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GEOMETRIC AND STATISTICAL MODELING OF LARGE-SCALE SPATIAL SIMILARITY USING FIBONACCI-BASED METRICS A CASE STUDY OF TERRESTRIAL AND CELESTIAL POINT NETWORKS

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ABSTRACT

Comparing large spatial systems is difficult when the elements belong to different physical domains and scales. In this work, spatial similarity is examined using a combination of geometric ratios, angular relationships, and statistical testing, with particular emphasis on Fibonacci-based proportions. The analysis focuses on whether structured point networks exhibit measurable correspondence that exceeds random expectation. The terrestrial dataset consists of summit points and geomorphological reference locations in the Bosnian Valley of the Pyramids, derived from LiDAR surveys and geodetic measurements. The celestial dataset is based on high-precision astrometric coordinates of the main stars of the Pleiades cluster obtained from the Gaia mission. Distances between points were normalized and compared using golden-ratio thresholds, angular separations were evaluated within fixed tolerance limits, and overall geometric similarity was assessed through rotation- and scale-invariant Procrustes alignment. Several inter-point relationships on the terrestrial landscape approximate Fibonacci proportions within a 2% deviation. Angular relationships between corresponding point sets converge within $\pm 2^\circ$, and Procrustes alignment produces a low root-mean-square deviation, indicating strong geometric similarity after normalization. To test whether such correspondence could arise by chance, 100,000 Monte Carlo simulations were performed using randomized point configurations constrained by the same spatial bounds. Only 2.1% of randomized cases produced equal or stronger similarity, yielding a p-value of 0.021. The results do not imply cultural intent or causal connection but demonstrate that the observed spatial coherence is statistically unlikely to be random under the applied constraints. The methods used here are reproducible and can be applied to other spatial modeling problems where proportional structure, orientation, and pattern similarity are of interest.

KEYWORDS

spatial similarity; Fibonacci ratio; Monte Carlo simulation; Procrustes analysis; Bosnian Valley of the Pyramids

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DEVELOPMENT OF AUTOMATED NUTRIENTS COMPOSITION CONTROL FERTIGATION SYSTEM

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ABSTRACT

Inefficient management of nutrient inputs has put a large constraint on the environment and human's health. Indiscriminate use of nitrogen and phosphorus fertilizers has led to ground water pollution. So the farmers has to pay close attention to nutrient management and incorporate the concept of balanced plant nutrition into their farming techniques. The balanced nutrition level to plant is provided by managing pH and Electrical conductivity level of fertilizer solution according to soil pH and electrical conductivity. Developed system comprises of two sensors to measure pH and EC of the fertilizer solution and soil. The output signals from the pH and EC electrode sensors are conditioned with the help signal conditioning cards and then interfaced to microcontroller through inbuilt ADC. Microcontroller will turn ON and OFF particular solenoid valve to pore the fertilizers into the mixing tank according to the pH and EC level in the mixing tank solution. LCD is used to display the computed results. pH and EC level of fertilizer solution is maintained on the basis of output readings of EC and pH sensors.

KEYWORDS

Fertigation, pH, EC, Acidity, Alkalinity, Electrical conductivity, Nutrients.

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DESIGN AND DEVELOPMENT OF AUTOMATIC WATER FLOW METER

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ABSTRACT

Effective irrigation water management begins with timing and regulating irrigation water application in a way that will satisfy the need of the crop without wasting water, soil and crop nutrients. This involves supplying water according to the crop requirement, quantity that can be held by the soil and is available to the crop at rates tolerated according to the soil characteristics. So measuring water in fields is very essential step in irrigation management systems. There are many water flow measurement techniques as well as different types of water flow meters used in irrigation to measure the volume of water flow in pipelines but these all are too costly. This paper describes design and development of low cost automatic water flow meter which supplies only required amount of water to the crops saving water as well as energy. G1/2 Hall Effect water flow sensor is used as a sensing unit with a turbine rotor inside it whose speed of rotation changes with the different rate of flow of water. The Hall Effect sensor outputs the corresponding pulse train for frequency input to the microcontroller. The whole system comprises of AT89S52 microcontroller, G1/2 Hall Effect water flow sensor, relay, optocoupler, a water pump, 5V supply, LCD, keypad and some passive components. The AT89S52 microcontroller is programmed in Keil development Tool.

KEYWORDS

Low cost sensor, Hall Effect sensor, rotation of rotor, flow rate of water, AT89S52 microcontroller, Keil software, Ultrasonic flow meter.

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COMPARING PROGRAMMER PRODUCTIVITY IN OPENACC AND CUDA: AN EMPIRICAL INVESTIGATION

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ABSTRACT

OpenACC has been touted as a "high productivity" API designed to make GPGPU programming accessible to scientific programmers, but to date, no studies have attempted to verify this quantitatively. In this paper, we conduct an empirical investigation of program productivity comparisons between OpenACC and CUDA in the programming time, the execution time and the analysis of independence of OpenACC model in high performance problems. Our results show that, for our programs and our subject pool, this claim is true. We created two assignments called Machine Problem 3(MP3) and Machine Problem 4(MP4) in the classroom environment and instrumented the WebCode website developed by ourselves to record details of students' coding process. Three hypotheses were supported by the statistical data: for the same parallelizable problem, (1) the OpenACC programming time is at least 37% shorter than CUDA; (2) the CUDA running speed is 9x faster than OpenACC; (3) the OpenACC development work is not significantly affected by previous CUDA experience

KEYWORDS

OpenACC, CUDA, empirical investigation, programming time, programmer productivity

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BASIC ANALYSIS ON PROSODIC FEATURES IN EMOTIONAL SPEECH

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ABSTRACT

Speech is a rich source of information which gives not only about what a speaker says, but also about what the speaker's attitude is toward the listener and toward the topic under discussion—as well as the speaker's own current state of mind. Recently increasing attention has been directed to the study of the emotional content of speech signals, and hence, many systems have been proposed to identify the emotional content of a spoken utterance. The focus of this research work is to enhance man machine interface by focusing on user's speech emotion. This paper gives the results of the basic analysis on prosodic features and also compares the prosodic features of, various types and degrees of emotional expressions in Tamil speech based on the auditory impressions between the two genders of speakers as well as listeners. The speech samples consist of “neutral” speech as well as speech with three types of emotions (“anger”, “joy”, and “sadness”) of three degrees (“light”, “medium”, and “strong”). A listening test is also being conducted using 300 speech samples uttered by students at the ages of 19 -22 the ages of 19-22 years old. The features of prosodic parameters based on the emotional speech classified according to the auditory impressions of the subjects are analyzed. Analysis results suggest that prosodic features that identify their emotions and degrees are not only speakers' gender dependent, but also listeners' gender dependent.

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TAXONOMY OF CLOUD SECURITY

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ABSTRACT

Cloud computing is envisioned as the next generation architecture for IT Enterprises, and has proliferated itself due to the advantages it provides. Cloud computing provides solutions for carrying out efficient, scalable and low cost computing. The pay per usage concept of Cloud computing increases the resource utilisation of a vendor's computing power and resources; at the same time, it results in reduced hardware costs for its users. It also provides access mobility, easier maintenance, scalability and operability in terms of its management and usage. Because of the facilities and solutions it provides to the industry for the next generation computing, it is vulnerable to a variety of known and unknown attacks from attackers. Hence, securing a Cloud environment is a critical problem that needs urgent attention. This article focuses on a taxonomy of possible attacks on a Cloud environment and a taxonomy of the defence. The attack taxonomy describes existing threats on Cloud security, and the defence taxonomy gives a classification of the various counter measures that can be taken to protect the Cloud environment from such attacks. The aim of this article is to provide researchers, academicians and industry with a better understanding of existing attacks and defence mechanisms on Cloud security. This is to provide a clear vision of the challenges that should be worked onto ensure next generation security for Cloud computing.

KEYWORDS

Cloud, security, attack, defence, Taxonomy, Intrusion, Detection.

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FPGA DESIGN FOR H.264/AVC ENCODER

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ABSTRACT

In this paper, we describe an FPGA H.264/AVC encoder architecture performing at real-time. To reduce the critical path length and to increase throughput, the encoder uses a parallel and pipeline architecture and all modules have been optimized with respect the area cost. Our design is described in VHDL and synthesized to Altera Stratix III FPGA. The throughput of the FPGA architecture reaches a processing rate higher than 177 million of pixels per second at 130 MHz, permitting its use in H.264/AVC standard directed to HDTV.

INDEX TERMS

H.264/AVC, Video coding, VHDL, FPGA architecture.

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PROPOSAL OF A TWO WAY SORTING ALGORITHM AND PERFORMANCE COMPARISON WITH EXISTING ALGORITHMS

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ABSTRACT

An algorithm is any well-defined procedure or set of instructions, that takes some input in the form of some values, processes them and gives some values as output. Sorting involves rearranging information into either ascending or descending order. Sorting is considered as a fundamental operation in computer science as it is used as an intermediate step in many operations. A new sorting algorithm namely 'An Endto-End Bi-directional Sorting (EEBS) Algorithm' is proposed to address the shortcomings of the current popular sorting algorithms. The goal of this research is to perform an extensive empirical analysis of the newly developed algorithm and present its functionality. The results of the analysis proved that EEBS is much more efficient than the other algorithms having $O(n^2)$ complexity, like bubble, selection and insertion sort.

KEYWORDS

End-to-End Bi-directional sort (EEBS), algorithms, selection sort, bubble sort, insertion sort.

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NATURAL LANGUAGE PROCESSING PIPELINE FOR CO-DESIGNING CULTURALLY AWARE HEALTH CHATBOTS FROM USER STORIES TO SYSTEM SPECIFICATIONS

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ABSTRACT

Designing culturally aware health chatbots for underserved communities is essential to advancing global health equity. A major challenge, however, is the conversion of contextual, often qualitative user requirements into technical specifications. In this paper, we present a natural language processing (NLP) pipeline for the co-design of culturally aware health chatbots. The pipeline systematically converts user stories into system specifications. By employing Large Language Models (LLMs), the pipeline automates the extraction of cultural and contextual requirements from user stories, which inherently counteracts biases from general AI models. By using the requirements engineering phase to direct attention to domainspecific and culturally relevant data, this approach ensures that the resulting specifications for chatbots are grounded in the realities of the communities they aim to serve. This approach does not only improve the efficiency of the design process, it also proactively embeds cultural sensitivity and inclusivity at the heart of AI-driven health solutions

KEYWORDS

Culturally Aware Chatbots, Health Natural Language Processing (Health NLP), Requirements Engineering, AI Bias Mitigation, Co-Design

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