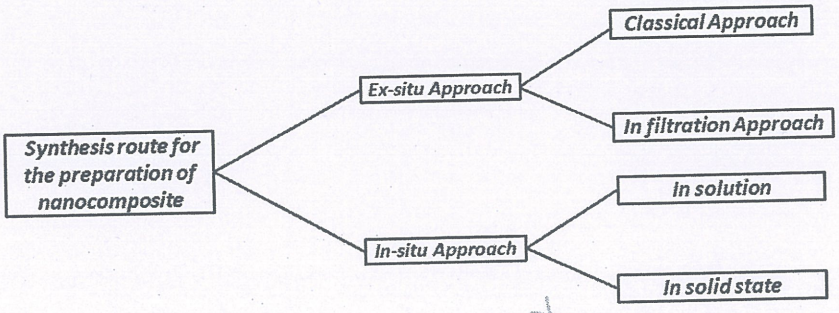


Fig. 1.1 Different routes for preparing nanocomposite

For the synthesis of nanocomposites (NC) two different routes *ex-situ* and *in-situ* are commonly used. The *ex-situ* route is classified in to classical and in-filtration approach.

1.1.1 Classical approach

In this approach, the inorganic NPs are prepared separately and the growth of the NPs was restricted by introducing long chain alkaline amine.

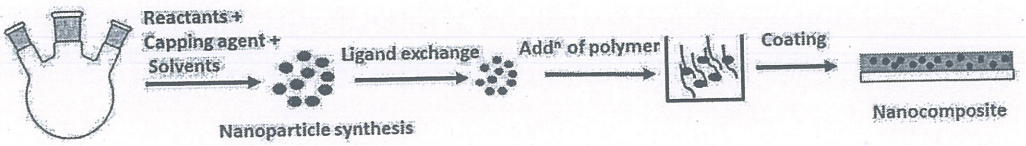
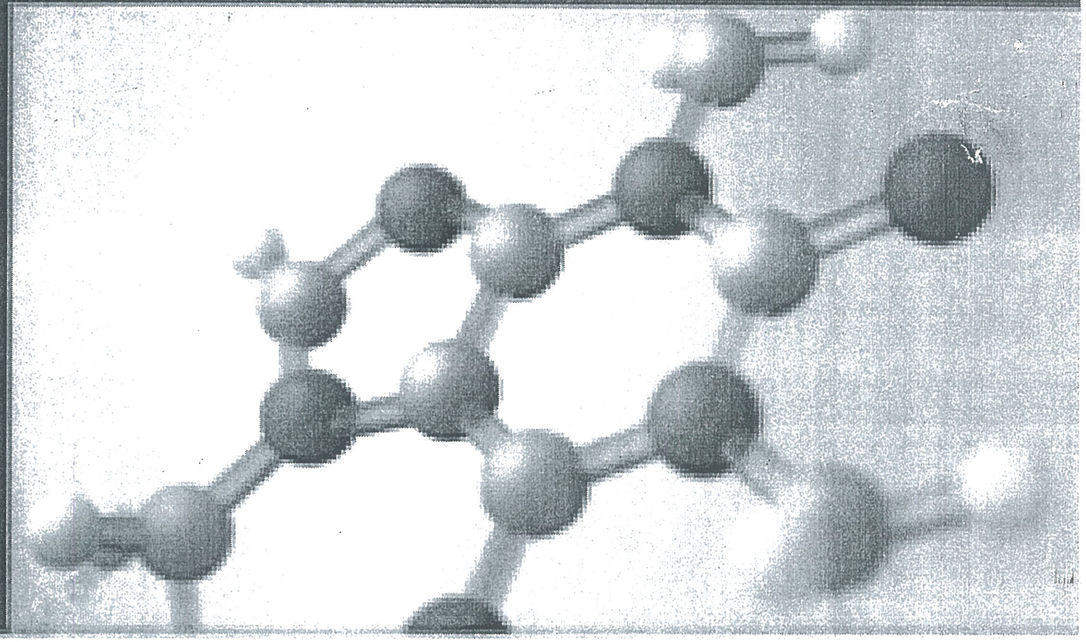


Fig. 1.2 Classical approach for the preparation of nanocomposite

The principal objective of this book is to summarize the present knowledge on the use, the advantages and the weaknesses of a large number of experimental techniques that are available for the characterization of nanoparticles. Different characterization techniques are classified according to the concept/group of the technique used, the information they can provide, or the materials that they are destined for.



Miteshkumar Harshibhai Patel
Vaibhav Patel
Sanjay Pargade

Instrumentation Technique Used for Nanomaterial Characterization

Dr. Miteshkumar Harshibhai Patel has doctorate degree in chemistry. His area of specialization is synthesis and characterization of inorganic organic nano composites for various applications. He is also expert in advanced understanding in fabrication of semiconductor nano materials and nano structured.

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Miteshkumar Harishbhai Patel
Vaibhav Patel
Sanjay Panjabi

Instrumentation Technique Used for Nanomaterial Characterization

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1. INTRODUCTION

The ground breaking changing in the field of material chemistry especially in synthesis and characterization of nanomaterial shows considerable attention to the researchers. Nanomaterial comes up with unique physical and chemical identity that cannot be seen in the bulk material. The imperative aspect that can distinguish nanomaterial from the bulk is reduction of particle in the nanoscale. The reduction in size can bring several benefits such as improved surface area and scalable desired properties. The reactivity of nanomaterial is more rely on the surface. The material having large surface area provide more reactivity because surface atoms are located at the surface and having fewer number of neighbor atoms as compared to bulk, as a result of this more atoms having lower coordination and unsatisfied bonds. Such surface atoms are overall less stable than bulk atoms, which means that the surface of nanomaterials is more reactive than their bulk counterparts.

The reduction in the size is best example of scalable properties that is continuously changed. Moreover of that some of the nanomaterial such as quantum dots does not show scalable properties they exhibit non-scalable properties. The non-scalable properties, we refer to those properties that can change drastically when a certain size limit is reached. Quantum confinement effects are the best example of non-scalable property that can be further exemplified by some nanomaterials such as Lead sulphide (PbS), Cadmium Sulphide (CdS) etc. Quantum dots are basically semiconducting nanoparticles having particle sizes below ~10 nm.

Several techniques have been used to characterize the size, crystal structure, elemental composition and a variety of other physical properties of nanoparticles. In several cases, there are physical properties that can be evaluated by more than one characterization technique. The method which is used to characterize nanomaterial's has their own strengths and limitations. The limitation of the characterization technique it is very complicate to choice most suitable method, while often a

Preparation and Characterization of Inorganic/Polymer Blend Nanocomposites

Mitesh Patel

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1. INTRODUCTION AND REVIEW OF LETURATURE

In the recent years, the synthesis of nano structured materials and exploration of their properties are more interested to the researchers because of their physical and chemical properties that are characteristically different from their bulk. Inorganic compounds provide the potential for high carrier mobilities, band gap tunability, dielectric properties, thermal and mechanical stability. On the other hand, organic materials offer structural flexibility, convenient processing, tunable electronic properties and efficient luminescence.

The nanocomposite (NC) consisting semiconducting nanoparticles (NPs)in polymer matrixes have scientific importance due to their application in electronic and optical devices. Different inorganic nano crystals (NCs) can be employed to fabricate inorganic-organic NC; some of the most commonly used NCs are ZnS, PbS, CdS, AgS and HgS, out of them PbS is unique and exceptional. Bulk PbS has a narrow band gap of 0.41 eV with large excitionic Bohr radius of 18 nm. In addition of that, PbS NPs has significant size-dependent band gaps varies from 0.4 to 3.5 eV. Hence, the synthesis and processing of PbS/polymer NC have attracted much attention due to their diverse application in, solar cells [1-6, 15], photo detectors [7-9], non-linear optical devices [10-12], photo refractive devices [13] and high refractive index materials [14].

1.1 PbS/CONJUGATED POLYMER NANOCOMPOSITES

Bakueva et al. [16] prepared size tunable infrared electroluminescent PbS nanoparticle by using poly(2-methoxy-5-(2-ethylhexyloxy)-1,4-phenylenevinylene)(MEH-PPV) and poly(2-(6-cyano-6-methyl-heptyloxy)-1,4-phenylene) (CN-PPP) as polymer matrix. PbS NPs were prepared by dissolving lead oxide in long chain oleic acid at 150 °C under argon atmosphere followed by replacing long chain alkaline amine in to shorter alkyl amine chain. Particle size of the PbS NPs was controlled by varying the reaction parameters and growth condition. These octylamine capped NPs were isolated by precipitation with a polar solvent. The anode of PbS/MEH-PPV and PbS/CN-PPP were prepared on indium tin oxide

15

3.4.6
19.20

PREPARATION AND CHARACTERIZATION OF INORGANIC/POLYMER BLEND NANOCOMPOSITES

This book provides essential information on how the inorganic nanoparticles affect the physical properties of polymer blend. It can also provide platform for upcoming research student who pursue their doctorate in synthesis and characterization of inorganic-organic nanocomposites. This book covers different characterization technique such as: optical structural, thermal and electrical that is very beneficial for new students.

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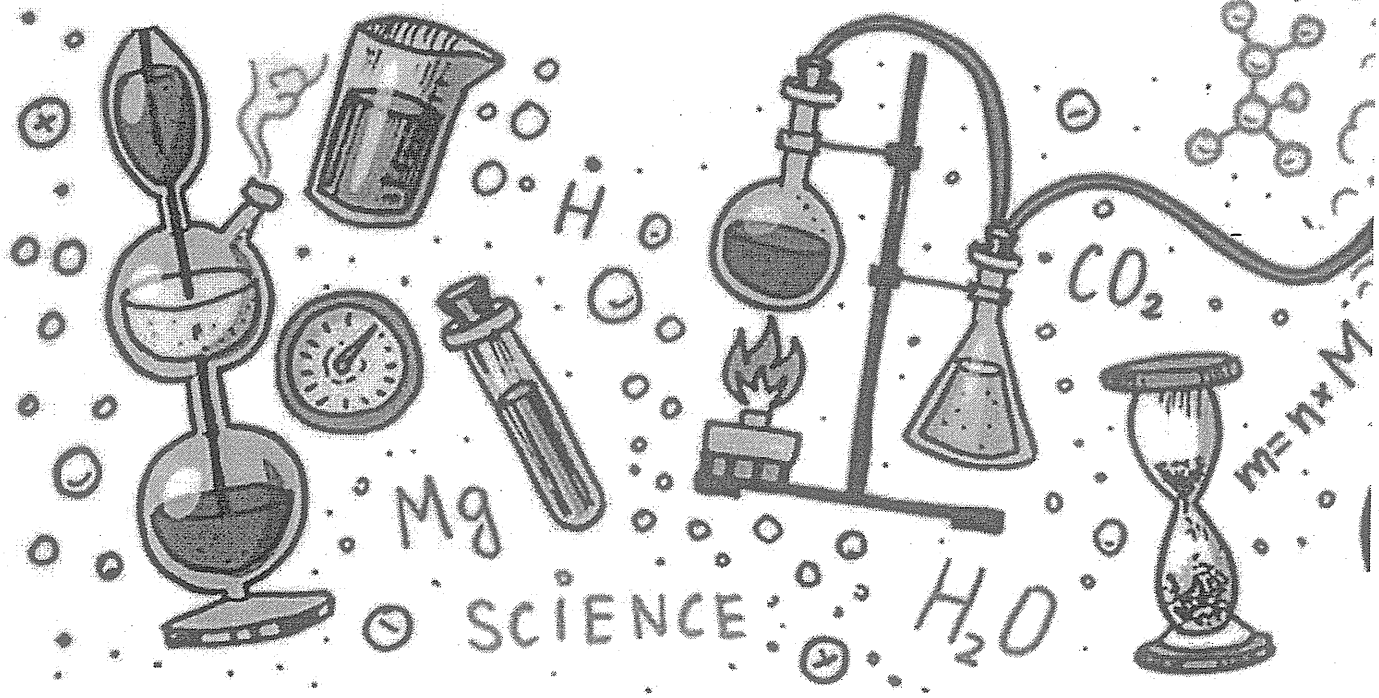

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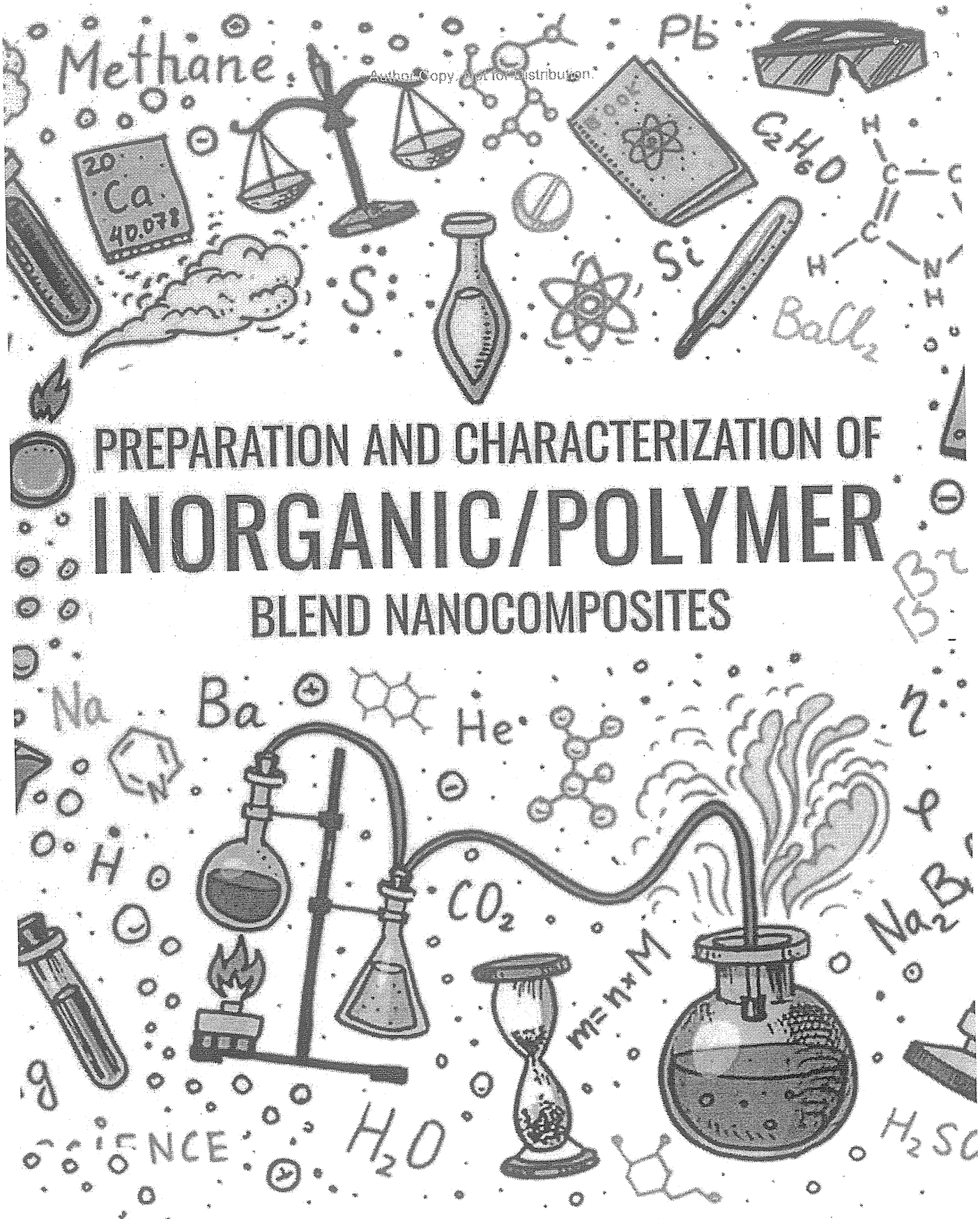

DR. MITESHKUMAR HARISHBHAI PATEL

book comprises a total of fourteen chapters contributed by
ts from different countries across the globe. The book is divid-
to five sections containing two to three chapters each. It is a
rehensive collection of articles that give an overview of micro-
atalysts which include enzymes that contribute to many fields
re widely used in industrial products. Microorganisms have
d and continue to serve as one of the largest and useful sourc-
many enzymes used in foods and the food industry. Microbial
sts are environmentally friendly and consume lower energy.
ticular focus of this book is on applied and industrial microbiol-
gricultural microbiology, and food microbiology. All of the sec-
discuss microbial catalysts, enzymes with respect to their
ion and their benefits to humankind in general, and biotech-
y as a subject of which enzymology is an integral part. This
deals also with the structure and function of some microbial
nes. Microbial catalysts are generally preferred than plants
nimals as sources of industrial enzymes because their pro-
on cost is low. In addition, their enzyme content is more pre-
ble and controllable, and more so because of the easy avail-
y of raw materials with constant composition for their cultiva-

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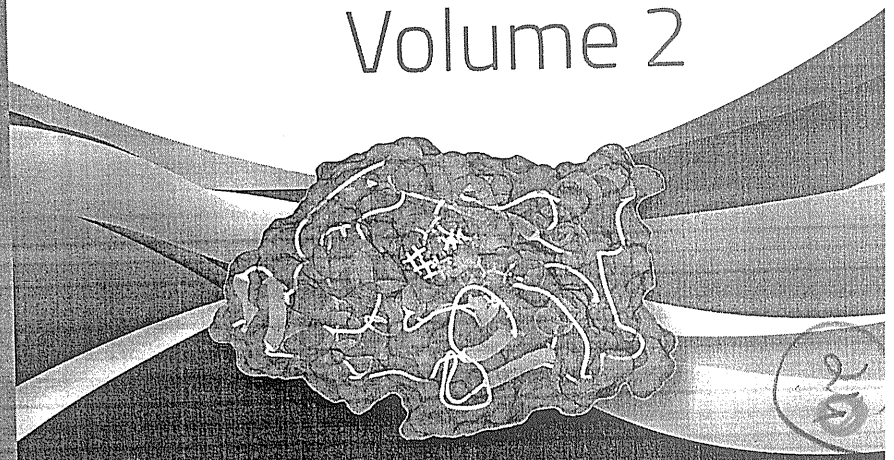

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Chapter 3

UREASE PRODUCING MICROBES TO AID BIO-CALCIFICATION: AN INTERDISCIPLINARY APPROACH

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ABSTRACT

Ureases (urea amidohydrolases; EC 3.5.1.5) are nickel-dependent enzymes that catalyze the hydrolysis of urea into 2 mole of ammonia and 1 mole of carbon dioxide. Urease activity tends to increase the pH of surrounding environment as it produces ammonia, a basic molecule. These enzymes are widespread in nature, being synthesized by plants, fungi and bacteria, but not by animals. Plant and fungal ureases are hexamer of single type of ~90 kDa subunit with about 840 amino acids whereas, bacterial ureases are multimers of two or three polypeptide chains that correspond to the single chain of the plant/fungal urease. Urease from the bacterium *Klebsiella aerogenes* was the first to have its tridimensional structure solved by crystallography in the year 1995. Since then ureases from several bacterial strains have been studied. First application of urease enzyme was to detect *Helicobacter pylori* in stomach and it was restricted to be used as a diagnostic tool to detect the presence of pathogens in gastrointestinal or urinary tract as these pathogens produce urease. Later, Urease conductometric biosensors were innovated for

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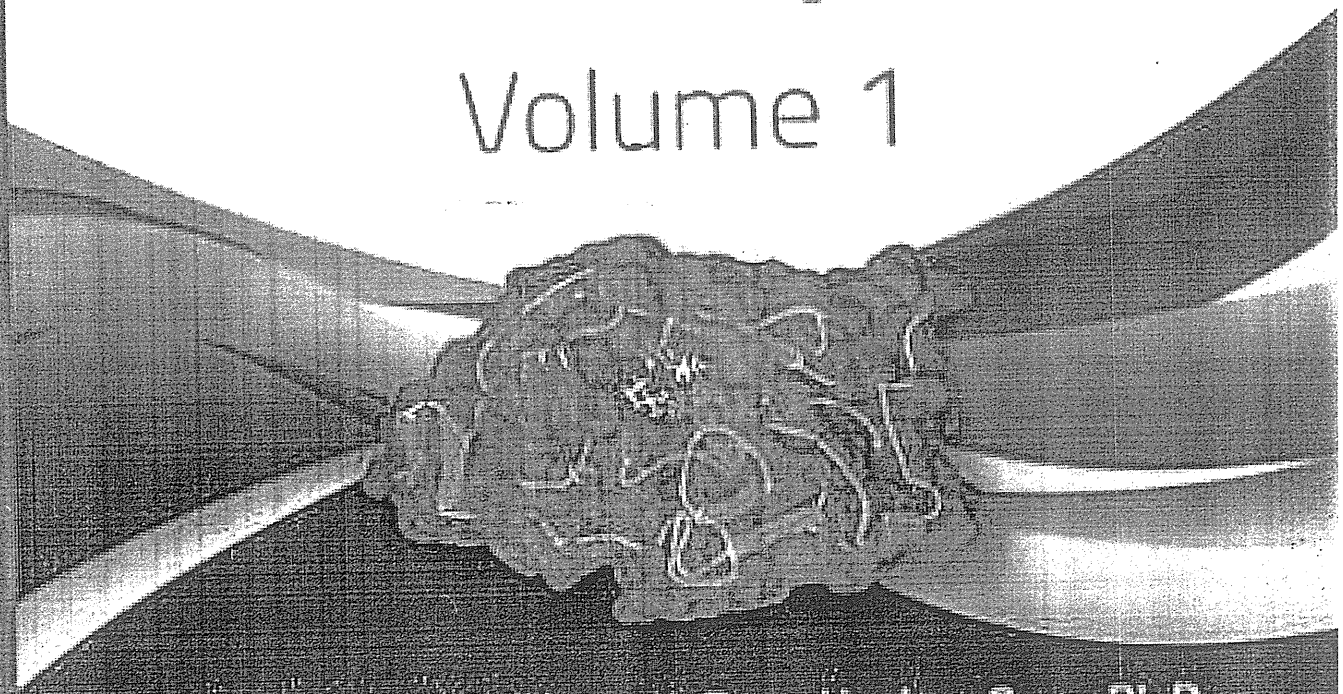

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book is on applied and industrial microbiology, agricultural microbiology, and food microbiology. All of the sections discuss microbial catalysts, enzymes with respect to their function and their benefits to humankind in general, and biotechnology as a subject of which enzymology is an integral part. This book deals also with the structure and function of some microbial enzymes. Microbial catalysts are generally preferred than plants and animals as sources of industrial enzymes because their production cost is low. In addition, their enzyme content is more predictable and controllable, and more so because of the easy availability of raw materials with constant composition for their cultivation.

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Chapter 8

MICROBIAL ENZYMES: THE TYPES AND ROLES IN THE BIO-CONTROL OF FUNGAL PHYTOPATHOGENS

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ABSTRACT

Fungal pathogens are the major culprit causing infections in plants. An estimated, two-third of the total diseased plants are infected by fungi. Aggregate of 125 million tons of the main five sustenance crops in particular rice, wheat, maize, potatoes and soybeans are being spoiled by parasitic diseases all around every year. Diseases caused by phytopathogenic fungi constitute of rusts, smuts, needle casts, leaf curls, mildew, sooty molds, flower spots, cankers, blights, scabs (in root, stem and fruit), wood rots, wilts (in leaf, shoot) and bud galls. Parasitic contamination by fungi in rice, wheat and maize itself represents the loss of $60 billion every year. Fungal diseases are controlled through the use of fungicides, however new races of fungi that are resistant to various fungicides are evolving that are resistant to various fungicides. Moreover, the concerns regarding the public safety has revoked the use of toxic chemical fungicides use leading to the development of other alternatives for suppressing fungal phytopathogens. Thus, plant beneficial microbes including both bacteria and other non-pathogenic fungal strains that can antagonize growth of phytopathogens on plant tissues are exploited. Such microbes which can suppress fungal phytopathogens are known as bio-control agents. These agents produce fungal cell wall degrading enzymes, β-1,3-glucanase, chitinase, cellulase, and

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