Review on flexural performance of reinforced concrete beams designed with hybrid bars

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Abstract.. Reinforced steel bars, commonly used in concrete construction, are prone to corrosion due to their insufficient corrosion resistance, which ultimately leads to reduced durability and long-term performance. Moisture interaction is the leading cause of corrosion, which results in rust, cracks, and spalling, leading to durability and long-term performance issues. To address this problem, FRP bars are now being introduced to the market, which offer numerous benefits over steel bars, such as strong corrosion resistance, higher tensile strength, and reduced weight, leading to lower shipping and labor costs. Concrete gains mechanical stability, stiffness, durability when polypropylene fibres are used, improving the material's effectiveness. The purpose of this study is to examine the flexural behavior, load-deflection characteristics, and ductility of hybrid reinforced concrete beams. that use both GFRP bars and steel bars, as well as compare them with reinforced concrete beams that use only GFRP bars or steel bars with and without using polypropylene fibres as a supplement. In order to enhance the beams flexural strength as well as ductility, it has been identified that 0.25% of their volume should be made up of polypropylene fibres. After the experimental investigation is finished, analytical studies using ANSYS simulation will be carried out to determine the load-deflection behaviours.

Keywords. Glass Fiber Reinforced Polymer bar, Polypropylene fiber.

1 Introduction

Concrete is renowned for its versatility, durability, and reliability as a building material. Despite its high compressive strength, it has lower rigidity and is therefore sensitive. In many countries, the use of waste materials is challenging due to rising raw material costs and the depletion of natural resources. Throughout history, fibers have been used for reinforcement, such as horsehair and straw for mortar and mud.

Experimental studies on flexural action of RC beams made with hybrid rebars - A brief review

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Abstract: Reinforced Steel bars used in concrete constructions are particularly susceptible to corrosion since they don't have enough corrosion resistance, which decreases durability and long-term performance. The main cause of steel bar corrosion is moisture interaction, which results in rust, which causes cracks and spalling, which affects durability and long-term performance. FRP bars, which have several benefits over steel bars such as strong resistance to corrosion, higher tensile strength than steel bars, and a 1/4th of the weight of steel bars, which decreases shipping and labor costs, are now entering the market as a solution to the aforementioned issues. Polypropylene fibers in concrete have high mechanical strength, stiffness, and durability. This paper tells about the type of FRP bar and Fiber that has been chosen in order to enhance the studies on the performance of flexure of RC beams made with a combination of FRP and Steel bars. From previous studies, it has been concluded that 0.25% of fibers are used as optimum dosage in terms of volume fraction in order to improve the behavior of flexure and ductility of beams made with a combination of Steel and FRP bars.

Key words : Glass Fiber Reinforced Polymer bar, Polypropylene fiber.

1 Introduction

Concrete is the most adaptable, long-lasting, and dependable building material on the planet. It is a sensitive material with profoundly contrasting malleable and compressive qualities since it has a high compressive strength yet a much lower rigidity. In many countries, the use of waste materials is beyond the capacity of the production company due to the increase in raw material costs and the continuous depletion of natural resources. Since the beginning of time, fibers have been utilized for reinforcement.
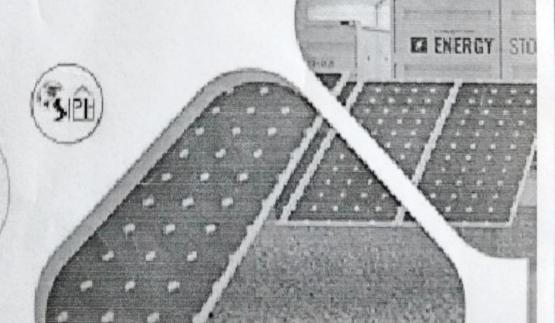
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FUNDAMENTALS OF
SOLAR PHOTOVOLTAIC
POWER SYSTEMS

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ENERGY STO

Optimal Placement of Micro-Phasor Measurement Units in Distribution Network using Pattern Search Algorithm

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Abstract—This paper presents a Pattern Search (PS) algorithm for optimal placement of Micro-Phasor Measurement Units (M-PMUs) in a distribution network to obtain complete observability through which security of network can be attained. By the distribution state estimation process, these M-PMU measurements can help to estimate the state of every node in the network. The pattern search algorithm is a nonlinear, constrained procedure used to optimize network locations for M-PMU placement. Redundancy bus nodes in the feeder network are considered in the optimization process to minimize PMU locations. The locations of M-PMUs with and without radial buses are compared. A redundancy index (RI) at the node and a complete network observabilty index (CNOI) for the entire network are proposed to assess network observabilty. The proposed indices can show whether the system is completely observable or not. Test cases that are MATLAB-programmed include the IEEE-13, 33, and 69 feeder networks. The effectiveness of the findings in the optimization of nonlinear constraints is shown by comparison with other widely used techniques.

Keywords—distribution systems; micro-phasor measurement units; observability; pattern search; Redundancy

I. INTRODUCTION

The majority of electric utilities in the world nowadays employ the supervisory control and data acquisition (SCADA) system to track and manage the distribution of electricity. Remote terminal units (RTUs), which are traditional measuring devices deployed in various parts of the power system, provide data to the SCADA system. It captures a few seconds' worth of unsynchronized voltage, current magnitude, and actual and reactive power flow. As a result, the present distribution network's dynamic behavior is not captured by the SCADA system. For the purpose of controlling, monitoring, and safeguarding power networks, the Phasor Measuring Unit (PMU) was introduced [1][2]. As a result of the PMU's GPS antenna, it may provide synchronized measurements in Transmission network [3]. But in Distribution network, Due to their large number of nodes, close proximity, minimal amplitude and angle discrepancies between nodes, rapid dynamics, and absence of standardized records, distribution networks are exceedingly complicated [4], [5]. As a result,

these complications have increased the demand for new, highly accurate, and precise monitoring systems that allow the development of situational alertness in distribution networks and empower the distribution controllers to make effective choices in response to such disruptions [6]. For distribution networks, the M-PMU or distribution-level (D-PMU) has been technologically advanced to enhance situational responsiveness and lessen this complexity. [7][8].

Micro-PMU is a power quality recording device incorporating a GPS receiver that enables very precise time stamping for voltage and phase angle measurement. The precision of the transmission system's conventional PMUs is $1°$, whereas that of the micro-PMU is $0.01°$. With high sample rates of 30 s for transmission and 120 s for distribution, Micro-PMUs are phasor measuring units that detect time-synchronized voltage and phase angle. Due to the differing X/R ratios than in transmission, distribution requires a higher level of precision since angle shifts and discrepancies are much smaller. When compared to a transmission system, defects like white noise and instrumentation errors have an impact on distribution measurements. These M-PMUs are more affordable to construct than the present commercial PMUs utilized in the Transmission network [9]. These M-PMUs may be installed and would provide the distribution grid a considerably greater resolution since they are less expensive than commercial PMUs. Many authors proposed Linear based algorithms and Heuristic algorithms for optimal placement in distribution network.

In this paper, A Pattern Search (PS) Method is proposed considering non-linear constraints of the network to find optimal locations in the network. Radial Buses in the network are considered to optimize the M-PMU Locations. Complete Network observability (CNOI) indices are formulated to attain security of the Network with measurements.

II. FORMULATION OF THE PROBLEM

A. M-PMU Allocation in Distribution Systems

Installing M-PMUs at each network node is not economically viable. Therefore, it is necessary to reduce the M-PMUs that will be situated in order to save costs. In order to

conference (3)

Control Strategy for Load Frequency Control in Power Systems with Electric Vehicle Charging Stations

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Abstract—The increasing usage of electricity in modern times has led to a rise in power system loads and a rapid increase in pollution caused by petrol and diesel vehicles. As a result, many individuals are transitioning to electric vehicles (EVs). However, charging EVs for extended periods can significantly impact the load on power systems, leading to frequency fluctuations that may damage the system. To mitigate these disturbances in interconnected systems, Static Synchronous Series Compensator (SSSC) is employed as a controller. SSSC is a Flexible AC Transmission System (FACTS) device that effectively reduces deviations in transmission lines, ensuring a steady-state frequency. This research paper aims to reduce frequency deviations caused by uncertain loads from EV charging stations by optimizing SSSC parameters using the RAT optimization technique within the MATLAB environment.

Keywords—Frequency fluctuations, Steady state, Interconnected System, FACTS, Electric vehicles, Settling Time, TCSC Controller.
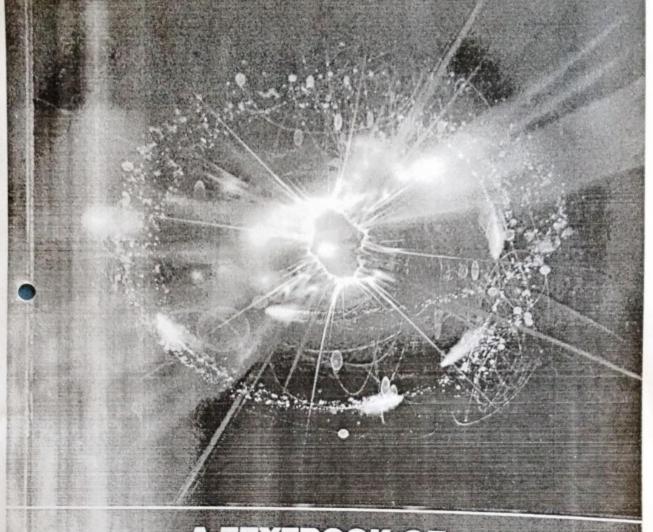
I. INTRODUCTION

In recent times, there has been a significant surge in the demand for electrical energy. For this Electrical demand there is a huge need of interconnected power systems to control the load frequency problems. Here, Electrical system is said to be interconnected when an Electrical system containing two or more interconnected with each other. Power systems consist of various interconnected systems interlinked with the transmission lines from one to another. Generally, the change in frequency occurs due to the differences between the generation of the system and load when the initial value of frequency in a power system changes to an instantly condition then, we have to implement the control technique to maintain a constant frequency.

In an interconnected power system, when an abrupt change occurs in load leads to change in frequency. At, this time the frequency will be decreased due to low generation of power & power will be deviated to transmission lines. If the load is increased the frequency automatically decreases to rectify this problem the speed controller (Governor) increase input of the turbine. In these days, the importance of load demand is increasing due to this; imbalance of loads may leads to fluctuations in load frequency. To overcome these problems various control strategies are developed. In many cases, we use several types of controllers such as, turbine, generator and governor. Also several controlling techniques are used for LFC with different controllers namely PID, PI, whale optimization technique, smart grids etc. And one of advanced version & efficient method for the controlling techniques is optimal controllers and optimal compensators. Optimal compensators are used to tuning of parameters frequency like in LFC. In recent times, the load demand is suddenly increasing because usage of several electrical gadgets at a time will results in fluctuations in load frequency in an interconnected system. To control all these problems several control techniques are used as explained above. The main aim of these techniques is to maintain a proper output and the power deviation between the transmission lines. This paper illustrates [1] [2010], Frequency fluctuations occur when there is an imbalance in load in a constant electric supply.

To overcome this, a new methodology is introduced i.e., Vehicle-to-Grid (V2G) which can be used as BESS (Battery Energy Storage System). It deals with the state of charge control technique to control frequency fluctuations. This paper illustrate [2] [2015], the CDM technique (Co-efficient Diagram Method) is used to conduct the load disturbances occurred in the power system. Here, HPWH and EV methods are used for control of frequency deviations heat pump water heaters works with dealing of uncertainties in the system. This paper illustrates [3] [2016], for controlling purpose of frequency deviations the author compared two navel algorithms such as SSA (Salp Swarm algorithm) & MVO (Multi-Verse optimizer). These algorithms are employed for the optimal tuning of PID controller. Here, ISE (Integral of Squared Error) is used for objective function. This paper illustrates [4] [2016] where the
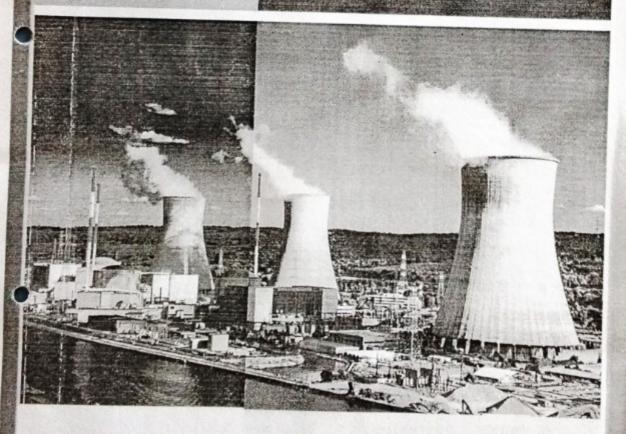
A TEXTBOOK OF
ENGINEERING THERMODYNAMICS

αIP

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CONCEPTS AND FUNDAMENTALS

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SPH

Chapter 13

Machine Learning and Artificial Intelligence in Disease Prediction:
Applications, Challenges, Limitations, Case Studies, and Future Directions

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ABSTRACT

Artificial intelligence (AI) based disease identification has the potential to transform medicine by utilizing machine learning algorithms and techniques to analyze large volumes of medical data and identify patterns and features that may be difficult for human experts to detect. However, there are still challenges and limitations to overcome, such as the need for high-quality medical data and concerns around privacy and bias. This chapter explores the growing intersection of machine learning (ML) and AI techniques with disease prediction. The chapter begins by providing an overview of ML and AI methodologies commonly employed in disease prediction, including supervised and unsupervised learning algorithms, deep learning techniques, and ensemble methods. Lastly, the chapter outlines future directions and research opportunities in the field.

Chapter 3
Data Analytics and Artificial Intelligence in the Circular Economy:
Case Studies

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ABSTRACT

This chapter discusses the implementation of data analytics and artificial intelligence (AI) in the circular economy. The case studies cover various domains, such as resource tracking and tracing, resource recovery, decision-making support systems, and machining optimization. The outcomes include improved supply chain management, extended product lifecycles, reduced waste generation, enhanced product quality, and cost savings. Data analytics and AI have the potential to shape a sustainable circular economy by optimizing resource utilization, improving processes, and enabling informed decision-making.

A Review on Hybrid Micromachining Process and Technologies

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Abstract

Materials always in demand in everyday life of human beings and industries need as per applications. Every material has its properties. As per the demand for the desired object, raw materials changed through different manufacturing processes (shown in Figure 12.1). The manufacturing process also plays an important role, and today's improvement and development prospects in the manufacturing process help in energy-efficient manufacturing processes. An advanced method was developed for hybrid-micromachining operations per desired object shapes. And still, a researcher is researching to improve the manufacturing and machining process to improve its limitations during work. To maintain a sustainable hybrid-micromachining and hybrid-microfabrication process for industries. This study provides an overview analysis in detail of the various hybrid-micromachining process bibliometric survey, classification and machining mechanisms and their effective utilization of process parameters in the hybrid-micromachining (nanolevel, macrolevel, and microlevel) domain with particular emphasis.

Keywords: Hybrid-micromachining, bibliometric survey, process development, material, applications, types, analysis

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Overview of Hybrid Micromachining and Microfabrication Techniques

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Abstract

Hybrid micromachining and microfabrication techniques utilize concurrent deed of two or more micromachining procedures with assistance of some vitality in removal of material to augment the advantages and diminish the prospective difficulties observed in specific material ejection methods. There are different instances, like compound processes, energy aided micromachining methods, thermally aided micromachining, pulse-aided micromachining, and combined hybrid micromachining processes. This study introduces a unique categorization and analyses of the previous and current exploration and functions of the hybrid micromachining and microfabrication procedures and emphasizing its influences on performance characteristics. Even though it is an enthusiastic research field

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ELECTRIC AND HYBRID VEHICLE

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ELECTRIC AND HYBRID VEHICLE

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Chapter 7
Internet of Things and Artificial Intelligence–Integrated Nano–Materials Research

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ABSTRACT

This chapter presents a system design and architecture that incorporates AI, IoT, and ML-based solutions for data collection, analysis, and interpretation in the nano-materials industry. It consists of three components: data acquisition, data analytics, and decision-making. The system incorporates robust security measures, such as authentication, access control, encryption, and Industry 4.0 principles, to ensure the security and privacy of data. The proposed system was used to collect, analyze, and interpret data from the production, resulting in improved quality, increased efficiency, and reduced waste. AI, IoT, and ML-based solutions have the potential to revolutionize nano-materials research and production, improving productivity, reducing costs, and improving quality.

Chapter 13
Biofuel Production, Bioremediation, and the Frontier of Synthetic Cell-Free Processes:
IOT-AI Integration

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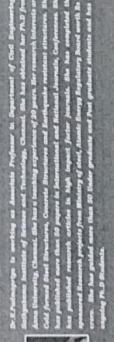
ABSTRACT

This chapter examines how synthetic cell-free processes, bioremediation, and biomass usage interact to promote sustainability and innovation. It emphasises biomass's potential as a source of renewable energy and for the generation of biofuels, concentrating on a variety of feedstocks and cutting-edge conversion methods. While synthetic cell-free methods offer customised biochemical reactions beyond biological cells, bioremediation employs microorganisms to reduce pollution. The chapter investigates how various disciplines might be combined to address environmental problems, emphasising moral questions, legal issues, and practical applications. The chapter seeks to shed light on a sustainable and peaceful future through case studies and technological breakthroughs. IoT-AI system streamlines biofuel production, bioremediation, and synthetic cell-free processes for efficient workflow.

FINITE ELEMENT METHODS

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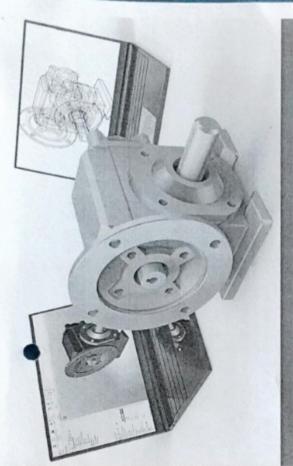
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FINITE ELEMENT METHODS

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Electronic Devices & Circuits

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ELECTRONIC DEVICES & CIRCUITS

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Comparative Analysis of Approximate Integer and Floating-Point Multiplier

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Abstract. The approximate multipliers allow saving power and area by deploying many other contemporary, error flexible, compute intensive application. In this manuscript, first discussed an original minimally biased approximate integer multiplier design method that can be configured with an error. The proposed MBM architecture by combining by an approximated 'Log' biased numeral multiplier of a specific error reduction mechanism. After that analysed a place of original estimated floating point (FP) multiplier. These are showing to facilitate these FP multipliers is on the Pareto obverse on the region designs space against power and error. Here used the 45-nm criterion cell library to synthesis the designs. When compared to the precise version we designed MBM integer offers 84% power reduction and 78% area reduction. The proposed estimated FP multiplier offers improved error effectiveness than the precise scaling. The discussed FP multiplier offers 57% power and 25% area improvements. It is a smaller amount of 4% error bias, 8% mean error and 28% of peak error.

Keywords: Approximate integer, Multiplier, Floating point, Computing, Power reduction

1. Introduction

Approximate computing is mainly used to decrease the gaps between the computing requirements and available processing resources. People who search or shown that highly compute-intensive are called error-resilient Example: multimedia processing and machine learning [1]. These applications to allow the existence of computational errors with the decline to low in the output feature. Unnatural error is allowed to develop these applications to achieve an easier and important system with the decline to low final output feature. These consist of a small number of dominated Kernels which related closely to multiplication [2], [3]. FP multipliers have to collect comparatively small observations for approximation than their integer equivalent FP multiplier are advisable in computing system due to the below conditions [4]. Approximate multipliers are large, thick in design space and it is popular. Which is offers a different off against source important arrangement as well as a compression [4], [5]. Hardware multipliers are two types 1. Integer multipliers. 2. FP multipliers in this paper a novel fault configurable modestly influenced approximate unsigned integer multiplier and number of approximation FP multiplier [6]. The advanced MBM multipliers are constructed to have very little error bias. Here shown that analysed error configuration MBM multiplier

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Deep Neural Network Inference via Edge Computing: On-Demand Accelerating

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Abstract. Deep Neural Networks (DNN) are a vital technology for allowing Artificial Intelligence applications in the 5G future, and they've gotten a lot of press. Complex DNN-based activities are difficult to run on mobile devices. Edge computing was introduced in this research as a solution to these problems. Edge makes use of two design features: DNN partitioning and DNN right-sizing. The training technique provides information about the training. Preserving Edge is a very dynamic filtering approach for video images. Filters for edge preservation are vital tools for the many tasks involved in image processing and transformation. Nonlinear algorithms calculated the filtered grey value according to the contents of a certain neighborhood. Only for the average pixels evaluated with the same grey values are these taken on the basis of the list of neighborhood pixels. While one of their common features is the conservation of the rim, each edge preserving filter is characterized by its own individual algorithm.

Keywords: DNN, Edge computing, AI, 5G, Filtering

1. Introduction

In Edge Artificial Intelligence (AI) is required for quickly processing large volumes of data and deriving insights. There is a tremendous need for edge computing and AI integration, which marks the start of edge artificial intelligence [1], [2], [3]. DNN harvests features layer by layer and combines low-level features to generate high-level features, allowing it to find dispersed expression of data and, when compared to the output of different layers, to simulate complicated mapping [4], [5], [6]. However, DNN is unable to perform effective training due to the gradient diffusion problem produced by its depth [2], [7], [8]. To resolve this issue, Cloud computing is becoming a computer paradigm. Gathering a large amount of idle compute power and storage space disrupted at network boundaries can provide enough capacity for mobile devices to conduct heavy operations [3], [4], [9], [10], [11]. Mobile Edge Computing (MEC)is the name given to this concept. While significant propagation delays are still a major issue of cloud computing, MEC has emerged as a key technology for cloud computing [5], [6], [12], [13], [14]. The edge-preserving filters have been constructed so that the measured images on "rime" are automatically limited, such as high gradients [7], [15], [16]. Having an anisotropic diffusion, for example, the motivation is that a Gaussian smoothed picture is essentially one-time part of the heat equation solution which has the real image first.

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Interference-Normalized Least Mean Square Algorithm: A Comparative Study

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Abstract. A general least mean square interference technique is provided for effective adaptive filtering. The gradient adaptive learning rate methodology can now handle non-stationary data with the Interference normalised least mean square technique. Because of issues like duplicate talk and echo route variance, echo cancellation is made more difficult because the learning rate must be adjusted. Frequency domain echo cancelers learn at different rates, which can be altered in a novel fashion. Normalized least mean square method normalised learning rate under noise is used to calculate an optimal learning rate. This double-talk detection technique exceeds the competition while also being incredibly simple to implement. A number of least mean square (LMS)-type algorithms have been investigated in place of their recursive equivalents of IVM or TLS/DLS, which involve large calculations. As a result of these findings, we provide a consistent LMS type technique for the data least squares estimate problem. This unique approach normalizes step size and estimates the variance of the noise in a heuristic manner using the geometry of the mean squared error function, resulting in rapid convergence and robustness against environmental noise.

Keywords: LMS, Speaker recognition, NLMS, Adaptive filtering, FIR filtering

1. Introduction

The least mean square adaptive filtering techniques are the most essential factor in the learning rate. In interference, it is in charge of the exchange of convergence speed and divergence [1-4]. The filter weights are updated such that they are near to the optimum filter weight, and the least mean square is determined. In this case, the incline succession algorithm is applied [5-6]. The process starts with minimal weights and updates them at each step by calculating the mean square error gradient [7-11].

The least mean square method with interference normalization adds interference signals to the normalization process. This method is used to improve the robustness of non-stationary signals. The filter input is normalized using the normalized least mean square algorithm [4, 14, 15]. Because the Gradient–adaptive learning rate technique fails for severely non-stationary interference signals, we created the Interference normalized least mean-square approach. They have a sluggish and data-dependent convergence pattern. Step size or learning rate refers to the rate at which weights are altered during training [2, 12, 13]. A flexible linear filter where the parameters determine the transfer

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Improving Speech Quality Using Deep Neural Network-Based Manipulation of Cepstral Excitation

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Abstract. The source-filter paradigm, which is used in human speech development, would be used in this proposal to increase speech quality. Excitation signals in the cepstral domain are amplified using a sophisticated neural network (DNN). As a result, they compared the effects of normalization on two different types of goals. Using the cepstral excitation manipulation approach (CEM) instead of traditional signal processing-based cepstral excitation, we were able to reduce noise by 1.5 dB. Studying various combinations of data demonstrates that envelope and excitation enhancement are also present. When adopting a low signal-to-noise ratio, good speech intelligibility can be achieved even with a lot of noise attenuation. It can be shown that a traditional pure stats system can attenuate noise better than its modern counterpart because it is older and has a larger sample size. Older classic pure stats systems use less processing power, hence they're more efficient. We've created a new a priori method for measuring SNR for voice-enhancement apps. The cepstral domain spectral envelope is estimated using a DNN. We can improve the quality of low-order noise models while also providing listeners with a natural and pleasurable background noise experience using our CEM approach.

Keywords: DNN, CEM, Cepstral analysis, Speech quality, Speech recognition

1. Introduction

The field of speech enhancement is one that's expanding and becoming increasingly important. In order to communicate in the most natural way possible, it aims to improve the quality of your voice and your ability to speak clearly. Noise coupling, echoes, and bandwidth restriction are all ways that speech communications might be distorted. To address this issue, a number of algorithms have been created and improved throughout time [1, 2, 3, 4]. Recent improvements in speech technology, which are state-of-the-art, are increasing the usage of new deep learning technologies, although single-channel noise reduction is still a problem. Standard DNN-based improvement models have a hurdle when analyzing huge signals in a frame-based manner, as shown in [5, 6, 7, 8, 9]. Sections following this one will cover some of the most recent changes [3, 11]. Following the DNN-based learning of spectral weighting rules, a sketch of less integrated

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Logarithm and Antilogarithm Converter with Accurate Error Correction

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Abstract. In this paper, an algorithm for logarithm converter and antilog converter with fast efficient error correction and efficient area is discussed. Here discussed a Binary-to-Binary logarithm conversion. As, a Binary logarithm is a replacement for an arithmetic operation like multiplication and division due to their fast response and less storage area. A different approach taken by various researchers related to this field to achieve an accurate error correction scheme in form of literature review. This is restricted, a few methods to achieve logarithmic and antilogarithm conversion have been discussing methodology. In this article discussed various parameters in which explained the various method of with respect to existing method to do the conversion of outperforms the previously reported method.

Keywords: Logarithm, Anti-logarithm, VLSI, Power consumption, Accurate error

1. Introduction

In the Modern Age we are living in is constantly striving for accurate solutions to various problems with less power and less collection storage area. Currently, arithmetic operations are the most basic of all data operations. Multiplication and Division are a subset of this, which takes enormous space and time to run [1, 2]. To deal with this problem, we use logarithmic multipliers to speed up the process with high precision to prevent delay. Logarithm Multiplication plays a vital role in digital signal processing, and image processing as they require efficient, error less and low power for an arithmetic operation to be performed. Basic steps to convert binary –binary logarithm (1) the first step is to convert the binary data into logarithmic values and perform the operation. (2) After the compilation, the antilogarithmic converter transforms the data into binary [3, 4]. The block diagram of this process is shown below in figure1. In general, for every method, errors are produced due to practicality" No system in the world is ideal". As for the plan of using logarithm converter and antilog converter may seem to be a good idea but it generates high errors [5, 6]. So many researchers have been worked on the devise and proposed various method to make the operation errorless and have succeeded to come closer towards efficient error correction, this paper discusses their works and proposes a method to decrease the error generated in its unique way [7, 8].

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A Study on Chebyshev Filter Design by Using CSD

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Abstract. A problem was identified as being caused by the Canonical Signed Digit (CSD) generated during the calculation and selection of filter coefficients for higher-order FIR filters, as revealed by the study that was provided. It is also discussed how to use a second approach, known as canonical signed digits-based coefficients computation, which provides a distinct advantage in the overall process of developing, selecting, and executing FIR filters, while also being more energy efficient in terms of power consumption. A software tool called CSDFIR, which implements the recommended design technique, can be used to generate Chebyshev optimum floating point and fixed point CSD FIR filters.

Keywords. CSD, Chebyshev, FIR, IIR, Digital filter

1. Introduction

In In digital applications, the FIR algorithm is a regularly used technique to solve problems [1], [2], [3], [4]. A major part of digital systems is made up of the fact that there is multiplier [3]. Filters can be made worse by the use of chip space multipliers, which can increase their size [5], [6], [7]. As a result, the designers of FIR filters have avoided creating filters that are unduly complex in their design. The degradation of the fixed-point coefficient is responsible for the degradation of the filter's performance [8], [9], [10], [16]. The number of non-zero digits in CSD FIR filters is much lower than in conventional FIR filters. The usage of CSD allows for the implementation of digital multipliers with more efficiency. The research of these may be carried out using a variety of methodologies such as Some examples of genetic algorithms are: simulated annealing, least-squares, mixed-integer linear programming, and two-stage search [11], [12], [13], [14].

A "gene" is a fundamental unit of heredity, similar to how a gene function in a biological system. Alleles, often known as alternate forms of genes, are different variants of the same gene [15], [16], [17]. When creating filters, a large multiplier is frequently required, signalling that the filters' coefficients will be expressed as floating-point numbers [6], [18], [19], [20]. Filtering techniques that use floating-point coefficients frequently result in filters that have coefficients that are too accurate, necessitating the use of multipliers with even more precision. More basic filters with the same level of speed but a somewhat higher level of complexity should be implemented in order to keep expenses low [7], [21], [22], [23].

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FPGA-Based System for Real-time Epileptic Seizure Detection using KNN Classifier

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Abstract: Epileptic seizure detection is a crucial task in the field of biomedical signal processing. Seizures are abnormal electrical discharges in the brain that can lead to various symptoms, such as convulsions, loss of consciousness, and cognitive impairment. People with epilepsy experience repeated seizures that happen suddenly and without warning. More than 70 million people worldwide suffer from epileptic seizure illness. Health professionals examine and identify the epilepsy in electroencephalography (EEG) signal using visual perception. The real time visual analysis of EEG signal is tough and challenging process. Therefore, it is essential to identify seizure event in EEG signal using a real time system in order to prevent patient from unexpected death. In this work Parks-McClellan algorithm was used to design the finite impulse response (FIR) filters, which can be used to remove the noise present in the EEG signals. The preprocessed signal is modelled using proposed weighted moving average model. From the modelled signal the features such as mobility feature, Fluctuation index and weighted spectral entropy features are extracted. The K nearest neighbor classifier is used to classify the seizure and normal EEG signal based on the extracted features. The system that has been developed employs the utilization of the Xilinx System Generator methodology on the Zynq-7000 fully programmable SOC (System-on-a-Chip) platform. This approach enables the implementation of a fully customizable and flexible system, utilizing the inherent capabilities of the SOC and the System Generator tool. Furthermore, the use of the Zynq-7000 platform enables integration of both hardware and software components, providing a more efficient and powerful solution.

Keywords— Epileptic seizure, Parks-McClellan, moving average, Zynq, KNN

I. INTRODUCTION

Epilepsy is the second most common neurological disease after stroke and is a very prevalent neurological condition characterized by seizures [1]. The primary function of electroencephalography (EEG) is to provide information on the brain's neuronal activity and helps to identify epileptic seizures using EEG. The major cause of epileptic seizures is due to inappropriate electrical interference in the brain. Direct examination of EEG signals by an expert is crucial for detecting the disease. Additionally, it requires extensive time and effort, and the final diagnosis may vary among different

experts [2]. The rapid identification of seizures can significantly enhance the patient's standard of living. Yao Guo et.al [3] proposed a mixed model classifier to reduce the data labelling task with improved performance. The seizure detection is performed using supervised learning easy ensemble algorithm and produce the accuracy of 92.6%.

To determine the beginning stage of the seizure, jiang-ling song et al. [4] created a system based on a model-driven methodology. The method enables the parameters to be optimized in order to describe the EEG signal. For the analysis of continuous EEG signal and amplitude integrated EEG signal, duanpo wu et al. [5] employed overlapping and morphological filter approach. Using a random forest classifier, the feature is classified with an accuracy of 99.23%. In order to build a multivariate technique for seizure identification, miaolin Fan et al. [6] studied the spatial-temporal synchronization. To track the transient of features in EEG signal, a statistical control chart is made according to the procedure. To identify nonconvulsive seizures in EEG data, aldana et al. [7] presented the Canonical Polyadic Decomposition technique. The accuracy of the experimental method utilising the Hilbert-Huang transform is 98%. A technique was developed by akira furu et al. [8] to explain the non-gaussian that results from random oscillations in EEG recordings. The high frequency band features that are extracted in this strategy produce higher categorization outcomes. A hybrid technique in edge gateway was used by Ali Kadhum et al. [9] to build a strategy for the internet of medical things. When compared to other existing strategies, this strategy improves the performance of compression power. A Poincare plot-based feature from an accelerometer device was used by Ali Kadhum idrees et al. [9]. The best features are chosen using ROC analysis, and classification is carried out using a kernelized support vector. A Hilbert transform-based technique was used by Hisham G. Daoud et al. [10] to diagnose epileptic seizure illness precisely. FPGA is used to analyse the system's real-time performance. A more effective epileptic seizure detection system was developed by prabin jose et al. [11-18] using FPGA and an extreme machine learning classifier.

The matching algorithm for machine learning is discussed by jaffino1 et al. [19-24] for image processing

Social Media Enhances the Happiness Levels of Various Age Groups in Society: An Empirical Study

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ABSTRACT

Social media is unavoidable in today's modern era. Most businesses and organizations have their existence virtually through these Social Networking Websites. It is the modern way of communication. The purpose of communication may vary but people use it for entertainment and as an engaging activity. Happiness is the major motto of human life. Every human being is in quest for happiness. Social media now provides another path in the search for happiness. In the present study it is brought forth the impact of social media on the overall happiness quotient of a person. It is seen that majority of the users feel satisfied, contented, and happy using social media. It is helping in filling relationship gaps also. It is the modern way of connecting people and has a lot of advantages to its credit but with a lot of negative impact on the society.

Keywords: Social media; happiness; satisfaction; entertainment; positive emotions; negative emotions.

1. INTRODUCTION

Social media is unavoidable in today's modern era. Most businesses and organizations have their existence virtually through these Social Networking Websites. It is the modern way of communication. The purpose of communication may vary mainly used for entertainment and as an engaging activity.

Web sites that allow social interaction are considered as social media sites, including social networking sites such as Facebook, Whatsapp, MySpace,

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A Comprehensive Analysis on Co-Saliency Detection on Learning Approaches

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Abstract- **Co-saliency recognition is a fast-growing field in computer vision. Co-saliency detection, a unique field of optical sensitivity, relates to the identification of shared and salient backgrounds from two or even more pertinent images, and it is broadly applicable to a variety of computer vision tasks. Various co-saliency detection techniques are composed of three modules: extracting image characteristics, examining informative signals or elements, and creating effective computer foundations to construct co-saliency. Even though several strategies have been created, there hasn't yet been a thorough analysis and assessment of co-saliency prediction methods in the literature. This work intends to provide a thorough analysis of the foundations, difficulties, and implications of co-saliency detecting. An overview is offered based on the connected computer vision works, investigates the detection history, outline and classify the important algorithms and address certain unresolved difficulties, explain the possible co-saliency identification applications as point out certain unsolved obstacles and interesting future appears to work.**

Keywords- Co-saliency, prediction, feature extraction, computer vision, optical sensitivity

I. INTRODUCTION

Many imaging devices, including digital photography and mobile phones, can store vast amounts of image and video information. Such information is readily available because to photo-sharing platforms like Flickr and Facebook.

Therefore, it is increasingly normal for individuals nowadays to see a big number of photographs that are often enormous in size and feature similar items or occurrences [1]. A collection of photographs offers deeper and more insightful information than a single image. Frequent patterns or prime foregrounds might reflect the image group's core content [2]. The co-saliency job is subsequently developed with the intention of developing efficient computing methods to provide robots these skills.

Co-saliency denotes the salient visual stimuli that are shared by all members of an image group. Co-saliency identification is a quantitative challenge that seeks to identify the shared and prominent foreground areas in a set of images [3]. Because the semantic subcategories of co-salient entities are unavailable, the computer must deduce them from the image group's content. Consider an image collection, an image are separated into four constituents: ordinary background (CB), common forefront (CF), unusual background (unCB) and unusual forefront (unCF). Finding the salient areas (foregrounds) from the available images is the problem of co-saliency detection [4]. The current co-saliency detection techniques primarily concentrate on resolving three important issues: i) collecting representative features to define the foregrounds; (ii) relevant signals or elements to characterise co-saliency; and (iii) creating efficient computational methods to construct co-saliency [5].

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Quantum Dots as a Versatile Tool for Bioimaging Applications

Shaik Baji Baba, Naresh Kumar Katari, Rajasekhar Chokkareddy and Gan G. Redhi

CONTENTS

12.1 Introduction

Many researchers are exploring the outstanding potentiality of QDs in biomedical research in medical imaging to develop sophisticated theranostic agents to indicate the potentiality of QDs in biomedical applications. Nanoprobes (nanoparticles, fluorescent proteins, and carbon/graphene-based nanomaterials) and semiconductor QDs have many applications themselves in bioimaging because of their size and optical properties [1]. The size of the QDs is smaller than the excitation Bohr radius. The small size property (1–10 nm) of these QDs is supreme candidate to identify and track the biomolecules inside the cells [2]. Moreover, carbon dots and red fluorescence emission are possible with QD semiconductors, which may be favored to color in biological imaging because of the autofluorescence property of cells in the range of 400–600 nm (like green, blue, and yellow). In targeting applications, QDs effectively target tumors or biomarkers and play a key role in cancer detection, monitoring, and diagnosis [1].

QDs, also known as semiconductor nanocrystals, have been introduced as a capable tool in life sciences due to their optical and physical properties, consisting of II-VI, III-V, or IV-VI elements in the periodic table [3]. QDs are remarkably stable at the time of excitation and contain typical absorption and emission spectra [4]. These nanoparticles are shown narrow emission peaks and the semiconductor QD fluorescence is brighter than the organic fluorescent dyes. Therefore, the visibility of particles is improved, and less laser intensity is required for the bioimaging process. These properties help biomedical researchers build a potential tool to express the importance of QDs in diagnosis and imaging. Many fluorescent materials (quantum dots, carbon dots, organic dyes, metal-organic frameworks) are designed, developed, and applied in several fields like biomedicine [5], sensing [6], photo-electrochemistry [7], and catalysis [8], etc. Compared to all QDs, CdS play a key role in developing the various fluorescent nanomaterials. QDs are now considered as potential candidates as luminescent probes and labels in life science applications such as disease diagnosis, biological imaging, and molecular histopathology [9]. Many studies have reported the use of QDs for sentinel lymph nodes for in vitro and in vivo imaging [10], tumor immune responses [11], tumor-specific receptors [12], and malignant tumor detectors [13]. Figure 12.1 shows the number of articles published using nanotechnology in biological applications during the last 10 years.

Many reviews addressed and explained various questions related to QDs, including recent developments in surface modification of QDs, cellular uptake mechanism, bioimaging, and structure–activity relationships. This review chapter has shown developments and applications of QDs in biomedical research, especially in bioimaging. This review gives an excellent understanding of why and how QDs are an important versatile tool in biomedical applications.

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Magnetic Nanocomposites and Their Biomedical Applications

Rajeshkar Chokkareddy, Raghavendra Vemuri, Nookaraju Muralasetti and Gan G. Redhi

CONTENTS

20.1 Introduction

"Nanotechnology" means the technology that performs on a nanoscale level by size and shape at the nanometer scale for design, production, characterization, and application. Renowned physicist Richard Feynman first described nanotechnology in a meeting held at the American Physical Society (APS), California Institute of Technology (CIT), in 1959, entitled "There Is Plenty of Room at the Bottom: An Invitation to Enter a New Field of Physics". The term "nano" comes from the Greek word "nano", which means "dwarf". One nanometer is designated as 1 nm and is equal to 10^{-9} m, which means one nanometer in length is approximately equivalent to the width of six carbon atoms or 10 water molecules [1, 2]. Development