

Bandwidth Enhancement Of A Hybrid Minkowski Koch Fractal Bowtie Antenna Using Wilkinson Power Divider for X And Ku Band Applications

Dr.G. Ramalakshmi
 Department Of ECE
 Dr.L.B.College of Engineering
 Visakhapatnam, India
 gr.laxmi12@gmail.com

Abstract— This paper presents a Hybrid Minkowski Koch Fractal Bowtie antenna designed using FR-4 epoxy material with a dielectric constant value of 4.4 and thickness of 1.6mm. The size of the proposed antenna is $50 \times 50 \times 1.6 \text{ mm}^3$. A special feed network is being introduced in this paper named as Wilkinson power divide network, which divides the power equally into the two ports. The antenna design is explained using three design stages. In the initial stage of design a simple Bowtie antenna, fed with a simple strip line feed. Further modifications done on this stage-1 by employing the Minkowski and Koch fractal shapes on the bow tie arms which is mentioned as stage-2 of the proposed design. The performance of the stage-2 is further improved by employing a Wilkinson power driver in the stage-3. ANSYS HFSS tool is used to simulate the structures over the frequency sweep of (10-16GHz). The bandwidth and gain values are observed to be improved from stage-1 to stage-3. The proposed antenna possesses two bands with a BW of 2.0GHz in X, Ku band and 1.5GHz in Ku band. The gain values are improved to 10.98 dB, 5.4dB respectively for the two operating bands of stage-3 proposed antenna.

Keywords— Bowtie antenna, Koch Fractal, Minkowski fractal, Wilkinson divider

I. INTRODUCTION

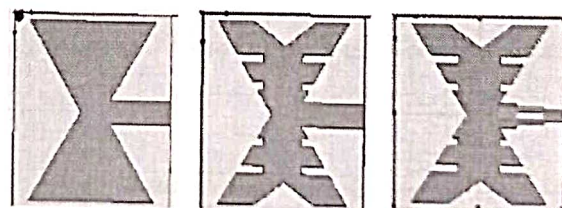
The modern wireless communication systems require antennas with wide operating frequency bands. It is being a complex task to design an antenna which serves several communication systems with multiple frequency bands as there should be a compromise between antenna's size, cost and frequency. In recent years the planar patch antennas are becoming the attractive source for antenna design engineers. The bandwidth enhancement of wide variety antennas are reported using slots of different shapes and fractals too [1-4]. However the conventional patch antennas resonates about half wave length which increases the size. Due to this reason Slot antennas are not suitable for many applications. On the other hand slot antennas possess limited bandwidth. A Bowtie antenna is the popular source for obtaining wideband characteristics [2][12]. A coaxial fed slotted Bowtie antenna designed for multiband applications like GSM, LTE and GPS applications [5]. The studies reveal that high data rates are required for video transmission services involved in satellite communication systems [6]. A multiband antenna is designed for X and Ku band

applications with a minimum value of return loss -22.75 dB [5]. A microstrip antenna with two parasitic patches is designed for obtaining wider Bandwidth [8]. A simple Bowtie antenna designed with slots for trainband applications [7]. Fractal geometry plays a vital role in antenna design due to its self similar structure and compactness[11] [13]. A Koch fractal antenna designed for Wi-Fi /WiMAX, WLAN with an impedance bandwidth of 9.8%. A Minkowski fractal antenna have been designed with a SRR on the ground plane leads two resonances with a gain of 1.52dB and 3.45dB respectively. Different feeding techniques like quarter wave feed, Coaxial feed, SIW feed mechanism and Wilkinson power divider are the most commonly used feeding mechanisms for antennas, mixer circuits, modulators and other communication systems to reduce the transmission loss [14].

In this paper a Bowtie antenna is proposed with both Koch and Minkowski Fractal slots and a Wilkinson Power divider network is designed to feed the proposed antenna.

II. DESIGN METHODOLOGY

In the view of performance enhancement the proposed Hybrid Minkowski Koch Fractal Bowtie antenna using Wilkinson power divider is designed in three consecutive stages named as stage-1, stage-2 and stage-3 shown in Fig.1. The basic antenna dimensions for all the 3 stages are shown in Table-1.



(a) Stage-1

(b) Stage-1

(c) Stage-3

Fig. 1. Stages of proposed Hybrid Minkowski Koch Fractal Bowtie antenna

Table:1 Geometrical parameters of proposed antenna

Parameter	Dimensions
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Performance Analysis of Dual Band Circularly Polarized Hybrid Dielectric Resonator Antenna

M. Sravani
 Department of EECE
 GITAM School of Technology
 GITAM Deemed to be University
 Visakhapatnam, INDIA
 smaliset@gitam.in

S. Neeraja
 Department of EECE
 GITAM School of Technology
 GITAM Deemed to be University
 Visakhapatnam, INDIA
 nsajja@gitam.edu

Abstract—The performance analysis of asymmetrical slot-based hybrid Dielectric Resonator Antenna (DRA) is presented in this paper. The volume of proposed DRA is 60mm x 60mm x 1mm and the DR material used is Alumina ceramic with dielectric constant of 9.8 various parameters studied. The proposed DRA possesses two resonances at 2.65GHz with a bandwidth of 900 MHz and 3.47 GHz with a bandwidth of 800 MHz. The Axial ratio is observed as 2.5dB at the bandwidth of 200MHz. The maximum gain obtained is 4.99 dBi. The suggested DRA meets the Wi-Max and basic 5G applications.

Keywords—Asymmetric Slot, Dual-band, Dielectric Resonator Antenna.

I. INTRODUCTION

Most of all the Circular Polarization antennas cannot be used in Ultra-Wide Band (UWB) applications due to their limited circular polarization (3-dB Axial Ratio) and bandwidth of impedance. The printed Circular Polarization Slot Antenna is appealing for wireless communications due to its broadband characteristics. Polarizations are considered orientation of electric fields, to minimize the power loss occurred due to multipath and Faraday effects. Circular Polarization antennas are selected to differentiate the line of sight signal from other reflected signals with reverse polarization. Asymmetrical feeding line is applied to achieve dual orthogonal modes to present Circular Polarization radiation [1-2].

Circular Polarization waves are normally excited by dual orthogonal linearly polarized element with a phase difference of 90° and similar amplitude. The practical outline for the antenna with Circular Polarization involves single-fed method with structural perturbation, structural rotation of numerous linearly polarized components and dual-fed technique. Bidirectional Circular Polarization (Bi-CP) is essential in different applications in modern wireless communications like radio frequency identification system, microcellular base station. Dielectric Resonator Antennas (DRAs) are in demand due to inherent advantages like light weight, low profile, wide bandwidth, absence of conduction losses in the resonator and high radiation efficiency. In applications like satellite and modern wireless communication, spacing of transmitter and receiver antenna is critical. In such cases, CP DRAs are chosen because they are insensitive to the alignment. DRAs are made up of various materials with wide range of permittivity [3-4].

Massive Multiple Input Multiple Output (MIMO) technology is required for achieving 5G, as it is able to give multi-gigabit per-second data throughput, multiplexing and through large-scale diversity. The pattern of CP DRAs is focused in the literature using single or multiple feeds. In contrary, with linearly polarized systems, CP systems are less

affected by the propagation effects and misalignment of antenna [5].

The flexibility of DRA in feeding techniques and shape provide to select the specific characteristics such as wideband, multiband, circular polarization, linearly polarization, monopole and omni directional radiation patterns. Antenna weight reduces when slots are initiated, polarization can be reversed by varying ratio of slot dimensions or orientation of slots. Initially, the dimensions of DRA can be adjusted to acquire the desired operating frequency, subsequently by changing the stub and slot lengths for impedance matching [6]. For most of the communication systems, it is suggested to operate in the CP mode, where the trajectory of the tip of the vector rotates about the propagation axis as a time function [7].

Broadside Circular Polarization DRA's can be excited by annular slots. E_ϕ and E_θ are same in amplitude and 90° phase difference then omnidirectional CP fields are achieved [8].

In this paper, Hybrid DRA performance analysis can be carried out by using asymmetric slot which is proposed for dual band applications.

II. PROPOSED HYBRID DRA CONFIGURATION

The proposed Asymmetrical slot-based Hybrid DRA has been introduced as a candidate for low-profile application. The rectangular DR has taken with relative permittivity, ϵ_r is 9.8 for Alumina ceramic material and it is placed on the C shaped feed line with a rectangular asymmetrical slot. Here the substrate is taken on FR4 Epoxy ($\epsilon_r = 4.4$). Substrate length, width and height can be considered as 60mm x 60mm x 1mm. The C shaped feed line is the combination of different stubs with dissimilar widths and lengths. To obtain the circular polarization, asymmetrical slots are considered in the proposed configuration of antenna which is shown in Fig. 1. The dimensions of design parameters of proposed Hybrid DRA are shown in Table I.

For the C-Shaped feed line along with asymmetrical rectangular slot plays the major role for the generation of orthogonal modes of TE_{x11}^* and TE_{y11}^* which are responsible to getting circular polarization from the proposed Hybrid DRA. Effective dielectric constant of the substrate and impedance is calculated by using equation (1) and (2) respectively

$$\epsilon_{eff} = \left(\frac{\epsilon_r+1}{2}\right) + \frac{\epsilon_r-1}{2} \left[\left(1 + 12 \frac{Sh}{Ws}\right)\right]^{-0.5} \quad (1)$$

$$Z = \frac{120\pi}{\sqrt{\epsilon_{eff}}} \left[\frac{Ws}{Sh} + 1.393 + 0.677 \ln\left(\frac{Ws}{Sh} + 1.444\right)\right]^{-1} \quad (2)$$

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Co-Editor

Dr. A.V. Sudhakara Reddy

Associate Professor, Malla Reddy Engineering College (Autonomous),
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**AkiNik Publications
New Delhi**

Published By: AkiNik Publications

AkiNik Publications

169, C-11, Sector - 3,

Rohini, Delhi-110085, India

Toll Free (India) – 18001234070

Phone No. – 9711224068, 9911215212

Email – akinikbooks@gmail.com

Chief Editor: Dr. G. Durgadevi

Co-Editor: Dr. A.V. Sudhakara Reddy

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Publications Year: 2022

Pages: 112

ISBN:

Book DOI: <https://doi.org/>

Price: ₹ 653/-

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Implementation of IT-SMC for Fault Rectification in a Grid-Connected PV System for Maximum Power Point Tracking

Dr. Ch. Varaha Narasimha Raja, M. Vijaya Kumari, R. Jayank Maanas, M. Bhavan, Dr. G. Anand and Dr. I.E. Sanyasi Naidu

Abstract

PV systems are becoming increasingly popular as a sustainable energy source. However, in the control community, establishing control systems that enable maximum power extraction for grid-connected PV arrays while adequately mitigating grid faults is still a difficult task. An integral terminal sliding mode control (ITSMC) method for grid-connected PV arrays is proposed in this study. The method tries to maximise power extraction while reducing the effects of irradiance changes and bulk voltage oscillations. The proposed approach's favourable aspects include effective voltage drop removal and maximum power point tracking. A simulation analysis comprising numerous operating circumstances and various malfunctioning situations was used to examine the efficiency of the proposed approach. In this paper the fault will be mitigated by controller and the maximum power extracted by irradiance fluctuations and oscillations in the voltage. Elimination of fluctuations, disturbances and maximum power can be tracked among the proposed approach by considering various scenarios based on the concepts of Irradiance and temperature.

Keywords: Photovoltaic, MPPT, integral terminal sliding mode control, electric power quality

1. Introduction

Photovoltaic plants are becoming a more popular source of energy. While individual PV panels are quite robust still failures tend to happen Due to arrangement of interconnection of PV panels in an array and if failure of single panel can impact the whole array ^[1]. The PV are known for efficiency of up to 30% which provides small output power compared to the input it takes. To maximize the efficiency and to reduce installation cost MPPT

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VOLUME - 5

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Dr. A.V. Sudhakara Reddy

Associate Professor, Malla Reddy Engineering College (Autonomous),
Maisammaguda, Hyderabad, Telangana, India

**AkiNik Publications
New Delhi**

Published By: AkiNik Publications

AkiNik Publications

169, C-11, Sector - 3,

Rohini, Delhi-110085, India

Toll Free (India) – 18001234070

Phone No. – 9711224068, 9911215212

Email – akunikbooks@gmail.com

Chief Editor: Dr. G. Durgadevi

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Publications Year: 2022

Pages: 112

ISBN:

Book DOI: <https://doi.org/>

Price: ₹ 653/-

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Chapter - 2

A Comparative Study in the Design of an Ann Based Controller

Dr. Ch. Varaha Narasimha Raja and Dr. G. Anand

Abstract

The power system stabilizer is based on artificial neural networks and is designed to cope with changing operational circumstances in real-world applications. The parameters of a conventional or supplementary power system stabilizer are generated with changing operating circumstances using a Multi-layer feed-forward with back propagation (MLP) Artificial neural network in this paper. As a result, the power system stabilizer's utility becomes more stable. Many researchers included this artificial neural network in their designs; however, information on network creation functions, hidden layer size, non-linear (active) functions employed in output and hidden layers, and back propagation training functions were not studied in detail. In this paper a study is carried out on these aspects to explore the effect of these aspects on the functionality of power system stabilizers.

Keywords: Artificial neural network, Multi-layer back propagation, Single Machine Infinite Bus, Eigen value Placement technique

a) Introduction

An Artificial Neural Network (ANN) is an information ^[8] processing paradigm that is inspired by the way biological nervous systems, such as the brain, process information. The key element of this paradigm is the novel structure of the information processing system. It is composed of a large number of highly interconnected processing elements (neurons) working in unison to solve specific problems. ANNs, like people, learn by example. An ANN is configured for a specific application, such as pattern recognition or data classification, through a learning process. Learning in biological systems involves adjustments to the synaptic connections that exist between the neurons. This is true of ANNs as well. Two reasons are put forward for using ANN. First, since an ANN is based on parallel processing, it can provide extremely fast processing facility. The second reason for the high level of interest is the ability of ANN to realize complicated nonlinear mapping from the input space to the output space.

Fuzzy System Based Load Frequency Control of Hydro-Thermal -Thermal Interconnected Power System

Dr. Anand Gondesi

Assistant Professor

Department of EEE

Dr. Lankapalli Bullayya College of Engineering

&

Dr. Varaha Narasimha Raja. Ch

Assistant Professor

Department of EEE

Anil Neerukonda Institute of Technology & Sciences (A)

Visakhapatnam, Andhra Pradesh, India

Abstract

Today, in power systems the Load Frequency Control (LFC) problem plays a vital role in an interconnected power system, wherein it maintains the system frequency and tie line flow at their scheduled values during normal period. It is due to frequency of power system, which changes over time with respect to continuous load variation. The present chapter proposes a new methodology to study the Load Frequency Control (LFC) problem of a three area inter-connected system using R Fuzzy system (FS) approach. Moreover, this technique is applied to control the systems which include three areas considering a non-linearity Generation Rate constraint (GRC) having two steam turbines and one hydro-turbine tied together. The main advantage of this controller is its high insensitivity to large load changes and plant parameter variations even in the presence of non-linearity. Furthermore, it is tested on a three-area power system to illustrate its robust performance. The results obtained by using Rule Based Fuzzy PID controller explicitly show that the performance of this proposed controller is superior to conventional controller in terms of several parameters like overshoot, settling time and robustness.

Keywords: Load Frequency Control, Reliability, Fuzzy Controller, Power System.

Introduction

Today, due to rise in the demand for electric power, electric power system is becoming more and more complicated. The power system operates in normal state, which is characterized by constant frequency and voltage profile with certain system reliability. Therefore, the supply of electric power with stability and high

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Author's Name:
Dr. M. Vamsi Krishna
Dr.K.Anuradha



Published by:



BH INTERNATIONAL PUBLICATIONS, Hyderabad.

Publisher's Address:

302, Ranga Sai Nilayam, Addagutta, KPHB, Hyderabad - 500072,
Telangana, India. editor@bhpublications.in, www.bhpublications.in

Printer Details:

BH INTERNATIONAL PUBLICATIONS, Hyderabad.

Edition Detail : 1

ISBN : 978-81-949705-9-0

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Network Security



Dr. M. Vamsi Krishna
M.Sc., M.Tech.,PhD.,

Dr. M. Vamsi Krishna MCA, M.Tech, Ph.D, MISTE is working as an Associate Professor in the department of Computer Science and Engineering in Aditya Engineering College, Surampalem, India. He is having a total of 20 Years of Experience in this teaching profession. He obtained his Masters in Computer Applications from Indira Gandhi Open University (IGNOU), New Delhi in 2004, Master of Engineering & Technology (M.Tech) Degree in Computer Science and Engineering with Specialization in Artificial Intelligence and Robotics, from Andhra University, in 2008. He obtained his PhD in Computer Science and Engineering from Centurion University, Odisha in 2016. He is having Supervisorship in the Faculty of Computer Science and Engineering in Centurion University, Odisha for guiding Ph.D candidate. 10 Research scholars have been awarded Ph.D under his supervision. A total of 5 more scholars are pursuing Research under his supervision. He has more than 50 articles in Scopus/SCI indexed Journals/Conferences to his credit. His Research Interest includes Machine Learning, Deep Learning and Data Science. His roles include as Reviewer of reputed journals globally like Springer, Elsevier, Taylor & Francis, IGI Global. He is also an Editor – in – Chief for one of the Journals which is listed under UGC Care Group – II.



Dr. K. Anuradha
M.Sc., M.Tech.,PhD

Dr. K. Anuradha has obtained M.Sc in Applied Statistics from SVU Tirupathi in 1999. She obtained her Ph.D in Statistics in 2009 from Sri Venkateswara University Tirupathi. She obtained her Master of Technology in Computer Science and Engineering From Andhra University College of Engineering, Visakhapatnam in 2010.

Dr. K.Anuradha has almost 20 years of Experience in Teaching and Research. Dr. K.Anuradha has started teaching in 2000at N.P.S.GovernmentDegreeCollegeforWomen,Chittoor and she joined in Dr.L.Bullayya group of colleges in 2006. Presently working as Assistant Professor at Dr.L.Bullayya college of Engineering, Visakhapatnam,Andhra Pradesh, India.

Dr. K.Anuradha published 1 patent and published almost 25 research articles in different national and International Journals and conferences.Dr. K.Anuradha is pursuing her Ph.D in Computer Science and Engineering with Network Security is her field of interest.Dr. K.Anuradha research interest includes computer application such as neural networks, machine learning, sentimental analysis and speech recognition.



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Nomenclature of Diverse Feature Selection in Sentiment Analysis using Machine Learning Techniques: A Comparative Study

Dr.K.Anuradha¹
Research Scholar,
Centurion University of
Technology & Management,
Odisha

Dr.M.Vamsi Krishna²
InPrincipal,
Chaitastitute of Science &
Technology,
Kakinada

Dr.Banitamani Mallik³
Associate Professor,
Centurion University of
Technology & Management,
Odisha

Abstract - Sentiment analysis has gained in importance in recent decades as the amount of digital text documents has increased in tandem with the advent of IT. The goal of sentiment analysis in the field of natural language processing (NLP) is to extract positive or negative polarity from social media text. Feature Selection (FS) is important based on critical analysis and efficiently identifying the necessary information for better segregation. The purpose of this research is to assess and compare the performance of several sentiment analysis FS techniques. Several Feature Selection (FS) procedures are studied in order to select the optimal Selection of features from a feature set. Various Machine Learning techniques such as Decision Tree (DT), Naive Bayes (NB), Support Vector Machines (SVM), K-Nearest Neighbour (KNN) and Logistic Regression (LR) are used to train the selected features on the Online Movie Reviews Dataset. According to the findings of the experiments, the proposed system decreases data dimensionality, picks efficient aspects for better analysis

Keywords: Sentiment Analysis (SA); Machine Learning; Feature Selection (FS); Online Reviews; Text Classification;

I. INTRODUCTION

Text mining is becoming more important as the volume of digitised text documents increases due to rapid improvements in information technology. SA, sometimes called as opinion mining, is a text categorization method that involves classifying emotive messages as positive or negative. Document-level, sentence-level, and aspect-level SA are the three granularities that can be applied. [1]. To retrieve data from this textual content, text mining techniques are used [2]. SA is used to collect subjective knowledge and opinion from internet material, codify it and evaluate it for specific applications [3]. Feature selection is a technique for improving the analysis of machine learning algorithms and implementations by clearing irrelevant data set [4].

The FS process [4] can be used to overcome this problem by tackling the the efficiency of ML techniques [5]. Because the feature set used to accomplish classification is the most important component of data for a learning algorithm, identifying the best set that accurately reflects the entire data set is vital. Thus, FS must focus on variables that accurately reflect input data while considering irrelevant, redundant data and guaranteeing good classifier performance. This is still a topic of discussion among scientists [6].

Traditional FS methodologies are employed in this research. Various ML approaches, such as K-Nearest Neighbour (KNN), Naive Bayes (NB), Decision Tree (DT), Support Vector Machines (SVM) and Logistic Regression

(LR) are employed to investigate the classification evaluation of the FS approaches. This study used an online movie review dataset collected from Pang and Lee [7], which comprised movie reviews from the Internet Movie Database (IMDb).

II. RELATED WORKS

Sentiment classification is becoming increasingly important as the use of digital text data expands [1]. The following table summarises all the studies in the and investigations in public's feelings, opinions, attitudes, and emotions about diverse components such as subjects, products or services, people, or organisations.

Author	Objective	Method	Outcome
Tang, H., et al. (2009)[8]	Sentiment Detection of Reviews	Survey of all methods	Multi-parametric output of document, sentence, and feature level
Singh N. K., et al. (2020) [9]	SA in Social Media	Comparative analysis of various methods	Processing a large text takes significant time and space
Kim K. (2018) [10]	Improvement by Feature Weighting	Semi-supervised dimensionality reduction	Social media data suffers from the curse of dimension
Xu F., et al. (2020) [11]	E-Commerce Product Review SA	NB Continuous Learning Method	Dimension reduction resulting in reducing computing costs
Li B., et al. (2007) [12]	Blog clustering using author comments	FS Approach	Cut processing costs and remove irrelevant information
Yousefpour . A et al. (2017) [13]	Ordinal & Frequency based Integration	FS Approach	High-quality minimum feature subset can be obtained by SA
Liu Y., et al. (2017) [14]	Experimental Multi Class Sentiment Classification	FS Approach and ML	Dimension reduction in sentiment classification using particle swarm optimisation (PSO)
Akthar, M.S., et al. (2017) [15]	Feature Selection & ensemble construction	Two-step method for aspect based SA	GR and SVM fared the best.

Prediction of Chronic Kidney Disease with Various Machine Learning Techniques: A Comparative Study



K. Swathi  and G. Vamsi Krishna

Abstract Chronic kidney disease is one of the serious health care issues faced by people across the globe. It is majorly resulting in kidney failure or sometimes leads to cardiovascular disease, or sometimes leads to the death of a person. So, the detection of this disease in the early stages plays a significant role which helps in treating and controlling the disease. In this paper, various machine learning algorithms are demonstrated that disclose and extract hidden information from clinical and laboratory patient data, which can aid clinicians in maximizing accuracy for illness severity stage assessment. Several machine learning algorithms like KNN, RF, AdaBoost, gradient boost, and a voting classifier were considered, and a comparative study was done. These comparisons were made by taking the CKD dataset available in the UCI repository. The models employed for the study provide much accuracy, greater than prior research, suggesting that they are more trustworthy than the previous models.

Keywords Classification · Machine learning · Chronic kidney disease

1 Introduction

Chronic kidney disease (CKD) is a long-lasting disease that affects the kidney that may further lead to end-stage renal failure, which will stop the entire kidney from functioning and not be able to perform the waste removal or excess water or any chemicals from your body may cause disparity [1]. The renal failure might expose cardiac arrest and various artery failures and lead to death. CKD affects various people worldwide and ranges between 7 and 15%. Globally, in 2007, around 1.21

K. Swathi (✉)

Department of Computer Science and Engineering, Vignan's Institute of Information Technology (A), Visakhapatnam, AP, India
e-mail: swathi.kalam@gmail.com

G. Vamsi Krishna

Department of Computer Science and Engineering, Dr. Lankapalli Bullayya College of Engineering, Visakhapatnam, AP, India

QCM Sensor-Based Alcohol Classification Using Ensembled Stacking Model



Pemmada Suresh Kumar, Rajyalaxmi Pedada, Janmenjoy Nayak, H. S. Behera, G. M. Sai Pratyusha, and Vanaja Velugula

Abstract Alcohol consumption is the global yoke of injury and disease attributable as per the early study. The excessive intake of alcohol is coupled with unconstructive consequences and jeopardizing future prospects. This paper presents an ensemble model made of an array of five chemical compounds of quartz crystal microbalance (QCM) sensors to find the corresponding compositions of a gas mixture. This study makes use of QCM sensor responses to determine the gas compositions. These physical device sensors are used to sense the resonance frequency change of gas sensors by classifying the chemical compounds and recognizing their harmful effects. The main focus of the study is to determine the reaction of QCM sensors to five different alcohols, such as 1-octanol, 1-propanol, 2-butanol, 2-propanol, and 1-isobutanol, and to determine the effective sensor type in the classification of these compounds. The experiment is conducted to classify and identify the constituent component amount through an ensemble classifier to progress the efficiency of the QCM sensors. The results of 125 different scenarios illustrated that various alcohols could be classified effectively using a stacking classifier from the QCM sensor data.

Keywords QCM sensor · Alcohol · Machine learning · Stacking · Ensemble learning

P. Suresh Kumar

Department of Computer Science and Engineering, Aditya Institute of Technology and Management (AITAM), Tekkali, India

H. S. Behera

Department of Information Technology, Veer Surendra Sai University of Technology, Burla 768018, India

R. Pedada · G. M. Sai Pratyusha · V. Velugula

Department of Computer Science and Engineering, Dr. Lankapalli Bullayya College of Engineering, Visakhapatnam 530013, India

J. Nayak (✉)

Department of Computer Science, Maharaja Sriram Chandra BhanjaDeo (MSCB) University, Baripada, Odisha 757003, India

Identification of Heart Failure in Early Stages Using SMOTE-Integrated AdaBoost Framework



B. Kameswara Rao, U. D. Prasan, Mokka. Jagannadha Rao, Rajyalaxmi Pedada, and Pemmada Suresh Kumar

Abstract Heart disease, often known as Cardiovascular disease is one of the most lethal yet silent killers of humans, resulting in a rise in the mortality rate of sufferers per year. Every year, it kills nearly 17 million people worldwide in myocardial infarctions and cardiac attacks. Heart failure (HF) occurs when the heart cannot produce enough blood to satisfy the body's needs. On the other hand, current risk prediction techniques are moderately effective because statistical analytic approaches fail to capture prognostic information in big data sets with multi-dimensional interactions. The research investigates the proposed AdaBoost ensemble technique with Synthetic Minority Oversampling Technique (SMOTE) on the medical reports of 299 heart failure patients obtained during their follow-up period at Faisalabad Institute of Cardiology (Punjab) and Allied Hospital Faisalabad (Pakistan), during April–December, 2015. The proposed approach builds on ensemble learning techniques such as adaptive boosting. It provides a decision support mechanism for medical practitioners to identify and forecast heart diseases in humans based on risk factors for heart disease. The efficacy of the proposed method validates by comparing various machine learning algorithms, and it is evident that the proposed method performs better with an accuracy of 96.34.

Keywords Heart failure prediction · SMOTE · Adaptive boosting · Machine learning · Ensemble learning

B. Kameswara Rao · U. D. Prasan · P. S. Kumar (✉)
Department of Computer Science and Engineering, Aditya Institute of Technology and Management (AITAM), Tekkali, India

Mokka. Jagannadha Rao
Department of Geology, Andhra University, Visakhapatnam, AP, India

R. Pedada
Department of Computer Science and Engineering, Dr Lankapalli Bullayya College of Engineering, Visakhapatnam 530013, India

A Fog-Based Intelligent Secured IoMT Framework for Early Diabetes Prediction



Dukka Karun Kumar Reddy, H. S. Behera, Janmenjoy Nayak,
Ashanta Ranjan Routray, Pemmada Suresh Kumar, and Uttam Ghosh 

1 Introduction

One of the chronic metabolic disorders swiftly mounting health catastrophes of this period, irrespective to the context of the ethnic, racial, and geographic situation, is diabetes mellitus. The metabolic disease is characterized by exalted levels of blood sugar (or blood glucose), which leads over time to serious mutilation to the blood vessels, nerves, eyes, heart, and kidneys. In general, diabetes is categorized into three types, called type 1, type 2, and gestational diabetes. Type 1 (is also described as insulin-dependent) occurs where the pancreas produces no insulin or little by itself due to the pancreatic beta cells which have been attacked by the immune system mistakenly. The most common type 1 diabetes symptoms are sudden weight loss, polyphagia, polydipsia, and polyuria. The type 2 diabetes develops when

D. K. K. Reddy

Department of CSE, Dr. Lankapalli Bullayya College of Engineering, Visakhapatnam, AP, India

H. S. Behera

Department of Information Technology, Veer Surendra Sai University of Technology, Burla, India

J. Nayak (✉)

Department of Computer Science and Engineering, Aditya Institute of Technology and Management (AITAM), Kotturu, AP, India

A. R. Routray

Department of I & CT, Fakir Mohan University, Balasore, Odisha, India

P. S. Kumar

Department of CSE, Aditya Institute of Technology and Management (AITAM), Kotturu, AP, India

U. Ghosh

Department of Electrical Engineering and Computer Science, Vanderbilt University, Nashville, TN, USA

e-mail: uttam.ghosh@vanderbilt.edu

Fuzzy Perceptron Learning for Non-Linearly Separable Patterns

Raja Kishor Duggirala

Abstract

Perceptron learning has its wide applications in identifying interesting patterns in the large data repositories. While iterating through their learning process perceptrons update the weights, which are associated with the input data objects or data vectors. Though perceptrons exhibit their robustness in learning about interesting patterns, they perform well in identifying the linearly separable patterns only. In the real world, however, we can find overlapping patterns, where objects may associate with multiple patterns. In such situations, a clear-cut identification of patterns is not possible in a linearly separable manner. On the other hand, fuzzy-based learning has its wide applications in identifying non-linearly separable patterns. The present work attempts to experiment with the algorithms for fuzzy perceptron learning, where perceptron learning and fuzzy-based learning techniques are implemented in an interfusion manner.

Keywords: perceptron learning, fuzzy-based learning, fuzzy C-means, interfusion, weighted distances, pattern recognition, sum of squared errors, clustering fitness

1. Introduction

A learning system could be thought as a collection of methods that are brought together in order to create an environment to facilitate different learning processes. The learning systems will provide various types of learning resources and descriptions of procedures for obtaining quality results [1]. The learning systems find their applications in the areas like, image recognition, speech recognition, traffic prediction, e-mail spam and malware filtering, automatic language translation, medical diagnosis, etc. [2].

As the data increases in large volumes in the digital repositories, it has become essential to look for alternative approaches to yield better results in extracting interesting patterns from the repositories. Intelligent learning systems are gaining attention from a wide range of researchers in the recent years in extracting patterns from the data repositories. The learning systems have three kinds of approaches. They are supervised, unsupervised, and semi-supervised learning approaches [3].

The concept of perceptron learning plays a critical role in pattern recognition, which has become a challenging problem in the data science research. In the recent years, perceptron learning algorithms are exhibiting their robust performance in identifying interesting patterns from large data repositories when compared to the traditional supervised learning approaches [4]. A perceptron can be thought as a computational prototype of a neuron. As a supervised learning approach, perceptron

Implementation of a Smart Intelligent Digital Home Lightning Control System

B.D. Sireesha¹ & K. Anuradha²

¹Department of ECE, SVCET, Chittoor, A.P., India.

²Department of CSE, L.B.College of Engineering, Vishakhapatnam, AP, India.

Abstract: This paper introduces the digital home lighting control system (DHLS), with a low cost Smart building power management Architecture to suit diverse Indian market. A review on Smart Home automation research and market has been presented. Further low cost energy meters to update the customers about the billing and usage the system is developed through ARM micro-processor and wireless communication technology and network technology is proposed. In this proposed system, a more efficient home energy management system is introduced to reduce power consumption in home. The room has power outlets, a light, and ZigBee transceivers. The ZigBee hubs in each room communicate with the home server and report the power consumption information to the home server. According to the control commands, the home can be controlled automatically from the home server. Load sharing information can also be displayed on the home server.

Keywords: DHLS, ARMProcessor, Zigbee Wireless Communication, Home Server, Load Sharing.

I. INTRODUCTION

In India, Smart Power management/ Home automation is perceived to be a necessary. Thus for serving over 1.2 billion public low cost oriented should be the main aim. The entire system cost for smart power management faces a barrier for the large scale deployment by distribution utilities in India. In order to avoid this, in the Indian Smart Grid Task Force is working on developing a low-cost basic smart Power Management meter. This paper presents one such effort and paves a way for further research. As more and more home appliances and consumer electronics are deployed, power consumption in home area tends to grow. Although advanced integrated circuit (IC)chipset and hardware technology enhances the power efficiency of home appliances and consumer electronics, the current energy crisis and green house effect require more efficient energy management in all areas. In this proposed system, we have designed architecture with effective power management in the home section, which can be controlled by a home server.

In this paper, we propose more efficient DHLS based on ZigBee communication and ARM processor. To implement the automatic standby power cut-off outlet with power measurement function. The home server is designed to collect

the information from the control section and at the same time the consumed power will be displayed in the control section itself. In this architecture, we proposed a clear management system, which is having a priority based control system. This is nothing but, when the server sends the command signal then the unit will go to the particular priority mode. So that wastage of power will be prevented. This in turns create an automatic power reduction. In the fig.1, the proposed architecture of DHLS is shown.

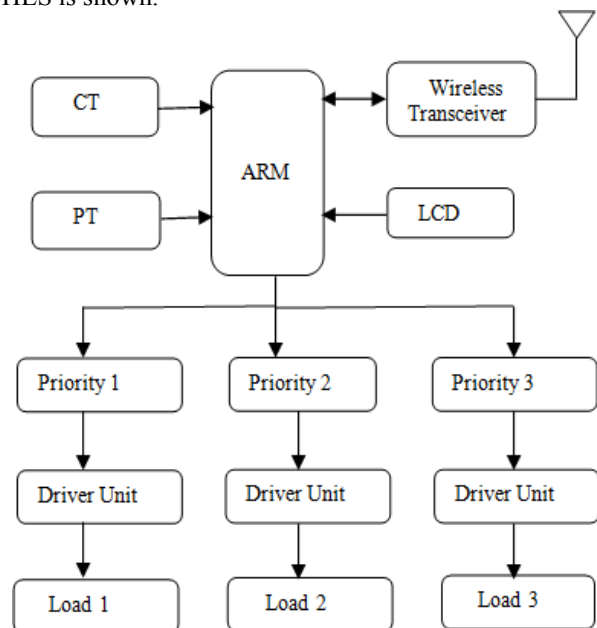


Fig.1. Proposed DHLS architecture.

II. DESIGN AND IMPLEMENTATION

The proposed architecture uses an ARM processor as a core. To the processor the power management priority settings will be programmed. Current transformer and the potential transformer will calculate the power factor and it will be given to the processor continuously. This information will be processed by the processor and it will calculate the amount for that consumed power. For easy understanding this information will be displayed on the device itself. This unit will also have a priority based load sharing in order to manage the power usage. This priority levels will be turned on or turned off according to the interrupts generated by the home server section. So that an automatically power consumption method will be implemented in the home section. The DHL system is

GIS Approach in Demarcating Groundwater Potential Zones—A Case Study in Visakhapatnam District, A.P.

Dr. I. Siva Parvathi¹, Er. Arunima Mahapatra² and Mr. B. Chiranjeevi³

¹Associate Professor, Department of Civil Engineering,
Andhra University College of Engineering (A), Viskhapatnam–530003, India

²Assistant Professor, Department of Civil Engineering,
Dr. L. Bullayya College of Engineering, Viskhapatnam–530013, India

³PG Student, Department of Civil Engineering,
Andhra University College of Engineering(A), Viskhapatnam–530003, India

E-mail: ¹isparvathi@gmail.com

Abstract—An ever-growing demand for freshwater has been driven by an increasing global population, along with more intensive agriculture and increasing industrial use. It is also important not only for targeting but also as a valuable resource to monitor and protect potential groundwater areas. Groundwater potential zones are commonly delineated using GIS tools. To identify the groundwater potential zones, twelve mandals in the Visakhapatnam district are selected as a case study. Geospatial data are being used in this research to measure the groundwater state of the field of study. The extent of land use land cover (LULC) in the study area was represented using nine categories. Different landscape parameters, such as geomorphology, geology, lineament, slope, drainage, LULC using satellite imagery and GIS methods, have been interpreted. These thematic layers were overlaid and multiplied with allocated weightage values to obtain a final weight map. The final map was integrated using the index overlay method following the multi-class map technique. The map was categorized using the groundwater index value into four groundwater potential zones and their distributions are very good, good, moderate, and poor. The results were found to be useful in enhancing groundwater resource strategy and management.

Keywords: GIS, Remote Sensing, Groundwater, Geology, Geomorphology, Lineaments, Potential zones.

INTRODUCTION

Groundwater is the greatest freshwater supply on earth accessible to mankind. The water sources available do not meet the numerous residential, agricultural, and industrial needs of human beings due to the exponential population growth. Groundwater is used for drinking by about half of the urban population and more than 80% of the rural population [1]. Precipitation and streamflow (infiltration) are the fundamental principles of groundwater recharge [2]. Although underground freshwater is the largest supply available, the control and preservation of this critical resource have become important. Aircraft or satellite remote sensing data has become an increasingly useful instrument for understanding the state of subsurface water [3]. For the selection of potential artificial recharge sites, [4] provides delineated prospective groundwater zones with the help of the weighted overlay method along with the boolean logic process. Several authors used a hydro-geomorphic approach based on GIS to identify areas conducive to the implementation and development of site suitability techniques for artificial recharge of the groundwater ([5],[6],[7],[8],[9]). In groundwater studies, particularly in hard rocks, lineaments have been observed to be significant. Remote sensing in combination with GIS has proved to be very useful in evaluating groundwater capacity ([10],[11],[12],[13],[14]). In morphometric research, remote sensing techniques are presented and approaches to groundwater analysis using satellite imaging have proved to be an effective tool ([15],[16]). Over-exploration of groundwater to satisfy the ever-increasing population's domestic needs leads to degradation of the groundwater, particularly during

DATA COMMUNICATIONS AND COMPUTER NETWORKING



Dr. G. Vamsi Krishna
Dr. R. Shankar

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ISBN 978-1-63832-370-9



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Chapter 10

Advance Machine Learning and Nature-Inspired Optimization in Heart Failure Clinical Records Dataset



Dukka Karun Kumar Reddy, H. S. Behera, and Weiping Ding

Abstract ML is a subset of computing procedures that aims to imitate human astuteness by swotting from its surroundings. It has become a challenging task to diagnose the ailment and provide the appropriate treatment at the right time because of the increasing population and disease. The recent technological advancements have propelled the adoption of innovative functional biomedical solutions in the public health sector. Procedures based on traditional ML have been applied effectively in computational biology to biomedical and medical applications. Biomedical solutions entail a complex series of procedures ranging from consultation to treatment and beyond to ensure that patients react optimally. These are considered the working horse in the new era of the so-called big data. The process's complexity can vary and encompass multiple phases of nuanced human-machine interplay with decision-making, which certainly derive the application of ML algorithms to enhance and systematize the automate processes. A population-based Nature inspired swarm algorithms is proposed to extract the relevant parameters of Tree-based ML algorithms by using hyperparameter tuning. The proposed framework attains the desired performance by using "Heart failure clinical records dataset" prediction from the UCI ML data repository.

Keywords Nature-Inspired optimization · Clinical data · Hyperparameter tuning · Clinical dataset · Heart failure

D. K. K. Reddy (✉)

Department of Computer Science Engineering, Dr. L. Bullayya College of Engineering,
Visakhapatnam, Andhra Pradesh 530013, India
e-mail: karun.reddy@gmail.com

H. S. Behera

Department of Information Technology, Veer Surendra Sai University of Technology,
Burla 768018, India
e-mail: hsbehera_india@yahoo.com

W. Ding

School of Information Science and Technology, Nantong University, Nantong, China

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J. Nayak et al. (eds.), *Nature-Inspired Optimization Methodologies in Biomedical and Healthcare*, Intelligent Systems Reference Library 233,
https://doi.org/10.1007/978-3-031-17544-2_10

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11 Deep Neural Network–Based Security Model for IoT Device Network

Dukka Karun Kumar Reddy

Dr. L. Bullayya College of Engineering (for Women)

Janmenjoy Nayak

Aditya Institute of Technology and Management (AITAM)

Bighnaraj Naik

Veer Surendra Sai University of Technology

G. M. Sai Pratyusha

Dr. L. Bullayya College of Engineering (for Women)

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Laser Applications for the Optical Exploration of the Dy³⁺ Doped Li₂O-CaF₂-Al₂O₃- B₂O₃- SiO₂ Glasses

D. Deenabandhu¹, K. Neeraja², K. Ephraim Babu^{2,*}, V. Venkata Kumar³,
K. Bueala Kumari³, K. Samatha⁴ and V. Veeraiah⁴

¹Department of Physics, Dr. L. B. College of Engineering for Women, Visakhapatnam, A.P, India.

²Department of Physics, Narasaraopeta Engineering College(A),Narasaraopeta, Yellamanda (P.O) Guntur(D.T) Andhra Pradesh, 522601, India.

³Department of BS&H, St. Ann's College of Engineering & Technology, Nayunipalli village, ChallaReddyPalem Post, VetapalemMandal, Chirala, Prakasam District, AP - 523187, India

⁴Department of Physics, Andhra University, Visakhapatnam, Andhra Pradesh, 530003, India.

*Corresponding author: ephraimbabu@gmail.com

Abstract. This paper provides details regarding the preparation, optical absorption, emission and FTIR spectral studies on Dy³⁺ doped Li₂O-CaF₂-Al₂O₃- B₂O₃- SiO₂ glasses. Absorption spectrum reveals different bands and it analyzed by the use of JO-theory. Emission spectra of the samples display two transitions ⁴F_{9/2}→⁶H_{15/2}, ⁴F_{9/2}→⁶H_{13/2}, a clear enhancement is observed with increase the concentration of Dy₂O₃ ions. The CIE coordinates is measured for these glasses it demonstrates that the glasses produce bright white light, which are appropriate for the improvement of the laser materials and white light LED's.

INTRODUCTION

Within course of recent decades, rare-earth (RE) particles doped materials gained vast significance, because of their huge applications inside the discipline of photonics beside with solid state lasers, X-ray beam imaging, sensors, optical enhancers, optical and magnetic devices etc [1]. Therefore on layout of latest devices with high performance by choosing proper new host for trivalent RE ions. In seeking of new host, lithium calcium fluoroaluminosilicate glasses are viewed as acceptable host for optically active ions as a result of their high transparency, low dissolving point and good suitability for the physical and chemical properties of the RE ions [2]. In addition to this RE³⁺ based glasses have major importance due to exciting optical properties together with the sharp absorption and emission bands with high efficiencies of intense radiation from visible to IR regions below excitations conditions.

Normally in the current investigation glasses are the aggregate of glass former (SiO₂, B₂O₃, Al₂O₃), modifier (CaF₂) and spectra materials (Dy₂O₃). Silica, boric oxides are recognized as glass formers in sight of their technological and innovative applications. In these glasses, silicon occurs in four-fold coordination whereas boron will exist in three, four-fold coordination. The network property of these structural units is characterized by using Q_n, where n (0–4) represents the number of bridging oxygen atoms per tetrahedron. Here the modifiers are distributed to the system; it'll increase the tendency to create the stable glasses. In case of boron, coordination conversion is found (BO₃ ↔BO₄). Finally the spectra materials are responsible for optical analysis and the way they act intervals inside the structural change is enlightened in latter.

Altogether the RE particles, Dysprosium has varied applications in creating white LED's. Lanthanide (RE) based materials are used considerably in light materials that use nearly any kind of strength because of its excitation supply [3] that entirely suits with the spectrum of GaN-based LED's. This sort of glasses concerning the mid-infrared wavelength region provides a attainable as light sources for laser device applications [4]. The Dy³⁺ ions have dense

First-principles study of structural, elastic, electronic and optical properties of cubic perovskite LiMgF_3 for novel applications

K. Ephraim Babu^{1*}, K. Neeraja¹, D. Deenabandhu², A. Mary Vijaya Ratna³, V. Venkata Kumar⁴, K. Bueala Kumari⁴, Paulos Taddesse⁵, G. Tewodros Aregai⁶, MVK Mehar⁷, B. Vikram Babu⁸, K. Samatha⁸ and V. Veeraiah⁸

¹Department of Physics, Narasaraopeta Engineering College(A), Narasaraopeta, Yellamanda (P.O) Guntur(D.T) Andhra Pradesh, 522601, India.

²Department of Physics, Dr. L. B. College of Engineering for Women, Visakhapatnam.

³Department of Physics, St. Joseph's College for Women(A), Visakhapatnam.

⁴Department of BS&H, St. Ann's College of Engineering & Technology, Nayunipalli village, ChallaReddyPalem Post, Vetapalem Mandal, Chirala, Prakasam District, AP.

⁵Department of Physics, College of Natural Sciences, Arba Minch University, Arba Minch, Ethiopia.

⁶Department of Physics, Aksum University, Ethiopia

⁷Department of Physics, P.R. Govt. College(A), Kakinada, E.G. Dist, A.P

⁸Department of Physics, Andhra University, Visakhapatnam, Andhra Pradesh, India.

*Corresponding author. E-mail: ephraimbabu@gmail.com

Abstract. Structural, elastic and optoelectronic properties of materials are important to identify their applications in technology. In the present paper LiMgF_3 is investigated to obtain these properties using the highly accurate full-potential linearized augmented plane wave (FP-LAPW) method. The exchange correlation effects are included through the generalized gradient approximation (GGA) and modified Becke-Johnson (mBJ) exchange potential. The structural optimization of LiMgF_3 is compared with previous results and is found to be in good agreement with those results. The predicted band structure shows an indirect (M- Γ) bandgap of 6.1 eV. The elastic properties such as elastic constants, anisotropy factor, shear modulus, Young's modulus, Poisson's ratio are calculated and based on these calculations it is found that this compound is elastically stable and brittle in nature. The contribution of different bands to the band structure is analyzed from the total and partial density of states curves. Optical properties like real and imaginary parts of dielectric function, refractive index, extinction coefficient, reflectivity, energy loss function, conductivity and absorption coefficient are presented. Based on the optical properties of the compound, it is predicted that LiMgF_3 is suitable for optoelectronic devices

1. Introduction

LiMgF_3 crystal is a candidate for vacuum-ultraviolet-transparent (VUV-transparent) material for lenses in optical lithography that are useful in the semiconductor industry [1,2]. Lithography technology requires to write more accurate circuit with many challenges like polarized light system, laser lens system, stronger light source, immersion technique, etc. Ternary compounds belonging to the group of fluoroperovskites have the general formula ABF_3 , where A is alkali metal (A=Li, Na, K



Segmenting Images Using Hybridization of K-Means and Fuzzy C-Means Algorithms

Raja Kishor Duggirala

Abstract

Image segmentation is an essential technique of image processing for analyzing an image by partitioning it into non-overlapped regions each region referring to a set of pixels. Image segmentation approaches can be divided into four categories. They are thresholding, edge detection, region extraction and clustering. Clustering techniques can be used for partitioning datasets into groups according to the homogeneity of data points. The present research work proposes two algorithms involving hybridization of K-Means (*KM*) and Fuzzy C-Means (*FCM*) techniques as an attempt to achieve better clustering results. Along with the proposed hybrid algorithms, the present work also experiments with the standard K-Means and *FCM* algorithms. All the algorithms are experimented on four images. CPU Time, clustering fitness and sum of squared errors (SSE) are computed for measuring clustering performance of the algorithms. In all the experiments it is observed that the proposed hybrid algorithm *KMandFCM* is consistently producing better clustering results.

Keywords: image segmentation, clustering, K-Means, Fuzzy C-Means, hybridization, sum of squared error, clustering fitness

1. Introduction

Images are often the most important category among the available digital data. In the recent years, image data is increasing and will continue increase in the near future. Since it is difficult to deal with large amount of image data as the available data increases, it becomes crucial to use the automated tools for various purposes in connection to image data. The image processing provides wide range of techniques to deal with the images. By using the image processing techniques, we can make the work much easier not only for now, but also for the future when there will be more data and more work to do on the images.

Image segmentation is an essential image processing technique that analyzes an image by partitioning it into non-overlapped regions each region referring to a set of pixels. The pixels in a region are similar with respect to some characteristic such as color, intensity, or texture [1]. The pixels significantly differ with those in the other regions with respect to the same characteristic [2–4]. Image segmentation plays an important role in a variety of applications such as robot vision, object recognition, medical imaging and etc. [5–7]. Image segmentation approaches can be divided into four categories. They are thresholding, edge detection, region

Lecture Notes in Networks and Systems 210

Sanjoy Kumar Saha
Paul S. Pang
Debnath Bhattacharyya *Editors*

Smart Technologies in Data Science and Communication

Proceedings of SMART-DSC 2021

 Springer

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Classification of Brain Tumors Using Deep Learning-Based Neural Networks



Jayavani Vankara, Muddada Murali Krishna, and Srikanth Dasari

Abstract Deep neural networks have grown as the most interesting topic in past few years. This new machine learning technique has been applied in several real-world applications. It can be considered as a machine learning tool of high strength for solving the higher dimension problems. Deep neural network is used in this paper, for organizing the 66 brain MRI datasets into categories of four. We have considered four dissimilar classes; those are glioblastoma, sarcoma, metastatic bronchogenic carcinoma tumors and normal tumors. The classifier has been integrated with the discrete wavelength transform (DWT), which is used as a tool for extracting features, and the principal components analysis (PCA) for dimensionality reduction.

Keywords Brain tumor · Deep learning · Neural network · Classification

1 Introduction

The human brain is considered as most important and composite organ in a human body parts, which has billion of cells. A brain tumor is the resultant of an uncontrolled and unrestricted cell division. It leads to irregular and uncurbed group formation of cells inside and around the brain, which increases the change and cause of abnormal brain activity and destroys the healthy cells [1, 2]. Brain tumors have two classifications, i.e., benign or low-grade tumors called grade 1 and grade 2 and malignant or high-grade tumor which are called grade 3 and grade 4. Malignant tumors are more aggressive than benign tumor. The mass of abnormal cells does not contain cancer

J. Vankara · M. M. Krishna (✉) · S. Dasari
Department of CSE, Dr. Lankapalli Bullayya College of Engineering, Visakhapatnam, Andhra Pradesh, India
e-mail: muralimuddada@lbce.edu.in

J. Vankara
e-mail: vjayavani@lbce.edu.in

S. Dasari
e-mail: dsrikanth@lbce.edu.in



Reduction of PAPR in OFDM Signals Using Grey Wolf Optimization Combined with SLM

Reddi Sridevi¹(✉) and T. Madhavi²

¹ Assistant Professor, Department of ECE, Dr. L. B College of Engineering,
Visakhapatnam, India

himasri_sss@yahoo.com

² Professor, Department of ECE, GITAM Deemed to be University,
Visakhapatnam, India

madhavitatineni@gitam.edu

Abstract. The most widely used multiplexing technique in present wireless communication scenario is Orthogonal Frequency Division Multiplexing. PAPR is one of the most challenging observation and problem in the signals which are transmitted in the system. Different optimization techniques are been proposed to reduce PAPR. In this paper, SLM combined with grey wolf optimization technique is proposed and the results are been compared with other SLM based optimization techniques like SLM-GA, SLM-FA. The PAPR reduction accuracy and the level of complexity have been reduced using the proposed approach. The proposed model is simulated using Matlab software tool.

Keywords: OFDM · SLM · Genetic algorithm · Firefly algorithm · Grey wolf optimization

1 Introduction

Orthogonal Frequency Division multiplexing (OFDM) might be an adjustment subject go down for a few of the chief in vogue remote and broadcast communications standards. When contrasted with the standard recurrence division multiplexing amid which sub groups aren't any covering. The essential impression of OFDM is lifted piece rate is transmitted into a lesser piece rate of bearers. Each bearers are symmetrically kept up. OFDM flag create a tangled flag by multiplexing. OFDM learning is started by taking contribution to sequential to parallel convertor. The IFFT will get the compulsory range to time area and give the transporter which are symmetrical. The FFT is that the flip over technique for IFFT. It translates the time space flag to recurrence space and its job is to look out the particular transmission wave shape. High unearthly capability gives more data organizations (Figs. 1, 2, 3, 4, 5, 6 and 7).

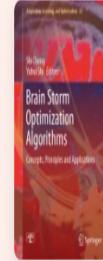
Solidarity to RF delay incredible execution in unregulated and controlled repeat bunches bring down multi-way mutilation works in complex indoor circumstances and at speed in vehicles. It is utilized in high rate advanced broadband frameworks like advanced TV proliferation, computerized sound and video circulation. The essential favourable position of OFDM over single-transporter plans is its capacity to manage serious channel conditions (for instance, weakening of high frequencies in an

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Enhancement of Voltage Stability Using FACTS Devices in Electrical Transmission System with Optimal Rescheduling of Generators by Brain Storm Optimization Algorithm

Chapter | First Online: 04 June 2019



pp 273–297 | [Cite this chapter](#)



[Brain Storm Optimization Algorithms](#)

G. V. Nagesh Kumar , B. Sravana Kumar, B. Venkateswara Rao & D. Deepak Chowdary

 Part of the book series: [Adaptation, Learning, and Optimization](#) ((ALO, volume 23))

 458 Accesses  2 Citations

Abstract

Voltage stability is the capability of the power system to preserve the system under stable condition even exposed to small disturbances under normal or slightly over loaded conditions. Maintaining voltage stability is the one of the major factor for power system

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Chapter

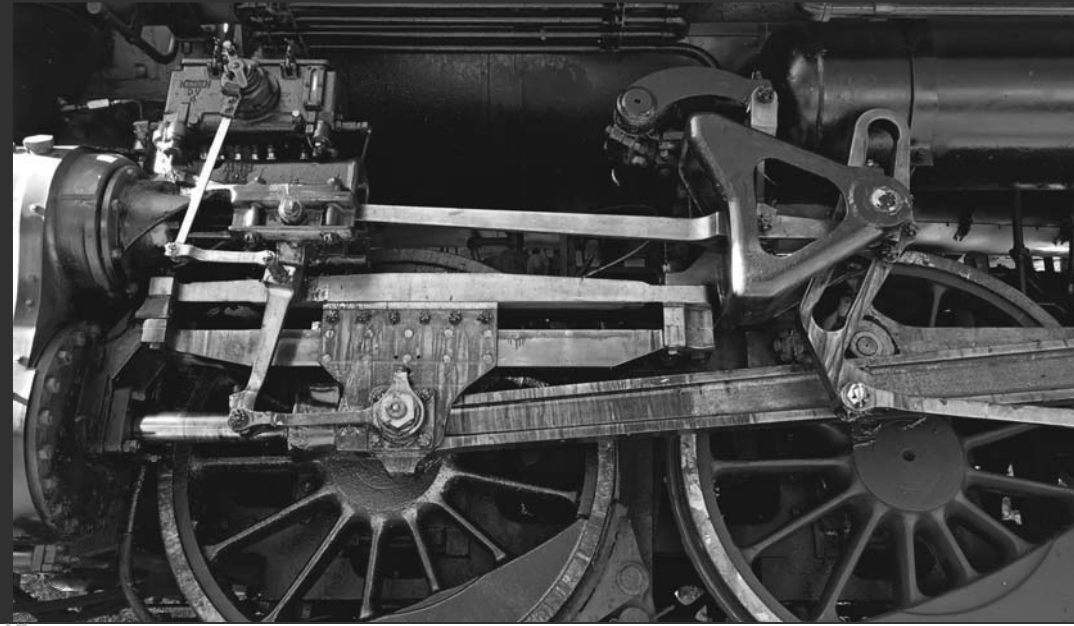
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Theory of machines-I covered all topics for engineering students. Beginning with an Introduction to Mechanisms and Machines, the authors goes on to cover Graphical and Analytical approaches to Velocity analysis, Mechanisms with Lower pairs, Gears, Cams, Gear Trains The book is inclusive of three appendices on Units, Mathematics and S.I. Units. The book is self-contained and the authors maintains a fine balance between practice problems and conceptual clarity. The book is also used for the candidates of competitive examinations like Indian Engineering Services(IES) and GATE.



M. Amareswari Reddy
M.N.V Krishna Veni

Theory of machines-I

Kinematics of machinery

1).Miss. M.Amareswari Reddy did her B.E (Mechanical), M.E (Machine Design) and pursuing Ph.D from Andhra University, Visakapatnam, INDIA.
2). Mrs.M.N.V.Krishna Veni did her B.E(MPIE), M.E (CAD/CAM) and pursuing Ph.D from Andhra University, Visakapatnam, INDIA. Both are working as an Asst.Professors in ANITS Engg. College.



978-613-9-45537-9

Reddy, Krishna Veni

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Cover image: www.ingimage.com

Publisher:

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International Book Market Service Ltd., member of OmniScriptum Publishing Group

17 Meldrum Street, Beau Bassin 71504, Mauritius

Printed at: see last page

ISBN: 978-613-9-45537-9

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THEORY OF MACHINES-I

Course Code: MEC224

Course Objectives:

To acquaint the students with the fundamentals of mechanisms and their kinematic analysis. Further this study is extended to specific applications like steering mechanisms, Hooke's joint, cams, gears and gear trains

Course Outcomes:

The Student will be able to:

1. CO-1 Understand the basic concepts of different mechanisms and their inversions.
2. CO-2 Understand and analyze mechanisms like straight line motion mechanisms & steering gear mechanisms and Hooke's joint.
3. CO-3 Perform kinematic analysis of any given simple mechanisms.
4. CO-4 Design cam profiles based on the prescribed follower motion and perform kinematic analysis on cams with specified contours.
5. CO-5 Get acquainted with gear terminology, distinguish gears & perform kinematic analysis of gears & gear trains

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UNIT- 2	MECHANISM WITH LOWER PAIRS	36 to 51
UNIT- 3	VELOCITY ANALYSIS	52 to 66
UNIT- 4	CAMS	67 to 95
UNIT- 5	TOOTHED GEARING AND GEAR TRAINS	96 to 164
	REFERENCE	165

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SYLLABUS

UNIT – I

Mechanisms and Machines: Introduction; Mechanism and machine; Rigid and resistant bodies; Link; Kinematic pair; Degrees of freedom; Classification of kinematic pairs; Kinematic chain; Linkage, mechanism and structure; Mobility of mechanisms. Application of Kutzbach Criterion to Plane Mechanisms. Grubler's Criterion for Plane Mechanisms. Grashof 's law. Inversions of Mechanisms: The four-bar chain; Mechanical advantage; Transmission angle; The slider-crank chain; Double slider-crank chain.

UNIT-II

Mechanism with lower pairs: Pantograph – straight line motion mechanisms – exact straight line motion mechanisms- Peaucellier mechanism, Approximate straight line motion mechanisms Watt mechanism. Condition for correct Steering-Davis & Ackerman's steering gear mechanisms. Hooke's joint: Ratio of shaft velocities – maximum and minimum speed of driven shaft – condition for equal speeds – Angular acceleration of driven shaft – Double Hooke's joint.

UNIT – III

Velocity Analysis: Relative velocity method – velocity of point on a link- application of relative velocity method to simple mechanisms – rubbing velocity of a joint – Instantaneous centre method –body centre and space centre - velocity of point on a link by Instantaneous centre method, location of Instantaneous Centre - three Centers in line theorem and application of the method for simple mechanisms.

UNIT –IV

Cams: Classification of followers and cams – terms used in radial cams – displacement, velocity and acceleration diagrams when the follower moves with uniform velocity, uniform acceleration and retardation, simple harmonic motion – construction of cam profiles.

Cams with specified contours: Tangent cam with roller follower – circular arc cam with flat faced follower.

UNIT-V

Toothed gearing: Classification of toothed wheels – terms used in gears - law of gearing – velocity of sliding of teeth – forms of teeth – Cycloidal and involute teeth– length of path of contact-arc of contact– contact ratio- interference in involute teeth - minimum number of teeth to avoid interference.

Gear trains: - Simple, compound and reverted gear trains – Epicyclic gear train – velocity ratio of Epicyclic gear train-sun and planet wheels – torques in Epicyclic gear train-Differential of an automobile.

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Real Time Flood Forecast for Vamsadhara River Basin through Unsteady Flow Simulation

Arunima Mahapatra¹, Venkatesh Kinthala² and Vazeer Mahmood³

^{1,2&3}Department of Civil Engineering, Andhra University College of Engineering (A), Visakhapatnam, Andhra Pradesh, India.
arunimamahanty@yahoo.co.in, amarvenkatesh.karthik@gmail.com and vazir81c158@gmail.com

Abstract

Successful flood disaster management relies on the ability to predict floods and their corresponding flood inundation areas to minimize loss of life and property. The large catchment area that falls under the Vamsadhara river in Andhra Pradesh and Odisha states with the increased possibility of floods caused majorly due to the frequent cyclones that form along the coast are the major causative factors that necessitate the creation of a flood forecasting model that can be used for flood warning and disaster management. This is done by conducting hydrological and hydraulic studies to estimate peak discharges and flood inundation plains induced by these cyclones for current and future land use conditions. Hydrological modelling is a commonly used tool to estimate the basin's hydrological response due to precipitation. HEC-HMS model is used to simulate rainfall-runoff process by utilising both spatial and non-spatial data such as rainfall, gauge-discharge data, and topographic and hydraulic parameters. It is more realistic to consider unsteady flow when assessing the impact of flood moving down a river. In the present study a real-time flood inundation model for two dimensional unsteady flow conditions was developed using GIS. The extreme flood events that occurred in 2006 and 2013 in this area were used as input data to the model. The methodology involved DEM hydrologic processing using HEC-GeoHMS and HEC-HMS. The output is in the form of flood inundation maps generated using HEC-RAS, from which an efficient flood disaster management can be achieved and also a sustainable watershed management can be planned.

Keywords: Flood inundation modelling, River Vamsadhara, Unsteady flow, HEC-RAS.

1. INTRODUCTION

Water is said to be the source of life on earth. Since the existence of humankind, drought and floods have majorly influenced mankind in a manner so indescribable that on the one hand while drought set man on the search for the elixir of life, establishing civilizations on the boundaries of rivers and tributaries, while the same water in uncontrollable proportions in the form of heavy downpour and the resulting flood wiped off entire civilizations. India with its huge and ever growing population is the second most flood affected country worldwide after Bangladesh. The densely populated areas, along with the often erratic cyclonic activity along the coastal areas which become high risk areas for occurrence of flood and inundation create additional problems for flood management. Predicting the occurrence of and then containing the possible loss to life and property due to floods has always been a major area of concern.

A variety of mitigation measures can be identified and implemented to reduce or minimize the impact of flooding. Such mitigation measures include flood forecasting and warning, adopting proper land-use planning, flood-prone area zoning and management. The process of flood inundation mapping is an essential component of flood risk management because flood inundation maps do not only provide accurate geospatial information about the extent of floods, but also, when coupled with a geographical information system, can help decision makers extract other useful information to assess the risk related to floods such as human loss, financial damages, and environmental degradation. For these reasons, flood maps have been widely used in practice to assess the potential risk of floods.

Precipitation is the only source of runoff and flood in the one or other form but the transformation of the runoff from precipitation is governed by the parameters such as land use, soil type, evaporation, and storage. HEC-HMS [6] deals with the basic water balance equation taking into account major parameters that governs

Medical Image Classification Through Deep Learning



Kaushik Raghupathruni and Madhavi Dabburu

Abstract The authors investigate the problem of image classification. Earlier, the task of image classification is accomplished by traditional machine learning techniques and other shallower neural network models. Later with the evolution of deeper networks, convolutional neural networks have gained without importance due to its outstanding accuracy in various domains. Unlike in real-world datasets for performing the classification of various images under different categories, the job of biomedical image classification of chest X-rays is quite tedious due to overlapping characteristics of X-ray images. The objective of this paper is to classify the images of chest X-rays and predict the pneumonia traces in lungs. Inception V3 model, with transfer learning is applied on this medical dataset. The model is implemented in Keras as front-end library with tensor flow framework. The training on this dataset to generate a custom model file on GTX 1070 video card consumed 30 min yielding 98% training accuracy and 99% validation accuracy.

Keywords Image classification · Deep learning · Convolution neural networks · Transfer learning

1 Introduction

This Image classification techniques play a vital role in the arena of artificial intelligence as the features of every image is unique. Deep learning is subset of machine learning methods in contrast to task-specific algorithms. Deep learning uses a layered structure of algorithms called an artificial neural network (ANN). Deep learning is

K. Raghupathruni (✉)

Department of CSSE, Andhra University, Visakhapatnam, Andhra Pradesh, India
e-mail: kaushikraghupathruni@gmail.com

M. Dabburu

Department of CSE, Dr. L. Bullayya College of Engineering for Women, Visakhapatnam, Andhra Pradesh, India
e-mail: drlbese@gmail.com

© Springer Nature Singapore Pte Ltd. 2020

H. S. Behera et al. (eds.), *Computational Intelligence in Data Mining*, Advances in Intelligent Systems and Computing 990,
https://doi.org/10.1007/978-981-13-8676-3_23

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A Q-Learning Approach for Sales Prediction in Heterogeneous Information Networks



Sadhana Kodali, Madhavi Dabbiru and B. Thirumala Rao

Abstract In today's world, recommenders have grabbed a major importance to improve the sales where this paper provides the use of machine learning approach which involves machine learning technique like Q-learning that has an evident prediction on improving the sales. The logical network that can be formed for the mobiles and sales can be treated as a heterogeneous information network and traversing this semantic network gives meaningful meta-paths. The reinforcement learning technique, Q-Learning, is applied to predict the sales of a product.

Keywords Machine learning · Meta-path · Q-learning · Heterogeneous information network

1 Introduction

With the evolution of machine learning and innovative algorithms, the approach to reach customer with a good prediction which can improve the sales is the main motto of many companies. With machine learning, we can identify different patterns which have evolved to identify many pattern recognition techniques. To learn from previous models and to predict reliable and better results from previous steps are the main aims of the learning algorithms. A network of objects which interact with each other logically is called heterogeneous information network [1]. These networks can be traversed from one object to the other forming what are called as meta-paths. The

S. Kodali (✉) · B. T. Rao
Department of CSE, Koneru Lakshmaiah Education Foundation, Guntur Dt,
Vaddeswaram 522502, Andhra Pradesh, India
e-mail: sadhanalendicse@gmail.com

B. T. Rao
e-mail: drbtrao@kluniversity.in

M. Dabbiru
Department of CSE, Dr. L. Bullayya College of Engineering for Women,
Visakhapatnam, Andhra Pradesh, India
e-mail: drlbcse@gmail.com

© Springer Nature Singapore Pte Ltd. 2020
A. K. Das et al. (eds.), *Computational Intelligence in Pattern Recognition*,
Advances in Intelligent Systems and Computing 999,
https://doi.org/10.1007/978-981-13-9042-5_72

Chapter 8

A Computational Comparison of Swarm Optimization Techniques for Optimal Load Shedding Under the Presence of FACTS Devices to Avoid Voltage Instability

G. V. Nagesh Kumar

Vignan's Institute of Information Technology (Autonomous), India

B. Venkateswara Rao

V. R. Siddhartha Engineering College (Autonomous), India

D. Deepak Chowdary

Dr. L. Bullayya College of Engineering (for Women), India

Polamraju V. S. Sobhan

Vignan's Foundation for Science, India

ABSTRACT

Voltage instability has become a serious threat to the operation of modern power systems. Load shedding is one of the effective countermeasures for avoiding instability. Improper load shedding may result in huge technical and economic losses. So, an optimal load shedding is to be carried out for supplying more demand. This chapter implements bat and firefly algorithms for solving the optimal load shedding problem to identify the optimal amount of load to be shed. This is applied for a multi-objective function which contains minimization of amount of load to be shed, active power loss minimization, and voltage profile improvement. The presence of with and without static VAR compensator (SVC), thyristor-controlled series capacitor (TCSC), and unified power flow controller (UPFC) on load shedding for IEEE 57 bus system has been presented and analyzed. The results obtained with bat and firefly algorithms were compared with genetic algorithm (GA) and also the impact of flexible AC transmission system (FACTS) devices on load shedding problem has been analyzed.

DOI: 10.4018/978-1-5225-5134-8.ch008

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Critical Developments and Applications of Swarm Intelligence

Yuhui Shi

IGI Global
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Published in the United States of America by

IGI Global
Engineering Science Reference (an imprint of IGI Global)
701 E. Chocolate Avenue
Hershey PA, USA 17033
Tel: 717-533-8845
Fax: 717-533-8661
E-mail: cust@igi-global.com
Web site: <http://www.igi-global.com>

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Library of Congress Cataloging-in-Publication Data

Names: Shi, Yuhui, editor.

Title: Critical developments and applications of swarm intelligence / Yuhui

Shi, editor.

Description: Hershey, PA : Engineering Science Reference, [2018] | Includes bibliographical references.

Identifiers: LCCN 2017035978 | ISBN 9781522551348 (h/c) | ISBN 9781522551355 (eISBN)

Subjects: LCSH: Swarm intelligence.

Classification: LCC Q337.3 C75 2018 | DDC 006.3/824--dc23 LC record available at <https://lcn.loc.gov/2017035978>

This book is published in the IGI Global book series Advances in Computational Intelligence and Robotics (ACIR) (ISSN: 2327-0411; eISSN: 2327-042X)

British Cataloguing in Publication Data

A Cataloguing in Publication record for this book is available from the British Library.

All work contributed to this book is new, previously-unpublished material. The views expressed in this book are those of the authors, but not necessarily of the publisher.

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Critical Developments and Applications of Swarm Intelligence

Yuhui Shi

Southern University of Science and Technology, China

A volume in the Advances in Computational Intelligence and Robotics (ACIR) Book Series





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ISSN:2327-0411
EISSN:2327-042X

MISSION

While intelligence is traditionally a term applied to humans and human cognition, technology has progressed in such a way to allow for the development of intelligent systems able to simulate many human traits. With this new era of simulated and artificial intelligence, much research is needed in order to continue to advance the field and also to evaluate the ethical and societal concerns of the existence of artificial life and machine learning.

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Mahesh B. Parappagoudar, Padre Conceicao College of Engineering, India

Pandu Ranga Vundavilli, Indian Institute of Technology Bhubaneswar, India

S. N. Bharath Bhushan, Sahyadri College of Engineering and Management, India

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Joseph M. Chuma, Botswana International University of Science and Technology, Botswana

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Reiga Ramalho Ribeiro, Universidade Federal de Pernambuco, Brazil

Allan Rivalles Souza Feitosa, Universidade Federal de Pernambuco, Brazil

*Victor Luiz Bezerra Araújo da Silva, Escola Politécnica da Universidade de Pernambuco,
Brazil*

David Edson Ribeiro, Universidade Federal de Pernambuco, Brazil

Rafaela Covello Freitas, Escola Politécnica da Universidade de Pernambuco, Brazil

Manoela Paschoal, Universidade Federal de Pernambuco, Brazil

Natália Souza Soares, Universidade Federal de Pernambuco, Brazil

Rodrigo Beltrão Valença, Universidade Federal de Pernambuco, Brazil

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Elemental Analysis of Indian Natural Chrysoberyl Gemstones by PIXE Technique

- [Authors](#)
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- S. Siva Jyothi
 - G. Padmaja Rani
 - P. Venkateswarulu
 - R. VenkateswaraRao
 - T. R. Rautray

Conference paper

First Online: 07 August 2019

- 241Downloads

Part of the [Lecture Notes on Multidisciplinary Industrial Engineering](#) book series (LNMUINEN)

Abstract

A selected number of Indian Eastern Ghats' natural Chrysoberyl gemstones were studied with a powerful nuclear analytical proton-induced X-ray emission (PIXE) technique. Sixteen elements, including Al, Cr, Ti, V, Cu, Fe, Pb, Mo, La and Ce, were identified in these Chrysoberyl gemstones and may be helpful in interpreting the various geochemical circumstances and the probable cause of their origin in the Eastern Ghats. The PIXE technique is an attractive method for quickly determining the elemental concentration of a material. The PIXE measurements were performed at the Ion Beam Laboratory, Institute of Physics (IOP), Bhubaneswar, using 3 MV tandem accelerator. The well-collimated 3 meV proton beam of 2 mm diameter was employed to irradiate the gemstone samples. Moreover, preliminary XRD studies of different Chrysoberyl patterns were performed and major compositional elements were confirmed by XRD. The chemical constituents of Chrysoberyl gemstones from Visakhapatnam, Andhra Pradesh, India, were analysed, and gemological studies were performed. Thus, in the present study, the usefulness and versatility of the PIXE system for research in geo-scientific methodology particularly in gemology are established.

Keywords


Chrysoberyl gemstones PIXE XRD Eastern Ghats India and trace elements

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Notes



A High Speed Two Step Flash ADC

K. Lokesh Krishna¹ , Yahya Mohammed Ali Al-Naamani², and K. Anuradha³

¹ S.V.College of Engineering, Tirupati, Andhra Pradesh, India

² S.V.C.E.T., Chittoor, Andhra Pradesh, India

³ L.B.C.E.W., Visakhapatnam, Andhra Pradesh, India

kayamlokesh78@gmail.com

Abstract. As wireless communication equipment's are demanding higher speed of operation, low power and into the digital domain, it becomes essential to design a high speed and low power ADC. This paper presents a novel power efficient, high-speed two step analog to digital converter (ADC) architecture combining two whole Flash ADCs with feed forward circuitry. The proposed circuit has been designed to overcome the drawbacks of the conventional flash ADC which draws more power due to the high speed comparator bank. Also the proposed two-step ADC employs a modified double tail comparator circuit which operates at high speed and consumes less power. The individual block of two step flash ADC is designed, simulated and implemented in CMOS 130 nm N-well technology operated at 1.8 V power supply voltage. The ADC consumes 2.32mW with a resolution of 6-bits for input signal frequencies upto 1 GHz and occupies a silicon area of 0.226 mm². The operating speed of the design is 10 GHz and the simulated static INL and DNL is found to remain within 0.15LSB and 0.42LSB respectively.

Keywords: Threshold inverter quantizer · Comparator · Register · Low power Time interleaving · Residue amplifier and CMOS

1 Introduction

Existing electronic systems such as Software Defined Radios, Aircraft communications, High performance Data Acquisition Systems, Broad band wireless communication systems, Medical Imaging and Diagnostic equipment's, High frequency oscilloscopes, Spectrum analyzers, 4G Long Term Evolution (LTE) systems, Signal generators, Communication test equipment's and High frequency oscilloscopes demand high data rates with low power consumption. The signals that we experience in our daily lives are analog. These signals are non-quantized, low amplitude or high amplitude and continuously vary with time. Nowadays due to the advances in digital processing techniques, utmost processing is carried out in digital domain only. The advantages of digital signal processing techniques are easier to design since exact values of voltages and currents are not required, accurate and highly precise, data storage is easier, logic can be reprogrammed, and less prone to noise. Hence it becomes essential that the received signal must be transformed to digital at some instance of processing.

A 10-bit High Speed Pipelined ADC

Alfakhri M.Murshed
B.Tech student,
Department of ECE
S.V.C.E.T. (Autonomous)
Chittoor, Andhra Pradesh
mzamhb@gmail.com

K. Lokesh Krishna
Associate Professor,
Department of ECE,
S.V.C.E.T. (Autonomous),
Chittoor, Andhra Pradesh
kayamlokes78@gmail.com

M.Abdullah Saif
Sana Community Center
Sana'a, Yemen

K. Anuradha
Associate Professor,
Department of CSE
L.B.C.E.W, Visakhapatnam

Abstract— The design of a 10-bit, 200MS/s Pipelined Analog to Digital Converter (ADC) is presented in this paper. The implemented pipelined ADC employs techniques such as pipeline stage scaling algorithm, to lower power, capacitor ratio independent conversion scheme, a nested gain boosting technique and thin oxide transistors with clock bootstrapping. The fully realized is measured under different input frequencies with a sampling rate of 200MS/s and it consumes 46.8mW from a 1.8V power supply. The pipelined ADC implemented in 130nm CMOS technology exhibits signal-to-noise plus distortion ration SNDR of 54.7dB and occupies a die area of 0.31mm².

Keywords— low power, data converter, op-amp, time-interleaving, high linearity, comparator, and amplifier.

I. INTRODUCTION

In the real world, most data is described by analog signals. In order to control the data using a processor or controller, a data converter circuit is very much essential. A data converter is an electronic circuit that is used to convert analog signal to digital signal or digital signal to analog signal. Currently, there has been rapid progress in the design of electronic systems for various applications. The prominence of data converter circuits in the implementation of digital computers and signal processing in communications, image processing, instrumentation and industrial control systems is increasing by leaps and bounds. Hence data converter circuits are widely used as interface between analog and digital circuits. In general there are two different types of data converter circuits. They are (i) Analog to Digital Converter (ADC) and (ii) Digital to Analog Converter (DAC). Analog to Digital Converter converts an analog signal (continuous time and continuous magnitude) into digital signals (discrete time and discrete magnitude).

ADCs are used in various applications such as Medical Imaging, Wireless Telecommunications, Audio and Video Processing Systems, Software radio and Instrumentation. Broadly there are numerous ADC architectures available to be used for these applications. But selection of an ADC is determined by the application and its specifications. However no single ADC architecture is found to be appropriate for all these applications. At present the major advances in consumer electronics are reflected in smart phones, notebook computers, camcorders, tablets and portable storage devices. All these devices employ various wireless technologies. Also wireless infrastructural systems such as satellite communication


systems, cellular base stations, and various electronic warfare systems require the direct digitization of analog signal in the giga-hertz range. High-speed, low power consumption and high resolution are the important requirements in many wireless portable applications.

Different ADC architectures such as Two-step flash type, Sigma-Delta, Flash type, Integrating type, Pipeline and Interleaving are being used to deliver these requirements for various applications. The performance of an ADC is affected by the nature of the input signal they process. Because the input analog signal is continuous in nature, ADCs suffer numerous problems such as clock jitter, nonlinear input impedance, number of bits, signal and clock skew, number of components, chip size, power dissipation etc. These problems limit the use of ADC architectures for various applications. Flash ADCs are very fastest converters and are well suitable for large bandwidth applications. But the main problem is that they consume lot of power as the resolution of the converter increases which in turn reflects in the increase in the size of the chip. Also as the chip size increases, more problems associated with signal and clock routing becomes noticeable.

Two step ADCs also well known as subranging converters is a cross between a flash ADC and pipeline ADC can be used to realize higher resolution and small power. Pipelined ADC architecture is a more specialized application of the two-step architecture and has been developed to be the most popular architecture for sampling rates from a few mega samples per second (MS/s) to 500 MS/s, with resolutions ranging from 8 bits to 20 bits. Successive Approximation Register (SAR) ADCs are used for applications requiring medium to high resolution (8-16) bits and with sample rates fewer than 20MS/s. The advantage using this architecture is that they provide low power consumption as well as a small form factor. Sigma-Delta (Σ - Δ) ADC architecture are used in low speed applications with resolution ranging from (12-24) bits. Integrating ADCs provide high resolution and can offer good line frequency and noise rejection. Time interleaved ADCs uses multiple identical analog to digital converters to process regular sample data series at a faster rate than the operating rate of each individual ADC. Time inter leaving technique will relax the power-speed tradeoffs of ADC and minimizes metastability error rate while



A 6-Bit Low Power SAR ADC

K. Lokesh Krishna¹ , K. Anuradha², and Alfakhri M. Murshed³

¹ S.V. College of Engineering, Tirupati, Andhra Pradesh, India
kayamlokesh78@gmail.com

² L.B.C.E.W., Visakhapatnam, Andhra Pradesh, India

³ S.V.C.E.T., Chittoor, Andhra Pradesh, India

Abstract. The design of a 6-bit, 100 MHz successive approximation register (SAR) analog to digital converter (ADC) is presented in this paper. The implemented SAR ADC is realized by using SAR logic, a 6-bit DAC, a sample and hold circuit and a comparator circuit. The fully realized system is measured under different input frequencies with a sampling rate of 100 MHz and it consumes 36.7 μ W from a 1.8 V power supply. The ADC implemented in 130 nm CMOS technology exhibits signal-to-noise plus distortion ration SNDR of 64.2 dB and occupies a die area of 0.14 mm².

Keywords: Data converter · High linearity · Low power · Time-interleaving Comparator · Amplifier

1 Introduction

Physically most data in the real world is described by analog signals. In order to control/process the data using a microprocessor or microcontroller, a data converter circuit is very much indispensable. A data converter is a microelectronic circuit that is used to transform analog signal to digital signal or a digital signal to analog signal. Currently, there has been rapid progress in the design of electronic systems for various applications. The prominence of data converter circuits in the implementation of digital computers and signal processing in communications, image processing, instrumentation and industrial control systems is increasing by leaps and bounds. Hence data converter circuits are extensively used as interface between analog and digital circuits. In general there are two different types of data converter circuits. They are (i) Analog to Digital Converter (ADC) and (ii) Digital to Analog Converter (DAC). Analog to Digital Converter converts an analog signal (continuous time and continuous magnitude) into digital signals (discrete time and discrete magnitude).

ADCs are used in various applications such as Wireless Telecommunication circuits, Medical Imaging technologies, Audio and Video Processing Systems, Software radio and Instrumentation. Broadly there are numerous ADC architectures available to be used for these applications. But selection of an ADC is determined by the application and its specifications. However no single ADC architecture is found to be appropriate for all these applications. At present the major advances in consumer electronics are reflected in smart phones, notebook computers, camcorders, tablets and portable storage devices. All these devices employ various wireless technologies. Also

A k-NN-Based Approach Using MapReduce for Meta-path Classification in Heterogeneous Information Networks



Sadhana Kodali, Madhavi Dabbiru, B. Thirumala Rao
and U. Kartheek Chandra Patnaik

Abstract Classification of the nodes along with the interconnected semantic edges in a Heterogeneous Information Network (HIN) has a lot of significance in identifying the class labels which involves the application of knowledge and dissemination of knowledge from one node to the other. In this paper, the authors applied PathSim similarity measure for finding k-nearest neighbors along with the use of the well-known MapReduce paradigm to classify the meta-paths in a Heterogeneous Information Network. Applying MapReduce simplified the classification approach which deals with huge data present in the Heterogeneous Information Networks. Experiments were carried out on movie theater dataset, and the results are accurate and successful.

Keywords Classification • k-NN • MapReduce-based classification
Meta-path

Sadhana Kodali (✉) · B. Thirumala Rao
Department of CSE, Koneru Lakshmaiah Education Foundation,
Vaddeswaram 522502, India
e-mail: sadhanaphd@gmail.com; sadhanalendicse@gmail.com

B. Thirumala Rao
e-mail: drbtrao@kluniversity.in

Madhavi Dabbiru
Department of CSE, Dr. L. Bullayya College of Engineering for Women,
Visakhapatnam 530016, Andhra Pradesh, India
e-mail: drlbese@gmail.com

U. Kartheek Chandra Patnaik
Department of CSE, Lendi Institute of Engineering & Technology, Jonnada,
Vizianagaram 535005, India
e-mail: ukcp.lendi@gmail.com

© Springer Nature Singapore Pte Ltd. 2019
J. Nayak et al. (eds.), *Soft Computing in Data Analytics*,
Advances in Intelligent Systems and Computing 758,
https://doi.org/10.1007/978-981-13-0514-6_28

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