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Available online at www.elixirpublishers.com (Elixir International Journal)

Vibrational Spectroscopy

Elixir Vib. Spec. 92 (2016) 38706-38717

Elixir ISSN: 2229-712X

# A Novel Technique For Classification of Images: A boon to Digital India Project

Nikkoo N. Khalsa, Rupesh Juware and Nilesh Wadhe
PRMIT & R, BADNERA

**ARTICLE INFO**

**Article history:**
Received: 6 February 2017;
Received in revised form:
28 March 2017;
Accepted: 20 April 2017;

**Keywords**
Natural Images,
Entropy,
Colour ratio,
Saturation Average,
Spatial Gray level,
Smoothness level.

**ABSTRACT**
The present age of information explosion is envisaging incredible development in both communication medium and hardware escalation. This in turn, is engendering a huge volume of digital signals in the form of images, videos, audio and texts, which proves to be challenging in terms of storage and broadcast. Even though, several breakthroughs in the price and performance of digital hardware and firmware have been put into practice, the demand for high data storage capacity and data-transmission bandwidth continues to outstrip the capabilities of available technologies. This research work proposes a novel method of classifying Natural images into different categories. From the results, it is concluded that classification of Natural images on the basis of various parameters can provide a better reference for application developers and will prove boon to Digital India project in terms of search engine application.



## 1. Introduction

It is rightly said that, "An image is worth ten thousand words". But one needs to know how to analyze the picture to gain any understanding of it at all. Present-day images include hefty information that necessitates much storage space, huge transmission bandwidths and extended transmission times, therefore it is beneficial to classify and compress the image by analyzing only the indispensable information to reconstruct the image effectively and precisely. Throughout the history of humankind great efforts have been placed towards the research and development of intelligent systems. Although the beginnings were set early in antiquity, the development and proliferation of electronic computational systems have paved the way towards the development and application of Artificial intelligence. [1]

The basic function of novel image classification system is to separate natural images into different classes and provide addition ease to search engine application by reducing its load. The paper proposes a unique method in view of "Digital India Project". An ideal system should be able to discern various images with no hesitation just like a human being. Unfortunately, sometimes the categorization task is hard and indistinct even for a human. This makes the problem even more challenging for computers. In this research work, a novel classifier for natural image classification system is proposed and analyzed. The sub-classes involved in the classification are Coast, Forest, Mountain, Highway, Open Country and Street. Given an image, the classifier extracts and analyzes some of the most pertinent features and combines them in order to create an opinion. The numerous features which affect the image classification system were individually tested and analyzed.

Each single parameter taken into consideration has been tested and tweaked changing thresholds and input parameters so that its precision is as high as possible.

Then the aggregate classifier was tested in order to evaluate the global performance of the system on the data set. A common dataset of physically labeled Natural images has been used as test set. This set has been later on resized to perform the same tests on resized images. In the best case, the performances achieved are at par or far better than previous works. Summarized steps in order to classify an image are

- Extract different features that give an individual classification.
- Combine them together using a classification method in order to boost the performance of the single classifier.
- Compare the output and assign the image to a category.

## 2. Natural Image

Natural images refer to photographs of persons, objects or scenes, normally recorded by a camera. They generally contain many Colours and irregular shaped objects. It is very unlikely to find any considerably large region with consistent Colour. Natural images are considered as the images like Coast, Forest, Mountain, Highway, Open Country and Street etc. Most of the photographs were downloaded automatically from different photographic websites and some are directly captured by the digital camera. The images were then labeled as Natural if belonging to one of the following categories:

- Coast
- Forest
- Mountain
- Highway
- Open Country
- Street

## 3. Need of Advance Image Classification System

During past some decades, products and services such as TVs, video monitors, photography, motion films, copying devices, magazines, brochures, newspapers, etc. have steadily evolved from monochrome to Colour.

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# A Spatial Domain Feature Based Approach For No Reference Image Quality Assessment of JPEG Compressed Images

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Anagha A. Wankhede
Assistant Professor, Department of Electronics Engineering
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*Abstract*— **This is the world of technological advancement; where emphasis is more on data transfer and that too with higher speeds. This leads to higher bandwidth requirement. To resolve the bandwidth requirement problem various compression techniques are employed. But with this compression and data transfer new problem arises that is nothing but distortions. And at the same time it is also important to assess the quality of these images being processed and transferred. This paper presents a novel approach for image quality assessment without any reference. This paper focuses on JPEG compressed images which mainly suffers blocking and blurring artifacts. A spatial domain approach is employed along with histogram to quantify the distortion. Results are found to be correlating well with the subjective image quality assessment and various standard quality assessment parameters. Results are also found to be comparable to that of full reference quality assessment technique.**

**Keywords— Image quality assessment; no reference; jpeg; subjective image quality assessment; full reference.**

## I. INTRODUCTION

World is getting closer with the growth in technology. Lots of multimedia data is exchanged over the latitudes with tighter bandwidth leading to advancement in compression technologies. These new compression techniques and processes have raised concerns over quality of data being compressed. Here in this paper we are dealing with the quality of jpeg compressed images. So it is important to assess the quality of such compressed images. Also distortions are introduced over transmission media leading to degradation in quality of the images. [1] The image quality assessment techniques are gaining lots of importance. There are basically two categories of image quality assessment techniques viz. subjective image quality assessment and objective image quality assessment. The subjective image quality assessment is considered to be most accurate of the two techniques. But it is time consuming in nature not practical since it cannot be implemented in real time. It is important to assess the quality of image in real time and automatically. And that's why objective image quality assessment comes into the picture. Objective image quality assessment technique can predict image quality score automatically through some well-defined algorithms. Objective image quality assessment can be further classified into three categories: full reference (FR), reduced reference (RR) and no reference (NR)

In full reference technique original image itself is available for the reference along with the distorted image. It is comparatively easy to assess quality using this technique since original image is present as reference. So by applying suitable algorithm image quality can be predicted. In reduced reference technique, some features of original image are available along with the distorted image for quality prediction [3]. Whereas in no reference image quality assessment technique reference image is not available for the quality assessment. Since in many practical applications original image is not available. So no reference technique is very much useful in these applications.

Many objective quality assessment matrices are available in literature such as peak signal to noise ratio (PSNR), mean squared error (MSE). But these measures are found to be less effective. Since they do not correlate well with the actual image quality. This has attracted researchers to develop new objective quality assessment algorithms. It is learned that human observers can assess the quality of perceived images very easily without requiring for any reference. Many approaches have been proposed in the past for objective quality assessment which uses original image as the reference. However image quality assessment without using any reference seems to be a cumbersome task. Hence this domain has fascinated many researchers and lots of approaches have already been proposed in no reference method. The first remedy for such no reference methods seems to be the understanding of types of distortions introduced in the image. Various compression categories suffer different types of distortions. This paper concentrates on only

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# International Conference on Computing Communication Control and Automation (ICCUBEA)



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Ajinkya M. Pund; Shubham C. Anjankar; Ankush D. Kadu; Anagha A. Wankhede

Publication Year: 2017 , Page(s): 1 - 6

# Internet of Things (IOT): An overview and its applications

**Publisher: IEEE**

Cite This

PDF

P.V. Dudhe ; N.V. Kadam ; R. M. Hushangabade ; M. S. Deshmukh **All Authors**





**Abstract:**

We are entering in a beginning of a new of computing technology i.e. Internet of Things (IOT). IOT is a sort of "universal global neural network" in the cloud which connects various devices. The IOT is an intelligently connected devices and systems which be made up of smart machines interacting and communicating with other machines, environments, objects and infrastructures and the Radio Frequency Identification (RFID) and sensor network technologies will go up to meet this new challenge. As a result, a very large in size data are being generated, stored, and that data is being processed into useful actions that can "command and control" the things or devices to make our lives much easier and safer — and to reduce our influence on the environment. This paper gives an overview of Internet of Things (IOT) and brief information about IOT applications and challenges in various fields.

**Published in:** 2017 International Conference on Energy, Communication, Data Analytics and Soft Computing (ICECDS)

**Date of Conference:** 01-02 August 2017

**INSPEC Accession Number:** 17859538

**Date Added to IEEE *Xplore*:** 21 June 2018

**DOI:** 10.1109/ICECDS.2017.8389935

# *Internet of Things (IOT): An Overview and its Applications*

Prof.Ms.P.V.Dudhe[1], Prof.Ms.N.V.Kadam[2], Prof. R. M. Hushangabade[3], Prof. M. S. Deshmukh[4]
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***Keywords: IOT application***

## I. INTRODUCTION

The phrase "Internet of Things" was invent by Kevin Ashton in 1999. He made at his place of employment, Proctor & Gamble. During his time there, Ashton came up with the idea of putting a RFID tag on each lipstick and having them communicate with a radio receiver. He put forward as fact that such data collection can be used to solve lots of problems in the real world. At the moment, a lot of connected devices can talk to internet and to our smart phones, and maybe even some similar products, but most of them can't talk to one another because of branded hardware and software with differing standards, languages and communication protocols. For most of the current smart household items, you'll need to use a different app or website to interface with the device. Unless they were especially designed by the manufacturer to work together. K. Rose in 2015 gave reasons that why IOT is possible. He said it is possible due to following reasons: Ubiquitous Connectivity, widespread adoption of IP–based networking, computing economics, advances in Data Analytics, rise of Cloud Computing so, the IOT is the conjunction of a variety of computing and connectivity trends that have been evolving for many decades.

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Gipsa Alex, Benitta Varghese, Jezna G Jose, AlbyMol Abraham proposed work on modern healthcare IOT platform with an intelligent medicine box along with sensors for health monitoring and diagnosis the disease. In their proposed work an intelligent home-based medicine box with wireless connectivity with an android application (Health-IOT) is developed that helps patients and doctors to be in a more close communication. They proposed work has an intelligent medicine box that gives alerts for patients to take their medicine at the night time. The box is wirelessly connected to internet to make timely updates about medicines which will be notified in the android application with in patient's smart phone. Their system automatically gives alarm so that the patient takes the right medicine at the right time. [1]

A. Arun Rajaa, R. Naveedhab, G. Niranjanadevic and V. Roobini proposed in their paper that a security alert system which records a video when a motion is detected and uploads it to the external server and notifies the user via text message is reported. Their application can be used to view the remote activities and notifications can be received whenever the motion is detected. Internet of Things basically deals with transferring of useable data without involving human interferences. In their proposed work they used Raspberry Pi camera module is used for detecting and capturing the motion. Raspberry Pi (Model B+), a credit card sized computer is used for processing the captured video. [2]

T. Balakrishna , R. Naga swetha proposed in their paper to describe the performance and functional characteristics of Arm based wireless sensor node in monitoring the parameters such as CO2, temperature, humidity and light around the pipeline structure. Their system is deployed to monitor any deviations in the system's parameters with the standard atmospheric values eventually alert the user even to a remote location. [3]

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**in the conference organized by Conference Info in association with Academic Science at Mahratta Chamber of Commerce Industries & Agriculture, Senapati Bapat Road, Pune, Maharashtra, India on 18th February 2018**

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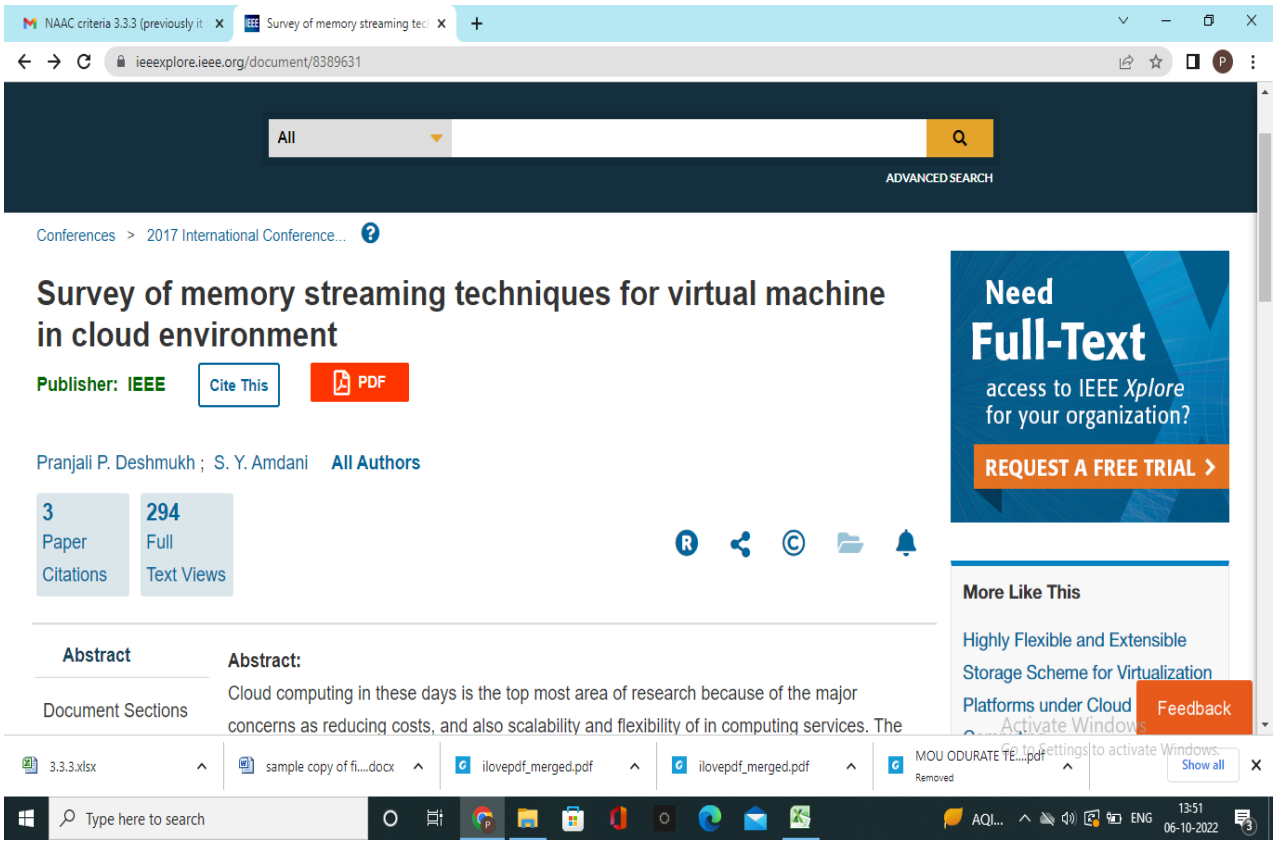
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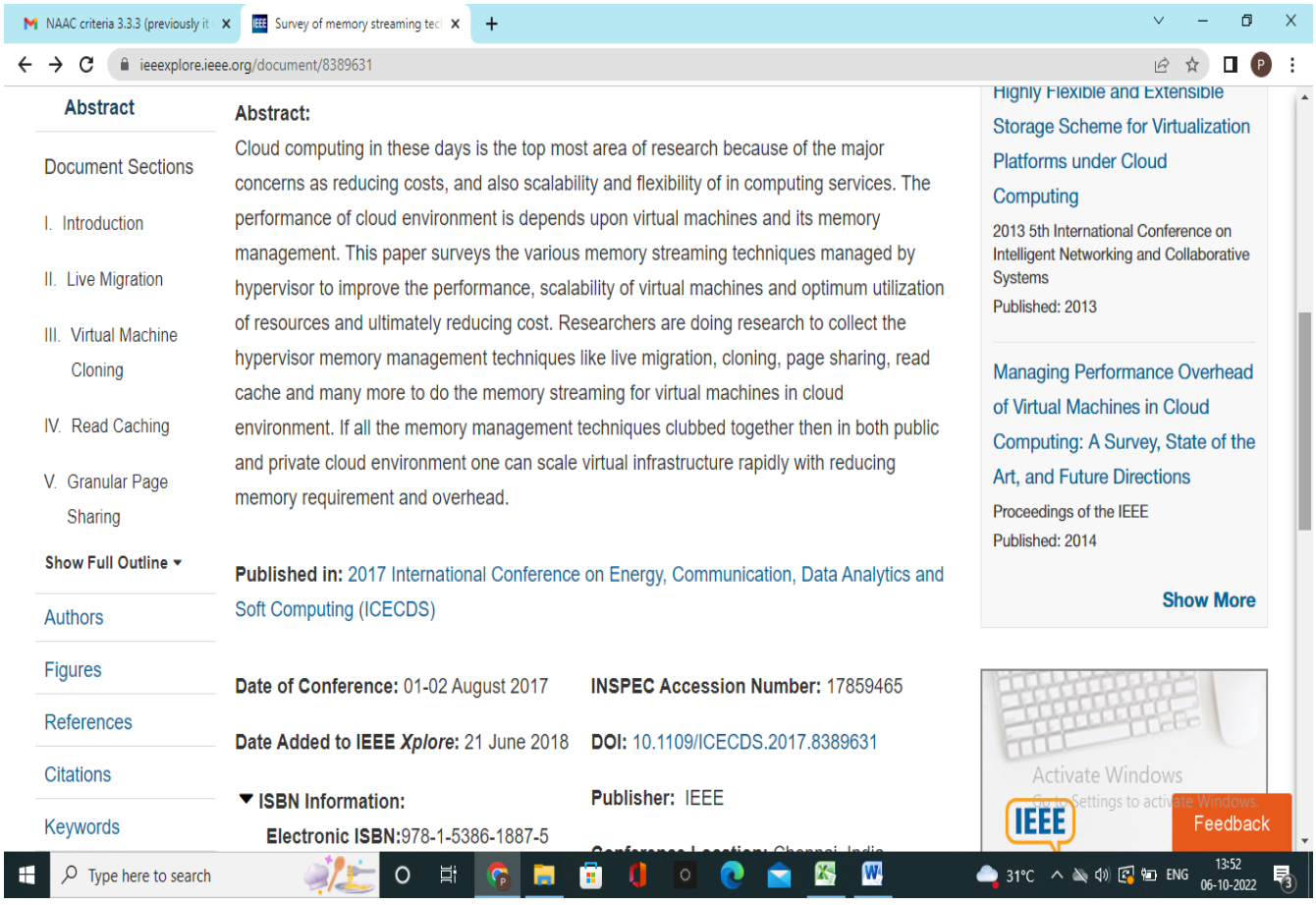
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Published in: 2017 International Conference on Energy, Communication, Data Analytics and Soft Computing (ICECDS)
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Date Added to IEEE Xplore: 21 June 2018
ISBN Information:
Electronic ISBN:978-1-5386-1887-5
INSPEC Accession Number: 17859465
DOI: 10.1109/ICECDS.2017.8389631
Publisher: IEEE
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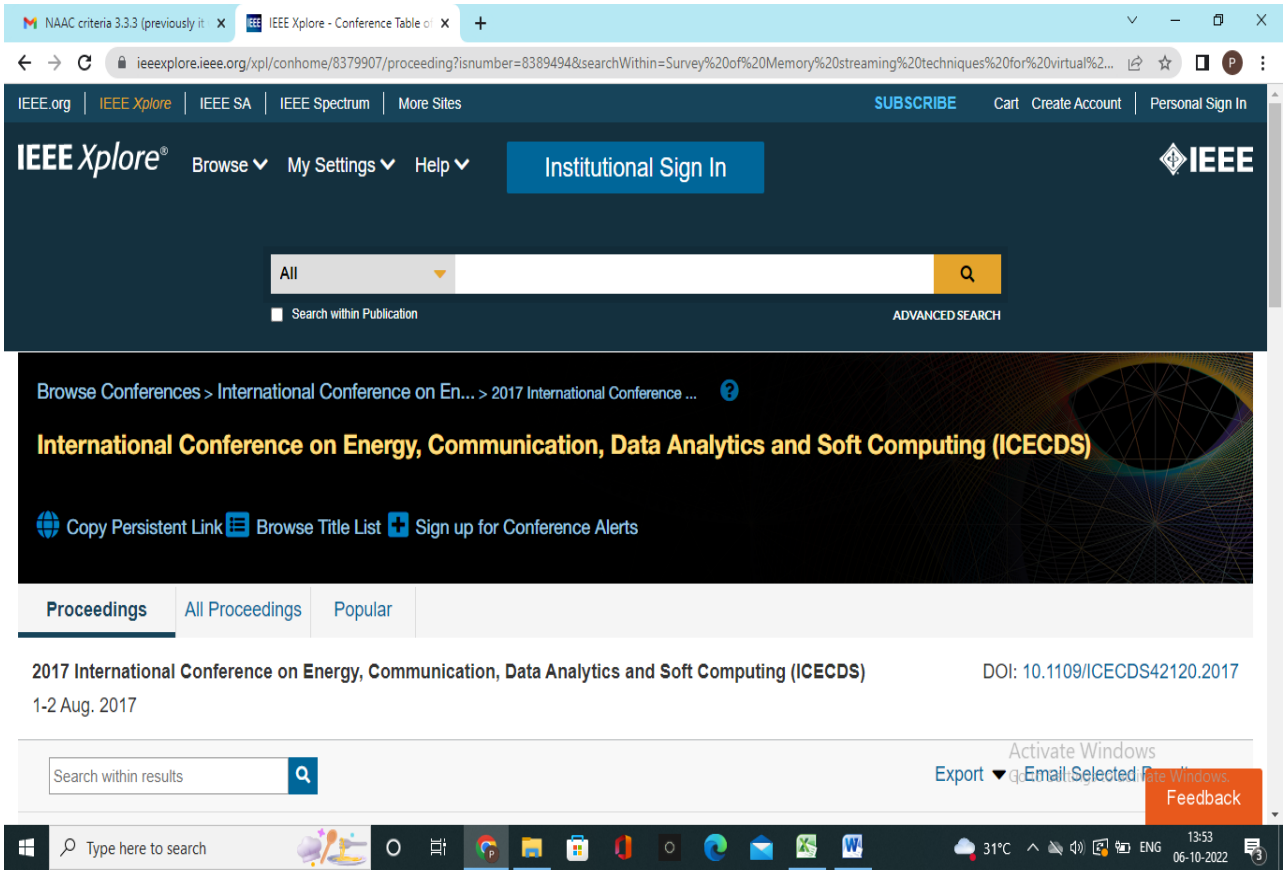
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# Internet of Things (IOT): An overview and its applications

**Publisher: IEEE**



P.V. Dudhe ; N.V. Kadam ; R. M. Hushangabade ; M. S. Deshmukh **All Authors**





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# Implementation of Security Algorithm and Achieving Energy Efficiency for Increasing Lifetime of Wireless Sensor Network

Harshal Misalkar, Umesh Nikam(✉), and Anup Burange(✉)

Amravati, India
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**Abstract.** The wireless sensor network is mainly needed for smart network functions or for emergency solutions where human interface is not possible. It is made of large number sensors for monitoring the physical and environmental situations e.g. Temperature, sound and motion etc. Main limitation of WSN is low power and minimum processing as well as they have to self organized as per the requirements of user. If WSN are installed in remote location, it become to much difficult to recharge the battery. In order to increase Lifetime of WSN sustainable consumption of power is required. This paper presents an approach for the cluster Head selection using basic information of node and objective functions. The proposed work minimizes the length of the packet by processing the data at the node. Moreover we emphasize on Node state switching mechanism which helps to increase the lifetime of WSN. With these things, the confidentiality, integrity and authentication of the communicated information becomes vital. In this article, we have focused on a lightweight encryption technique which encompasses faster encryption thereby, bringing down the computing time which increases the duration i.e. lifespan of wireless sensor network. The introduction of both symmetric and asymmetric cryptography in the two phase hybrid encryption algorithm, check marks the main aim of cryptography, i.e., Confidentiality, Integrity and Authenticity. Moreover hybrid encryption attempts to exploit the advantages of both symmetric and asymmetric encryption.

**Keywords:** Sensor nodes · Cluster heads · WSNs · Lifetime · Encryption Decryption

## 1 Introduction

Wireless sensor network is a field which contains large number of applications such as distributed system processing, embedded systems, wireless communications and have contributed a large revolution in Sensor Network (WSN) [7]. Wireless Sensor Network are a collection of small devices of low power, low cost, light weight sensor nodes working together to capture/monitor a particular event like temperature, pressure, movement etc [8]. Each sensor node sense the event, process it and communicate it with the other nodes present in same network [12]. Wireless sensor network are used in different application areas which includes home automation, healthcare, traffic control, industrial monitoring and many more [1]. A sensor node consists of power unit,


S. Verma et al. (Eds.): CNC 2018, CCIS 839, pp. 298–307, 2019.
https://doi.org/10.1007/978-981-13-2372-0_26

Shekhar Verma · Ranjeet Singh Tomar
Brijesh Kumar Chaurasia · Vrijendra Singh
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Communications in Computer and Information Science 839

# Communication, Networks and Computing

First International Conference, CNC 2018
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**Networks and Information Security**



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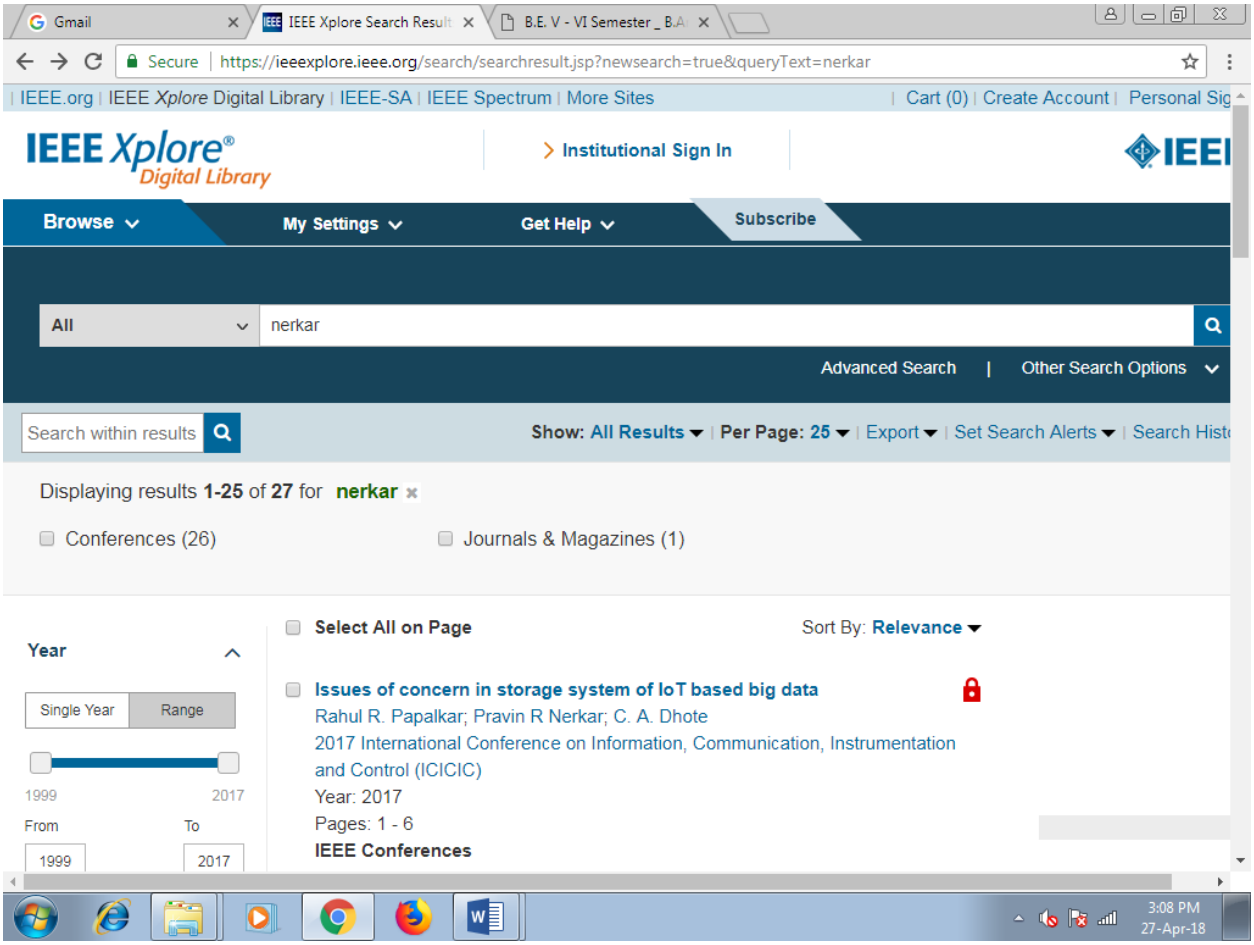
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through the presentation of the paper titled

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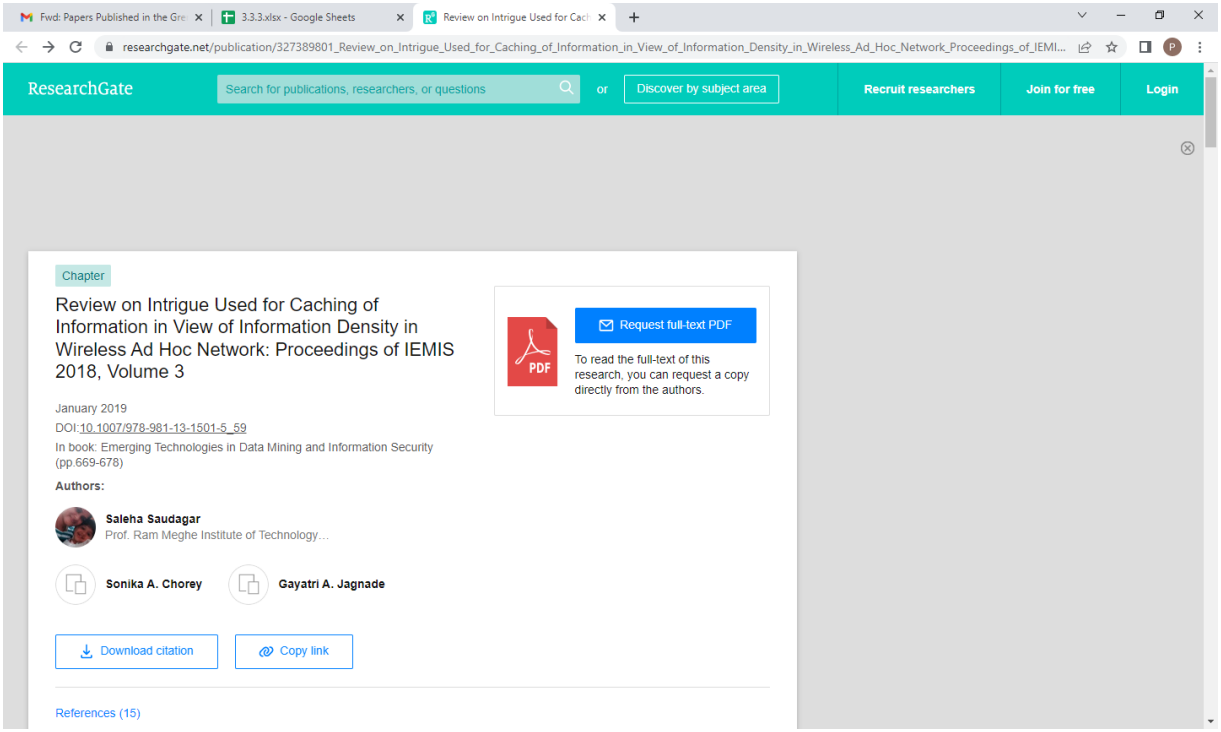
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In book: Emerging Technologies in Data Mining and Information Security (pp.669-678)
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Department of Information Technology, PRMIT&R, Badnera, India

*Published a paper in*

IJIACS, Volume 7, Issue 2, February 2018, ISSN 2347 – 8616

*Titled as*

"MIME Approach for Development of Cell Phone Audio/Video Text Services with Aural and Visual Representation "

UGC Approved Journal

Dr K. Agarwal
Editor, Academic Science

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**Smeet D. Thakur**

**Department of Information Technology, PRMIT&R, Badnera, India**

**Presented a paper Titled as**

**"MIME Approach for Development of Cell Phone Audio/Video Text Services with Aural and Visual Representation "**

**in the conference organized by Conference Info in association with Academic Science at Mahratta Chamber of Commerce Industries & Agriculture, Senapati Bapat Road, Pune, Maharashtra, India on 18th February 2018**

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## 2017 International Conference on

# Wireless Communications, Signal Processing and Networking (WiSPNET)

**22 – 24 March 2017**
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| **Date / Time** | 22 March 2017 (Wednesday) / 01:30 PM -- 02:30 PM |
| **Venue** | Hall 6 Microwave \& Optical Lab |
| **Chair(s)** | **S. Kiruhaveni**, *Assistant Professor Department of ECE SSN College of Engineering* |

# Performance analysis of various LMS adaptive filtering algorithms

Publisher: IEEE


Shrikant J. Honade ; Prashant V. Ingole ; Sanjay V. Dudul ; Nitin A. Shelke All Authors





**Abstract:**
Adaptive signal processing is extensively used as an area of research from few decades. There are various kinds of adaptive filtering algorithms are available in the literature which are used for different purposes. The work presented in this paper focused mainly on the performance analysis of various versions of most popular LMS (Least Mean Square) adaptive filtering algorithm when it is operated in unknown environment and deciding which algorithm has better performance in terms of minimum mean square error (MSE). From, the experimental results, it is observed that, when a same random input, random noise and desired response are considered for the different algorithms, with variable step size parameter and variable no. of filter taps, it very difficult to form a concrete decision on it, but in broader sense we can say that the performance of LMS sign sign algorithm for M = 2 and NLMS/Complex NLMS algorithm for higher value of M is found to be better in terms of mean square value of error when operated in an unknown situation.

**Published in:** 2017 International Conference on Wireless Communications, Signal Processing and Networking (WiSPNET)

**Date of Conference:** 22-24 March 2017

**INSPEC Accession Number:** 17598375

**Date Added to IEEE *Xplore*:** 22 February 2018

**DOI:** 10.1109/WiSPNET.2017.8299807

**ISBN Information:**

**Publisher:** IEEE

**Conference Location:** Chennai, India

## I. Introduction

The adaptive filtering algorithms are applied for various real time applications where the task of filtering is to be incorporated. There are two most popular adaptive filtering algo[illegible]ich is Least Mean Square (LMS) and Recursive Least Square (RLS) for real time applic[illegible]implified and understandable algorithm which basically works on Mean Square Error Criteria whereas RLS works on the principle of Least Squares Estimation approach.



Authors

# Extensive Approach for Strong Password Generation Using Content-Color Mechanism

**Publisher: IEEE**



Vijay B Gadicha ; A. S. Alvi **All Authors**





**Abstract:**

In Information security, access control is one of the most fundamental requirement. This can be achieved by assigning proper authentication credentials. In usual case we use the alphanumeric password strings to preserve the authentication. But it has several drawbacks, as all possible password strings which may be generated from keystrokes of the keyboard may be guessed or can be hacked by various attacks or some automated software tool may be used to crack the same. But here in this paper we are proposing a Content-Color method of Image fusion which will use multiple images to produce the password string. Once all these multiple images are fused, on the resultant fused image we will perform multi-share Visual key cryptography. Finally one such share can be selected randomly to generate the password string.

**Published in:** 2017 International Conference on Computing, Communication, Control and Automation (ICCUBEA)

# Extensive Approach for Strong Password Generation Using Content-Color Mechanism

Mr. Vijay B Gadicha
Research Scholar, Department of Computer Science & Engg P.R.Pote (Patil) College of Engineering & Management, Sant Gadge Baba Amravati University, Amravati
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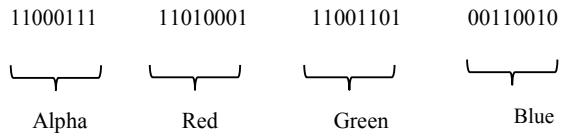
Dr. A.S.Alvi
Professor, Department of Computer Science & Engg Prof Ram Meghe Institute of Tech & Research Badnera Sant Gadge Baba Amravati University, Amravati
abrar_alvi@rediffmail.com

***Abstract: - In Information security, access control is one of the most fundamental requirement. This can be achieved by assigning proper authentication credentials. In usual case we use the alphanumeric password strings to preserve the authentication. But it has several drawbacks, as all possible password strings which may be generated from keystrokes of the keyboard may be guessed or can be hacked by various attacks or some automated software tool may be used to crack the same. But here in this paper we are proposing a Content-Color method of Image fusion which will use multiple images to produce the password string. Once all these multiple images are fused, on the resultant fused image we will perform multi-share Visual key cryptography. Finally one such share can be selected randomly to generate the password string.***

***Keywords: VC, Content- Color, Image Fusion, Fusion Rule.***

## I. INTRODUCTION

Visual cryptography is a cryptographic technique in which seen facts (Image, text, and video) gets encrypted in this form of way that the decryption may be finished with the resource of manner of the usage of the human seen device without useful aid of computer structures. Image is a multimedia hassle sensed via manner of human perception. Pixel is the smallest unit building a virtual image. Each pixel of a 32 bit digital color picture are divided into four additives, especially Alpha, Red, Green and Blue; every with 8 bits. Alpha element represents diploma of transparency. If all bits of Alpha trouble are zero, then the photograph is simply apparent. A 32 bit sample pixel is represented within the following determine way of structure [3]




Human sensory system acts as an OR operation. If two clear objects are stacked along, the ultimate stack of objects are going to be clear. dynamically any of them may be non-clear, the ultimate stack of objects are going to be non-transparent. In this paper we have proposed a mechanism that works on the content-color technique i.e. Contents of secondary image merge with contents of primary image so that to fused reflection can be obtained, later this fused image is utilize for applying visual cryptography, after applying VC fused image is converted to cryptic image concurrently divide into multiple shares of cryptic image with adding up wave file to produce resultant image. As we all are acquainted with Inet authentication, So initially the entire internet authentication became executed on the concept of textual content password. The Text password turned into the handiest device used for authentication system. But as time goes in this device reveals many bad components to apply it. As like this was now not trusted because it had generally chance of having hacked. Text password emerge as constantly tested the memory of the person, so it wasn't suitable tool. Then invention of biometric authentication gadget, QR codes and a pair of step cell verification invented to overtake the dangers of the textual content primarily based password [7].

## PRINCIPLE OF IMAGE FUSION:

The images of the equal modality taken at the identical time but from special locations or below distinctive situations are fused collectively to generate a single image with records content from each image. Such form of fusion is known as multi-view image fusion which is used in this look at. The goal of image fusion is to combine applicable statistics from those supply photos from special views right into a single photograph with the usage of the fusion regulations. The image because of the fusion includes most of the statistics from all the supply images. The programs fluctuate from one another in the usage of the fusion regulations.

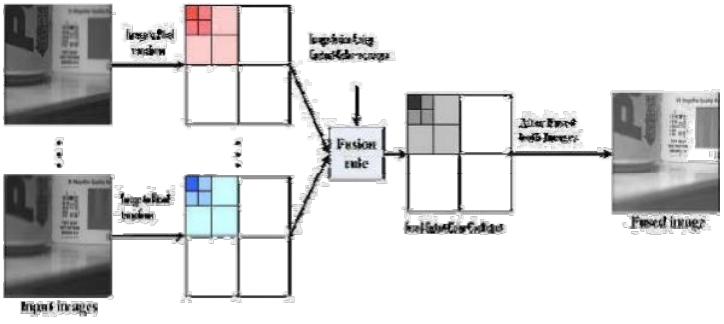



Fig 1: Image Fusion using Fusion Rules

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# Internet of Things (IOT): An overview and its applications

**Publisher: IEEE**

Cite This

PDF

P.V. Dudhe ; N.V. Kadam ; R. M. Hushangabade ; M. S. Deshmukh **All Authors**





**Abstract:**

We are entering in a beginning of a new of computing technology i.e. Internet of Things (IOT). IOT is a sort of "universal global neural network" in the cloud which connects various devices. The IOT is an intelligently connected devices and systems which be made up of smart machines interacting and communicating with other machines, environments, objects and infrastructures and the Radio Frequency Identification (RFID) and sensor network technologies will go up to meet this new challenge. As a result, a very large in size data are being generated, stored, and that data is being processed into useful actions that can "command and control" the things or devices to make our lives much easier and safer — and to reduce our influence on the environment. This paper gives an overview of Internet of Things (IOT) and brief information about IOT applications and challenges in various fields.

**Published in:** 2017 International Conference on Energy, Communication, Data Analytics and Soft Computing (ICECDS)

**Date of Conference:** 01-02 August 2017

**INSPEC Accession Number:** 17859538

**Date Added to IEEE *Xplore*:** 21 June 2018

**DOI:** 10.1109/ICECDS.2017.8389935

# *Internet of Things (IOT): An Overview and its Applications*

Prof.Ms.P.V.Dudhe[1], Prof.Ms.N.V.Kadam[2], Prof. R. M. Hushangabade[3], Prof. M. S. Deshmukh[4]
Assistant Professor, Dept. of Information Technology, PRMIT&R, Badnera, Amravati-Maharastra
preeti.dudhe@rediffmail.com, niketak39@gmail.com, rmhushangabade@mitra.ac.in, msdeshmukh@mitra.ac.in

***Abstract- We*** **are entering in a beginning of a new of computing technology i.e. Internet of Things (IOT). IOT is a sort of "universal global neural network" in the cloud which connects various devices. The IOT is an intelligently connected devices and systems which be made up of smart machines interacting and communicating with other machines, environments, objects and infrastructures and the Radio Frequency Identification (RFID) and sensor network technologies will go up to meet this new challenge. As a result, a very large in size data are being generated, stored, and that data is being processed into useful actions that can "command and control" the things or devices to make our lives much easier and safer—and to reduce our influence on the environment. This paper gives an overview of Internet of Things (IOT) and brief information about IOT applications and challenges in various fields.**

***Keywords: IOT application***

## I. INTRODUCTION

The phrase "Internet of Things" was invent by Kevin Ashton in 1999. He made at his place of employment, Proctor & Gamble. During his time there, Ashton came up with the idea of putting a RFID tag on each lipstick and having them communicate with a radio receiver. He put forward as fact that such data collection can be used to solve lots of problems in the real world. At the moment, a lot of connected devices can talk to internet and to our smart phones, and maybe even some similar products, but most of them can't talk to one another because of branded hardware and software with differing standards, languages and communication protocols. For most of the current smart household items, you'll need to use a different app or website to interface with the device. Unless they were especially designed by the manufacturer to work together. K. Rose in 2015 gave reasons that why IOT is possible. He said it is possible due to following reasons: Ubiquitous Connectivity, widespread adoption of IP–based networking, computing economics, advances in Data Analytics, rise of Cloud Computing so, the IOT is the conjunction of a variety of computing and connectivity trends that have been evolving for many decades.

## II. RELATED WORK OF IOT

Gipsa Alex, Benitta Varghese, Jezna G Jose, AlbyMol Abraham proposed work on modern healthcare IOT platform with an intelligent medicine box along with sensors for health monitoring and diagnosis the disease. In their proposed work an intelligent home-based medicine box with wireless connectivity with an android application (Health-IOT) is developed that helps patients and doctors to be in a more close communication. They proposed work has an intelligent medicine box that gives alerts for patients to take their medicine at the night time. The box is wirelessly connected to internet to make timely updates about medicines which will be notified in the android application with in patient's smart phone. Their system automatically gives alarm so that the patient takes the right medicine at the right time. [1]

A. Arun Rajaa, R. Naveedhab, G. Niranjanadevic and V. Roobini proposed in their paper that a security alert system which records a video when a motion is detected and uploads it to the external server and notifies the user via text message is reported. Their application can be used to view the remote activities and notifications can be received whenever the motion is detected. Internet of Things basically deals with transferring of useable data without involving human interferences. In their proposed work they used Raspberry Pi camera module is used for detecting and capturing the motion. Raspberry Pi (Model B+), a credit card sized computer is used for processing the captured video. [2]

T. Balakrishna , R. Naga swetha proposed in their paper to describe the performance and functional characteristics of Arm based wireless sensor node in monitoring the parameters such as CO2, temperature, humidity and light around the pipeline structure. Their system is deployed to monitor any deviations in the system's parameters with the standard atmospheric values eventually alert the user even to a remote location. [3]

Ammar khaleel,salman yussof mention the problem in Iraq like many student abduction cases are reported due to the lack of safety mechanisms and the lack of law enforcement. In Iraq many Educational institutions such as primary schools are

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## Mathematics

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ISSN 2349-638x Impact Factor 6.574 Special Issue No. 25
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# BIANCHI TYPE-VI$_0$ ANISOTROPIC DARK ENERGY MODELS WITH ELECTROMAGNETIC FIELD IN LYRA'S GEOMETRY

**S.D.Katore[1] & D.V. Kapse[2]**

[1] Department of Mathematics, SGBAU, Amravati 444 602, India.
[2] Department of Mathematics, PRMIT&R, Badnera-Amravati-444 701, India.
shivdas.katore@sgbau.ac.in, dipti.kapse@gmail.com

## ABSTRACT

*In this article we have studied the Bianchi type-VI$_0$ anisotropic dark energy cosmological models filled with electromagnetic field in Lyra geometry. The Einstein field equations have been solved exactly by using the special law of variation for Hubble's parameter proposed by Berman (1983). Some physical and kinematical properties of the models are also discussed.*

**Keywords.** *Bianchi type-VI$_0$, universe, anisotropic dark energy, Electromagnetic field, Lyra Geometry.*

## INTRODUCTION

The astronomical observation of SN Ia (Riess [1], Perlmutter [2]), galaxy redshift survey (Tegli [3]), cosmic microwave background radiation (CMBR) data (Caldwell [4], Huang [5]) convincingly suggest that the rate of expansion of our universe is positive, i.e. we live in an accelerating expanding universe. The most surprising and counterintuitive result coming from these observations is the fact that only ~ 4% of the total energy density of universe is in the form of baryonic matter, ~ 24% is non-baryonic matter and almost ~ 72% is completely unknown component with negative pressure. In the literature, the component with negative pressure is named as dark energy (DE) that produces repulsive force which gives rise to the current accelerating expansion of universe.

The Einstein [6] in 1916 proposed his theory of general relativity (GR) which provides a geometrical description of gravitation. Many physicists attempted to generalize the idea of geometrizing the gravitation to include a geometrical description of electromagnetism. One of the first attempts was made by Weyl [7] who proposed a more general theory by formulating a new kind of gauge theory involving metric tensor to geometrize gravitation and electromagnetism. But Weyl theory was criticized due to non-integrability of length of vector under parallel displacement.

Later, Lyra [8] suggested a modification of Riemannian geometry by introducing a gauge function into the structure less manifold which removes the non-integrability condition. This modified geometry is known as Lyra geometry. Subsequently, Sen [9] formulated a new scalar-tensor theory of gravitation and constructed an analogue of the Einstein's field equations based on Lyra geometry. He investigated that the static model with finite density in Lyra manifold is similar to the static model in Einstein's general relativity. Halford [10] has shown that the constant displacement vector field $\beta$ in Lyra geometry plays the role of cosmological constant $\Lambda$ in general relativity. He has also shown that the scalar-tensor treatment based in Lyra geometry predicts the same effects, within observational limits, as in Einstein's theory (Halford [11]). Katore et al. [12] studied the Einstein Rosen Bulk viscous cosmological model with bulk viscosity and zero-mass scalar field in Lyra's geometry. Ghate [13], Aasger and Ansari [14, 15], Das and Sarma. [16] studied the Bianchi type-V string cosmological model in Lyra's geometry with dark energy. SubbaRao [17] studied the Kantowski-Sachs cosmological model in Lyra's geometry in presence of bulk viscous string cosmological fluid and Sahu et al. [18] studied the Bianchi type-III cosmological model in Lyra's geometry.

There are many candidates of dark energy, among which magnetized (DE) is recently have been studied by many authors. The large scale magnetic fields can be detected by observing their effects on the CMB radiation. These fields enhance anisotropies in the CMB, since the expansion rate will be different depending on the directions of the field lines [19, 20]. Sharif and Zubair [21, 22], Katore et al. [23], Ghate and Santekke [24] studied some cosmological model in presence of magnetized anisotropic dark energy.

Sharif [22] has investigated the effect of electromagnetic field on the dynamics of Bianchi

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has actively participated in the International Conference on Recent Trends in Science & Technology held on 22nd & 23rd March, 2018 and has presented a research paper entitled BIANCHI TYPE-VIO ANISOTROPIC DARK ENERGY MODELS WITH ELECTROMAGNETIC FIELD IN LYRA'S GEOMETRY

during technical session of the conference.

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## Mathematics

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# BIANCHI TYPE I WITH STRANGE QUARK MATTER ATTACHED TO STRING CLOUD IN BIMETRIC THEORY

**V.S. Deshmukh[1*] & V.G. Mete[2]**

[1*]Department of Mathematics, P.R.M.I.T. & R., Badnera – Amravati (M.S.), India
[2] Department of Mathematics, R.D.I.K. & K.D. College, Badnera – Amravati (M.S.), India
vadeshmukh456@gmail.com

## ABSTRACT

*In this paper, we investigate bianchi type I cosmological model with strange quark matter attached to the string cloud in Rosen's(1973) bimetric theory. Some physical and geometrical properties are also discussed. It is shown that bianchi type I cosmological model do not exist in case of strange quark matter attached to the string cloud in bimetric theory. Hence only vacuum model can be obtained.*

***Keywords:*** *Bianchi type-I space time, quark matter, bimetric theory.*

## INRODUCTION

The bimetric theory proposed by Rosen [1] refers to a class of modified Einstein's theories of gravity, in which two metric tensors are used. These two metric tensors are the Riemannian metric tensor $g_{ij}$ and the background flat space-time metric tensor $f_{ij}$. The background flat space-time metric tensor $f_{ij}$ refers to inertial forces. The metric tensor $g_{ij}$ describes the Riemannian geometry of a curved space-time which plays the same role as given in the Einstein's general theory of relativity. The background metric tensor $f_{ij}$ refers to the geometry of empty (free from matter and radiation) universe and hence describes a space-time of constant curvature. This metric tensor has no direct physical significance but appears in the field equations. Moreover, the bimetric theory also satisfies the covariance and equivalence principles. The theory agrees with the present observational facts pertaining to general relativity.

The field equations of bimetric theory of gravitation proposed by Rosen [1] are

$$N_j^i - \frac{1}{2}N\delta_j^i = -8\Pi k T_j^i \qquad (1)$$

where

$$N_j^i = \frac{1}{2} f^{mn}\left(g^{ir} g_{rj,n}\right)_m$$

and

$N = N_j^i$ , $k = \sqrt{\frac{\kappa}{c}}$ together with $g = \det(g_{ij})$ and $f = \det(f_{ij})$

The vertical bar (|) indicates covariance differentiation with respect to $f_{ij}$ and $T_j^i$ is the energy–momentum tensor of the matter field.

Several aspects of bimetric theory of gravitation have been studied by various researchers.

Reddy et al [2] have established the non-existence of axially symmetric cosmological model with domain walls and cosmic string. Bali and Pradhan [3] have investigated Bianchi type-III string cosmological model with time-dependent bulk viscosity. Rao et al[4] have studied Bianchi type-I string cosmological models in bimetric theory of gravitation. Yavuz et al. [5] and Yilmaz [6,7] have studied 5-D Kaluza-Klein cosmological models with quark matter attached to the string cloud and domain walls. Sahoo et al.[8] have studied bianchi type cosmic string models coupled with Maxwell fields in this theory. Letelier [9] has solved Einstein field equations for a cloud of massive strings and obtained cosmological models in Bianchi type-I and Kantowaski-Sachs space-time. Itoh [10], Bodmar [11] have formed two ways for creation of strange quark matter. One is thequarkhadron phase transition in the early universe and another is the conversion of neutronstars into strange ones at ultrahigh density. In strong interaction theories it is supposed that breaking of physical vacuum takes place inside hadrons to form quark bag model. As a result vacuum energy densities inside and outside a hadron become essentially different, and the vacuum pressure on the bag wall equilibrates the pressure of quarks, thus stabilising the system. Sahoo [12] has discussed inhomogeneous plane symmetric string cosmological models in bimetric theory of gravitation. Katore and Rane [13] have

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Venue: S.S.S.K.R. Innani Mahavidyalaya Campus, Karanja (Lad)
Email: icrts2018@gmail.com Website : www.sssknmv.org.in Contact No.: 07256-222148/222171

Aayushi International Interdisciplinary Research Journal (AIIRJ)
ISSN 2349-638x Impact Factor 4.574 Special Issue No. 25
UGC Approved Sr No 64259 Website :- www.aiirjournal.com Email id:- aiirjpramod@gmail.com

# PLANE SYMMETRIC UNIVERSE WITH INTERACTING DARK MATTER AND HOLOGRAPHIC DARK ENERGY

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## ABSTRACT

*In this paper we present a plane symmetric universe filled with interacting dark matter and holographic dark energy. Solution of Einstein field equation is obtained by using condition that shear scalar is proportional to expansion scalar. The Statefinder diagnostic pair i.e. $\{r,s\}$ is adopted to distinguish our dark energy models from other existing dark energy models. The physical and geometrical nature of the model is also discussed.*

*Keywords: Plane symmetric universe, Interacting dark matter, Holographic dark energy, Statefinder parameters, Coincidence parameter*

## INTRODUCTION

Universe is expanding in an accelerating manner and this has been evidenced by recent observations of Type Ia Supernovae team (Riess et al.1998; Perlmutter et al. 1999), CMB (Bennett et al. 2003; Spergel et al 2003) and WMAP data (Tegmark et al. 2004a, 2004b). Two dark energy components known as CDM (the pressureless cold dark matter) and DE (dark energy with negative pressure) are importuned to explain these observations. The acceleration of the distance Type Ia Supernovae has been caused by DE, which contributes $\Omega_{DE} \sim 0.7$. The theoretical interpretation of the galactic rotation curve and large scale structure formation have been given by CDM (Cold dark matter), which provides $\Omega_{DE} \sim 0.7$. To satisfy the present value of dark energy, the cosmological constant ($\Lambda$) should be extremely fine-tuned. Which is the simplest component for dark energy having equation of state ate $\omega = -1$ and is favored by the present observational data. (Weinberg 1989; Carroll 2001; Peebles and Ratra 2003; Padmanabhan 2003)

Chaudhury 2002), phantom field (Caldwell 2002; Nojiri and Odinsstov 2003a, 2003b), the dark energy models including Chaplygin gas (Kamenshchik, et al. 2001; Bento et al. 2002), quintom (Elizalde, et al. 2004). Cosmic acceleration is a challenge for modern cosmology in split of these attempts. Early deceleration and late time acceleration with different dark energy cosmologies (isotropic) have been reviewed by Bamba et al. (2012). Among these f(R) gravity, f(R,T) gravity, f(T) gravity, Scalar field theory, holographic dark energy, coupled dark energy and $\Lambda CDM$ cosmological model representing the accelerating expansion with quintessence phantom nature in detail along with cosmography tests have been studied by them.

According to some basic quantum gravitational principle, the nature of dark energy can also be studied, for example holographic dark energy principle. According to this principle, the degree of freedom in a bounded system should be finite, and does not scale by its volume but with its boundary era (Susskind 1995). Cohen et al.(1999) discovered that for a system with ultra violate (short distance) cutoff scale $\Lambda$ and infrared (long distance) cutoff scale $L$ without decaying into, a

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 ISBN 978-81-930128-9-5

# "IMPACT OF INDIAN CULTURE, ETHOS AND PHILOSOPHY ON DEVELOPMENT OF FINANCIAL SECTOR IN INDIA"

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## Abstract

*The paper speaks about development of Indian financial sector, its market size also. It has covered investment taken place till financial year 2017-18. The Government initiatives and future prospects have been discussed.*

*ACKNOWLEDGMENT*

*The paper is desk research and secondary data and information collected for the same. The author is highly thankful to Reserve Bank of India, as mainly Media Report, Press Releases, IRDA, General Insurance Council, Union Budget 2017-18 published by RBI..*

## Financial Sector

India has a diversified financial sector undergoing rapid expansion. It is in terms of strong growth of existing financial services firms and new entities entering the market. The financial sector comprises commercial banks, insurance companies, non-banking financial companies, co-operatives, pension funds, mutual funds and other smaller financial entities. The banking regulator has allowed new entities such as payments banks to be created recently thereby adding to the types of entities operating in the sector. The financial sector in India is predominantly a banking sector with commercial banks. It is accounting for more than 64 per cent of the total assets held by the financial system.

The Government of India has introduced several reforms to liberalise, regulate and enhance financial sector. The Government and Reserve Bank of India (RBI) have taken various measures to facilitate easy access to finance for Micro, Small and Medium Enterprises. It includes launching Credit Guarantee Fund Scheme for Micro and Small Enterprises, issuing guideline to banks regarding collateral requirements and setting up a Micro Units Development and Refinance Agency (MUDRA). With a combination of both government and private sector, India is undoubtedly one of the world's most vibrant capital markets.

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