IBTA 21

20th September ~ 23rd September; 2021

NATIONAL CONFERENCE
ON

IoT Based Technology & Analysis

CONFERENCE PROCEEDING

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Nalanda Institute of Technology, Bhubaneswar

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Department of Computer Science & Engineering and Electrical engineering
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ABOUT THE CONFERENCE

Science and Technology has continuously evolved through decades. IBTA 2021 was organized in Sep - 2021 and was successful in capturing the development of technology and solutions. Department of Computer Science & Engineering and Electrical Engineering, NIT, Bhubaneswar is organizing IBTA 2021 to showcase recent advances in technology and applications. In keeping up with the research interest of the community, IBTA 2021 will provide an update on scientific and technical aspects covering broad areas of interests in engineering and technology.

ABOUT THE DEPARTMENT

The Department of Computer Science & Engineering and Electrical Engineering has been in existence since 2007 with the inception of the college with an initial intake capacity of 60 and is producing high quality technical manpower needed by industry, R&D organizations, and academic institutions. The intake capacity was enhanced to 120 in the year 2011.The Department has full fledged faculty members who are specialized in the fields of web design, software solutions, languages etc. Laboratories are fully equipped to enhance the knowledge of the student, periodic industry trips and visits to various project sites are arranged. Special lectures and seminars are held on a frequent basis to assist them tailor in their particular areas of interest and trying hard to transform students of even mild talent to professionals in the software sector. Already more than 750nos of alumni have been produced so far, placed in different Government, private, Public & other sectors and some of them have pursued higher studies. However, with the progress of time, many more frontier areas of software and electrical engineering have been taken up for active research.

ABOUT THE INSTITUTE

Established in the year 2007, Nalanda Institute of Technology (NIT) is one of the premier engineering colleges in the self-financing category of Engineering education in eastern India. It is situated at temple city Bhubaneswar, Odisha and is a constituent member of Nalanda Educational Trust. This reputed engineering college is accredited by NAAC, UGC and is affiliated to BPUT, Odisha. NIT aims to create disciplined and trained young citizens in the field of engineering and technology for holistic and national growth.

The college is committed towards enabling secure employment for its students at the end of their four year engineering degree course. The academic fraternity of NIT is a unique blend of faculty with industry and academic experience. This group of facilitators works with a purpose of importing quality education in the field of technical education to the aspiring students. Affordable fee structure along with approachable location in the smart city of Bhubaneswar makes it a preferred destination for aspiring students and parents.

The Institute works with a mission to expand human knowledge beneficial to society through inclusive education, integrated with application and research. It strives to investigate on the challenging basic problems faced by Science and Technology in an Inter disciplinary atmosphere and urges to educate its students to reach their destination, making them come up qualitatively and creatively and to contribute fruitfully. This is not only its objective but also the ultimate path to move on with truth and brilliance towards success.

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VICE CHAIRMAN MESSAGE

On behalf of the Organizing Committee, it is my great pleasure to welcome you to National Conference on "Iot Based Technology and Analysis" (IBTA- 2021). In our endeavour to raise the standards of discourse, we continue to remain aware in order to meet with the changing needs of our stakeholders. The idea tohost the IBTA - 2021 is to bring together Researchers, Scientists, Engineers, Scholars and Students in the areas of Computer Science & Engineering and Electrical Engineering. The IBTA - 2021 Conference will foster discussions and hopes to inspire participants from a wide array of themes to initiate Research and Development and collaborations within and across disciplines for the advancement of Technology. The conference aims to bring together innovative academic experts, researchersand Faculty in Engineering and Management to provide a platform to acquaint and share new ideas. The various thematic sessions will showcase important technological advances and highlight their significance and challenges in a world of fast changes. I welcome all of you to attend the plenary sessions and invite you to interact with the conference participants. The Conference Committees will make any possible effort to make sure that your participation will be technically rewarding and a pleasurable experience.

I am looking forward to meeting you in during IBTA - 2021 and to sharing a most pleasant, interesting and fruitful conference.

With regards,
Prof. Malaya Kumar Padhi
Vice. Chairman
Nalanda Institute of Technology, Chandaka
Bhubaneswar, Odisha

PRINCIPAL'S MESSAGE

It gives me great pleasure to welcome you to the National Conference on "Iot Based Technology and Analysis" (IBTA 2021), which will take place from September 20–23, 2021.

This conference's goal is to spread knowledge among other educated people in addition to discussing current, hot topics in a certain field. Dramatic advancements have been made in engineering and technology over the years. I am hoping that IBTA - 2021 will turn out to be the most beneficial national conference devoted to showcasing the newest developments in engineering and technology.

We have asked eminent specialists to participate in the Technical Programs in order to give an exceptional technical level for the conference presentations. Technical seminars and keynote plenary sessions will be held.

I hope IBTA - 2021 will make you aware of state-of-the art systems and provide a platform to discuss various emerging technologies in Computer Science & Engineering and Electrical Engineering.

With regards,
Prof. (Dr.) N.H.S. Ray
Principal
Nalanda Institute of Technology, Chandaka
Bhubaneswar, Odisha

CONVENER'S MESSAGE

National Conference on "Iot Based Technology and Analysis" (IBTA-2021) is a prestigious event jointly organized by Computer Science & Engineering Department, Electrical Engineering Department with a motivation to share a progress in recent technologies. The objective of IBTA-2021 is to present the latest research and results of scientists (preferred under graduate and post graduate students, research scholars, post-doc scientists, academicians and working professionals) related to the subjects of Computer Science & Engineering Department, Electrical Engineering Department. The conference will provide with paper presentations and research paper presentation by prominent speakers who will focus on related state-of-the-art technologies in the areas of the conference.

I wish all the success to the conference IBTA - 2021.

**With regards,Prof.
Narottam Sahu**

Professor and HOD of Computer Science
EngineeringNalanda Institute of Technology,
Chandaka Bhubaneswar, India

CONTENTS

Reusing Solutions and Tightening Bounds for Efficient Analysis of Evolving SystemsReusing Solutions and Tightening Bounds for Efficient Analysis of Evolving Systems

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ABSTRACT

Formal verification of software has long been a vital part of engi- neering dependable, safe software systems [2, 3, 6, 12, 20, 24, 27, 34, 40]. Performing such analyses, however, is often an expensive en- deavor, facing scalability issues, particularly for large and complex software systems like those that drive our modern world. Software systems also change frequently over their lifecycle in response to changes in configuration, routine maintenance, and user-initiated operations (to name a few reasons), requiring repeated analysis and thus repeated payment of the costs of formal analysis. In today's fast-moving software development environment, the high cost of formal verification may be prohibitive for rapidly evolving systems, despite the benefits it can offer for reliability, safety, and security.

Many researchers are actively seeking to improve the scalability and adoption of formal verification techniques, including applying those techniques to evolving systems. In particular, using bounded model checking to analyze evolving software specifications and changing configurations (e.g., for self-adaptive systems) has been an active research topic in recent years [4, 7, 8, 14, 28, 31, 37, 39, 41]. Many of the proposed techniques approach the problem in one of two ways: (a) finding ways to incrementally reuse portions of prior solutions [5, 37, 39, 41] or (b) tightening the bounds of the analysis to reduce the search space [4, 8, 16, 22]. Both general approaches serve to limit the work done by the solver with each iteration, but each of the specific realizations comes with its own limitations.

KEYWORDS

formal analysis, bounded verification, speculative analysis

1. INTRODUCTION

Formal verification has long been used by software developers to ensure the reliability and validity of their system designs. Their models must adapt as the system changes, frequently through predictable, domain-specific operations, necessitating that system designers repeatedly carry out the same formal proof on related system models. Modern formal verification methods can be costly in scale, and the price is increased by additional analysis. This paper presents a novel analysis method that can automatically identify domain-specific optimizations that can significantly lower the cost of frequently analyzing evolving systems. This method is implemented in a tool called SoRBoT. Different from all prior approaches, which focus on either tightening the bounds for analysis or reusing all or part of prior solutions, SoRBoT's automated derivation of domain-specific optimizations combines the benefits of both solu- tion reuse and bound tightening while avoiding the main pitfalls of each.

Partitioning-based high performance look-ahead binary counter

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Abstract

One of the key elements frequently used in VLSI design is the synchronous binary counter, which is needed to be quick and handle a wide bit-width in many applications. Unfortunately, the majority of earlier counters have a low counting rate due to wide fan-outs and protracted carry chains, especially when the counter size is not modest. In the proposed work, a new efficient structure for synchronous binary counting is intended supported partitioning and has a short counting duration for realistic counter sizes ranging from 8 to 128 bits. We first adopt an 1-bit Johnson counter to scale back the hardware complexity, and so duplicate the 1-bit Johnson counter to decrease the propagation delay caused by large fan-outs. within the proposed counter architecture, an N-bit counter is realized by partitioning it into three subcounters, C1, C2, and C3. Subcounter C1 is an 1-bit counter that toggles between 0 and 1 every clock. Subcounter C2 is an (n-1)-bit counter that works supported the backward carry propagation, and therefore the last subcounter C3 is an (N-n)-bit binary counter supported look ahead logic. In order for the clock edge to activate all modules simultaneously and update the count state concurrently with the same delay in the fewest counting path modules/stages relative to the clock edge, the state look-ahead path prepares the next counter state for the counting path before the clock edge. The proposed design can be implemented with a small number of flip-flops, which is almost linear to the counter size, and it can run at a high clock frequency, according to implementation results.

Keywords: Back ward carry propogation; Prescaled Counters; State lookahead logic

Regression Test Selection Using Oracle

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Abstract — By choosing a portion of the test cases for a software system to be used in testing changes made to that system, regression test selection (RTS) techniques try to lower the expenses associated with regression testing. Particularly when used with industrial systems like those created at ABB, where code changes may have broad effects, RTS approaches may choose too huge sets of test cases. In this research, we introduce a novel RTS approach that solves this issue by concentrating on particular sorts of defects that can be identified by internal oracles, oracles (rules) that impose constraints on system states during system execution. Program chopping is a technique we employ to find code changes that are pertinent to internal oracles and then choose test cases that cover those changes. We present the results of an empirical study that show that our technique is more effective and efficient than other RTS techniques, relative to the classes of faults targeted by the internal oracles.

INTRODUCTION

Regression testing is a testing process used to validate modified software and detect whether new faults have been introduced into previously tested code. In practice, regression testing can be expensive. To address this problem, researchers have investigated various strategies, including techniques for regression test selection and test case prioritization ([1] pro- vides a survey).

In this work, we are interested in regression test selection (RTS) techniques. RTS techniques select, from an existing test suite for a system, test cases that are relevant to a modified version of that system, and that are less expensive to execute than the complete suite. While empirical studies of RTS techniques (e.g., [2], [3]) have shown that they can be cost-effective, they have also shown that in certain cases these techniques may yield no benefits. In particular, in large industrial systems such as those developed at ABB, code modifications made for new product versions often have far- reaching impact on the rest of the system's code [4].

Information Foraging Theory Perspective on Predator Behavior in the Wild Web World of Bugs

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Abstract—Online mashups are frequently used by online users to combine web information. Debugging mashups is made more difficult by the constant evolution of web contents and the black box nature of visual languages. Debugging involves end users to detect errors in the code and then figure out how to fix them; this process necessitates that they look up details about the behaviour and content of web pages. In this article, we qualitatively examine the debugging behaviours of 16 web-active end users via the lens of information foraging theory. . Our findings indicate that the more potent scents that are available in mashup programming environments can increase users' success when foraging. Our findings help create a new information foraging theory-based model for debugging activities and improve understanding of how end-user programming environments may be improved to enable debugging..

1. INTRODUCTION

A "web-active end user" is a person who engages in many internet activities, but lacks programming expertise [34]. For many such end users, the web has become a vital part of day-to-day life. It has been estimated that 34.3% of the world's population and 78.6% of the North American pop- ulation use the internet [20]. The web, however, is content rich, and finding ways to effectively and efficiently access the information it provides can be challenging. Thus, web- active end users would often like to be able to "cobble together" various sources of data, functionality and forms of presentation to create new services [34]. Web mashups provide one approach to facilitate this. Web mashup environments such as Yahoo! Pipes [33], IBM mashup maker [12], and Deri pipes [5] allow non-programmers and programmers alike to compose various sources of data by taking advantage of dataflow concepts and visual interfaces. These environments ease the task of application development by end users.

Most web mashup programming environments deal with information that is collected at a given point in time. How- ever, web contents change frequently [6], and this can cause mashups to fail, as the sources of data on which those mashups depend change. In fact, in one study of one particular mashup domain [15], it was noted that 64.1% of a large set of mashups had become erroneous due to the evolution of information on which they depended. Complicating this need is the fact that mashups tend to utilize various components in "black-box" manners, and this adds layers of abstraction to the problem of understanding and debugging them.

Faced with a program failure, programmers must "forage" through code and related information to identify and correct

R (, m) C Reformulation Using Tree Decomposition

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Abstract

The success of constraint processing depends heavily on local consistency properties and strategies for enforcing them. Lately, we have shown the value of higher consistency levels and the efficiency of their methods for resolving challenging situations (Karakashian et al. 2010; Woodward et al. 2011). Our algorithm for the relational consistency property R(, m)C is improved using two reformulation strategies in this research (Karakashian et al. 2010). Both methods make use of a tree decomposition, or network embedding, of the constraints in a constraint satisfaction problem (CSP). Our first reformulation method uses the decomposition tree's structure and the backtrack search's current state to cut out pointless steps from our algorithm and improve its performance. The T-R(, m, z)C relational consistency property, which is strictly stronger than R(, m)C, is our second contribution. To achieve this property, the constraint network's structure is changed, and new redundant constraints are added to the CSP at the intersection of two tree decomposition vertices (Rollon and Dechter 2010). By employing the Backtracking with Tree Decomposition (BTD) method (J'egou and Terrioux 2003), we show the benefits of the two reformulations that have been suggested.

Introduction

Consistency propagation algorithms are at the heart of solving Constraint Satisfaction Problems (CSPs). Arc consistency has been widely used and improved over the years, and recent studies demonstrated the effectiveness of high levels of consistency properties (Karakashian et al. 2010; Woodward et al. 2011). In this pa- per, we present the algorithm PROCESSMQ as an im-

manages the relation updates, loops through all the re- lations until quiescence. PROCESSMQ is a reformula- tion of the algorithm PROCESSQ that does not loop when certain condition is met, and omits unnecessary checks during Backtracking with Tree Decomposition (BTD) (J´egou and Terrioux 2003).

A tree decomposition of a CSP is a tree embedding of the constraint network (Dechter 2003). The nodes of the tree are *clusters* of CSP variables and relations. The intersection of two adjacent clusters in the tree is, a *separator*, is the set of variables common to the two clusters. A tree decomposition can have the property where the variables in the intersection of every two clus-ters are a subset of the scope of a relation in one of the clusters. When this situation holds, we say that the *separator is covered by the relation*. When every sepa- rator is covered by a single relation, R(, m)C can be enforced by ordering the relations and checking them in only two passes: starting from the relations in the leaf clusters, via the parents to the root, and back to the leaf clusters. Quiescence is reached without having to loop. For example, the hinge (Cohen, Jeavons, and Gyssens 2008) and hinge+ (Zheng and Choueiry 2005) tree decompositions fulfill this condition. The refor- mulated algorithm PROCESSMQ[*] exploits this situation to reduce the propagation effort without affecting the filtering effectiveness.

Analysis of Lightning Phenomena for Underground Petroleum Pipeline System

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Abstract

This article presents an analysis of lightning phenomena and guidelines for the protection of an underground oil pipeline system, considering the continuity of electric power after a lightning strike. The transient output is convolved using a mathematical program (ATP EMTP) to simulate a standard 10/350 microsecond waveform associated with multiple dimensions. In this study, physical properties are converted into electrical properties, such as pipe metal, pipe insulation, corrosion protection circuit wires, and grounding as analysis parameters. As a result of this simulation, it was found that the transient voltage increases higher when the length is longer and greater than the safety limit of the pipe corrosion protection devices. Appropriate characteristics of lightning protection devices were used in this study to limit this overvoltage. Based on the simulation result and the corresponding characteristics of the lightning protection devices, the transient voltage was limited according to BS 60950. The result showed that the correct lightning protection devices help to reduce the damage caused by lightning to the assets of the oil transportation industry**.**

Keywords: Pipeline; Lightning; Impedance; Transient; Induced voltage

Possibilities for Cut-Through Switching with OpenFlow in a MobilityFirst Network

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Abstract— The Internet is predicted to increasingly rely on mobile devices. Because mobility was not a primary factor while designing current protocols, such as TCP/IP, they perform poorly in demanding mobile and wireless environments. MobilityFirst, a proposal for a brand-new architecture, includes a number of fundamental ideas centred on secure identifiers that naturally enable mobility and dependability as important criteria of the network architecture. In order to accommodate mobility, this also contains a hop-by-hop segmented data transmission that permits late and dynamic rebinding of endpoint addresses.

Even in parts that are stable, like the core, there are some overheads even though this leads to crucial improvements in wireless segments. In these situations, layer 3 decisions can be avoided by using lower layer cut through forwarding to increase the profits. This work introduces an universal bypass feature that could improve performance and enable both individual and aggregate flow-level traffic control within the MobilityFirst architecture. Also, we provide a thorough OpenFlow-based design that uses layer 2 VLAN tagging to go around MobilityFirst's layer 3 routing. Lastly, we demonstrate a working prototype that demonstrates how to implement the bypass using OpenFlow.

INTRODUCTION

Mobile devices are becoming dominant in current networks and significant core architecture changes have been proposed to support them. Current protocols such as TCP/IP were not designed with mobility as a key design requirement. The infe- rior performance of these protocols in highly mobile networks and the increasing number of mobile devices has motivated the research community to design Future Internet architectures that consider mobility as a key design requirement [1], [2], [3]. MobilityFirst [1], [4] is a project funded by the NSF FIA program that designs a mobility-centric architecture for the future internet. MobilityFirst supports secure identifiers that inherently support mobility and trustworthiness. These mechanisms greatly enhance the support of mobile devices in the network. In the MobilityFirst architecture, data is transmitted between adjacent routers in a hop-by-hop manner. Entire chunks of data are received at the next hop before being forwarded again. Also, routing decisions are performed at each hop to ensure proper delivery if a node has disconnected and connected to another point of the network. However, this process also increases the delay needed to send data in a hop
by hop manner [1].

Certain segments of the network are stable and allow exceptions to the storage and routing delays. If we know that a node will remain connected to the same access point for a period of time, we do not need to make routing decisions at every hop between the source and the destination. Also, segments within the core of the network are exempt of mobility requirements. In scenarios like this, it is possible to bypass the routing layer of MobilityFirst.

Implementation of Efficiency Generation of Microgrid from Solar Power Plant

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Abstract

Solar energy is produced from sunlight, which is an inexhaustible renewable source of energy that is not environmentally friendly. Every hour, enough sunlight reaches the Earth to cover the world's energy needs for an entire year. In today's generation we needed electricity every hour. This solar energy is produced in applications such as industrial, commercial and residential. It can easily absorb energy from direct sunlight. So it is very efficient and environmentally friendly. In this article, we looked at sunlight solar energy and discussed its future trends and aspects. Distributed solar power plants, the energy-efficient storage (ES) of the system are an installation system. The special feature of the proposed model is the location of the installation locations of the powerful active filter compensating devices, the use of which makes it possible to ensure the necessary quality of electrical energy and to achieve the lowest possible energy losses in the energy supply elements. . System Based on the results of the simulation, a comparison of the energy efficiency of the traditional energy supply system and Targa Võrgu was made.

Key Words: Solar, MPPT, ESS, Grid,Battery

Big Data: It's Importance

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ABSTRACT: Researchers and businesses alike are growing more interested in big data analytics as the need to analyse trends in massive datasets grows. As sensor networks and cyber-physical systems develop, the amount of data collected in the fields of health care, social media, smart cities, agriculture, finance, and education has increased dramatically. Data from sensors, social media, and financial records are intrinsically unreliable because of noise, incompleteness, and consistency issues. This article accomplishes two goals. The article also discusses various big data tools and their unique characteristics. Although there are numerous potential directions for research in these domains, the goal of this article is to facilitate both their discovery and the creation and application of the best Big Data techniques. It will be possible for researchers to learn about current trends as well as prospective future paths in this quickly expanding sector. This article examines big data, its difficulties, its future prospects, as well as the Big Data Analytics techniques employed by many businesses to assist in the making of sound investment decisions. On the other hand, the scope of this research is restricted to big data concepts and the problems they can resolve. The purpose of this study is to examine the issues and barriers that are becoming more prevalent in this new industry.

KEYWORDS: Analytics, Big Data, Data Analytics, Machine Learning, Natural Language Processing.

1. INTRODUCTION

Big data is a prominent issue in today's business world. Data collection and storage by companies all over the globe has skyrocketed in recent years, and accessing and analyzing this data has never been more important. We used to refer to predictive analytics or other methods for extracting value from data as "big data," which refers to data sets that are too large or complex for conventional data processing technologies. To explore the depths of big data, businesses depend on raw storage and processing capacity, as well as strong analytical skills and experience [1].

Big Data is a cutting-edge technology that, for the first time in human history, has made groundbreaking discoveries accessible in real time. Businesses, governments, and even non-profit organizations may all benefit from the insights provided by big data analysis. This trend will expand in 2018 because of data analytics and become much more common. Shopping malls or shops can observe, and travel companies may monitor, which locations their customers to decide which products are in demand and bestselling at particular times of the day most frequently search. The phrase "data analytics" is used to characterize this technique [2]. With smart watches, eyeglasses, and even smart clothes, there will be a data collecting mechanism all over the world. Big data is most frequently used in marketing, sales, IT, healthcare, and finance. Organizations are seeing more and more long-term possibilities for big data in areas like risk management and logistical planning as big data's reliability grows. Dense data, on the other hand, has its own set of issues to deal with. However, we tend to overlook this technology's potential because we do not completely comprehend its capabilities and are concerned about data security and privacy, particularly in light of the recent Facebook data leak. Data quality problems, as well as compliance with local and international data usage laws, are some of the roadblocks. A company that solely uses low-quality data is susceptible to inefficiencies, which may lead to wasted time, sales, and profits [3].

An Effective Fault Recovery Algorithm for Mixed-Criticality Multiprocessor Systems

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Abstract— In recent years, the automotive, avionics, and control industries have shown an increasing interest in integrating mixed-criticality features into a shared computing platform. High computational performance and lower hardware costs are two advantages of such integration. The integration also creates additional difficulties since it introduces conflicts between tasks of varying criticality, and these conflicts have the potential to have disastrous consequences. Due to the interferences, failures are probably to occur more frequently. Thus, it is crucial to cope with errors in systems with mixed criticality. Although several methods have been suggested to deal with failures in mixed-criticality systems, they either have a high cost because of hardware replication (spatial redundancy) or have a poor utilisation since they must be repeated (time redundancy). In this article, we examine a method for multiprocessor mixed-criticality systems that offers fault recovery through task reallocations in the event of persistent problems. We offer a method to reduce task reallocations while still guaranteeing that the most important applications will continue to meet their deadlines. By contrasting the suggested method with two baseline algorithms, its performance is assessed. We select the state-of-the-art metric known as ductility to explicitly measure the effects of deadline misses for jobs with various criticality levels in order to assess algorithm performance from the viewpoint of mixed-criticality systems. According to this metric, a high-criticality work is valued higher than the sum of all low-criticality activities. The simulation results demonstrate your proposed algorithm's efficacy in lowering the number of task reallocations while maintaining the performance of high-criticality jobs as promised..

I. INTRODUCTION

Modern large embedded real-time systems, such as those in avionics, automotive and robotics applications, typically comprise many diverse functions with different criticality levels. Traditional approaches implement the system using an independent architecture. In such an architecture, the functions have separate, dedicated devices for their software execution. With each control functionality running on its own computer system, all associated cost of acquisition, space, power, weight, cooling, installation, and maintenance increases. In addition, the lack of properly integrated control caused by the artificial separation of functions is one of the most common root causes for many design, integration, quality, and performance problems [9].

To address the challenges of integrating more intelligent, complex and cooperating controls in advanced embedded real-time systems, the integrated architecture is proposed and advocated. The key characteristic of integrated architecture is that functionalities of different criticalities are consolidated onto a shared computing platform. However, such sharing also introduces interferences across tasks which could poten- tially lead to catastrophic results [8]. Failures are likely to be more frequent due to the interferences across tasks in mixed- criticality systems.

A Review on Modified Teen Protocal to Improve the NetworkLifetime of WSN

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Abstract: WSNs are used in environmental monitoring, security, medical applications, etc. The sensor nodes are usually randomly deployed in a specific region. These sensor nodes collect their data and send it to the Base Station (BS) via some routing protocol. These nodes cannot be recharged from time to time to keep them alive. They must follow a protocol which must ensure the efficient use of their power, so that those nodes may serve as long as possible without any external assistance. A routing technique plays a key role in their energy consumption. Many of the routing protocols use clustering as their routing technique. So clustering plays a very important role in prolonging the stability period and network life time. The Cluster Heads (CHs) collect the data from all the nodes in their cluster, aggregate it and then finally send it to the BS. These sensor nodes must follow a certain routing protocol to send their data efficiently to the BS. The main objective of all routing protocols is to minimize the energy consumption so that the network lifetime and particularly the stability period of the network may be enhanced. By network lifetime we mean the time duration from the start of the network till the death of the last node, whereas, stability period means the time duration from the start of the network till the death of the first node. This has object to develop an energy efficient increased lifetime threshold sensitive clustering algorithm by dynamic selection of cluster heads using multi-hops and multi-path, that leads to load balancing on different-different clusters. This results in the enhancement of cluster heads or normal nodes network lifetime and comparison of performance of the proposed protocol with TEEN. In this work we propose an energy efficient multipath routing algorithm in WSN. This protocol is designed to improve the latency, resiliency and efficiency through discovering multiple paths from the source to the destination.

Keywords: Teen protocol, WSN, energy-efficient, delay, network life time, Average energy

I. INTRODUCTION

Advances in wireless communication made it possible to develop Wireless Sensor Networks. Wireless Sensor Networks, also abbreviated as WSN, are the new fast evolving technology that have been successfully utilized to perform the function of monitoring of the socio-economic areas, environmental conditions, in military applications, home applications and many more commercial applications. They consist of spatially distributed sensors which supervise physical or environmental conditions, such as temperature, sound, pressure, etc. The information collected by these sensors is then passed to the main location through their whole network by using the interaction amongst themselves. (Fig. 1).
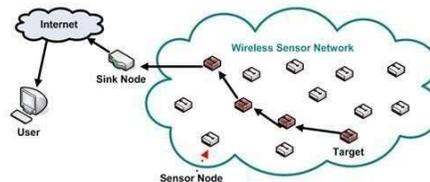
Fig. 1 Wireless Sensor Network [1]

Closed Loop Speed Control of Induction Generator with Scalar-Control Inverters

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Abstract

A closed-loop speed control of an induction generator is presented. A system was developed for a space vector modulation voltage inverter and a three-phase squirrel cage induction generator to control the speed and generator voltages using a scalar control technique. The purpose of this study was to generate voltage at a constant rate with variable mechanical torque from the power supply. The simulation results show that the proposed speed controller can achieve good system performance.

Keywords: Induction generator; speed control; scalar control; voltage source inverter

Evolution and Approaches for Thermal Analysis of Electrical Machines

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Abstract

In this article, the authors present an extended overview of the development and modern approaches of thermal analysis of electrical machines. Improvements and new techniques proposed over the past decade are thoroughly analyzed and compared to highlight the strengths and weaknesses of each. This article specifically looks at thermal analysis based on collected parameters, finite element analysis and computational fluid dynamics. In addition, an overview of the problems related to the determination and calculation of thermal parameters is proposed and discussed. Given the objectives of this article, a detailed list of books and articles is provided in the references to assist researchers interested in these topics.

Keywords: Computed fluid dynamic; Electrical machines; Finite-element analysis (FEA); Lumped-parameter thermal net-work (LPTN); Thermal model; Thermal parameter identification.

Detecting Errors in State Diagrams with Multiple States

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Abstract
In order to identify anomalies in UML multiple state and sequence diagrams, this study introduces Super State Analysis (SSA). The SSA model makes use of a transition set to record relationship details that are not specified in UML diagrams. The transition set is used by the SSA model to connect the transitions of several state diagrams. Automatically, the analysis produces three separate sets. To find inconsistencies, these created sets are compared to the supplied sets. Because SSA considers multiple UML state diagrams, it discovers inconsistencies that cannot be discovered when considering only a single UML state diagram. The analysis identifies five types of inconsistencies: impossible super states, unreachable super states, illegal transitions, missing transitions, and illegal sequences.

Keywords: UML, Modeling Languages, State Diagrams, Sequence Diagrams.

CONTRIBUTION OF EACH ARTICULATOR TO THE PRODUCTION OF PHONEME

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ABSTRACT

Individual articulators move in concert to produce speech sounds. Knowing how each articulator contributes to speech production is essential for both improving speech evaluations and treatments as well as understanding how speech is created. In this study, we examined how the six articulators—tongue tip, tongue blade, tongue body front, tongue body rear, upper lip, and lower lip—each individually contributed to the classification of phonemes. Eleven native English speakers provided 3,838 production samples of vowels and consonants. The tongue encodes substantially more information than the lips, according to the results of speech movement classification using a support vector machine, and the tongue tip may be the most crucial individual articulator among the six for phoneme production. Additionally, our findings indicated that for the purpose of identifying significant English phonemes based on articulatory movements, the surveillance of four articulators—namely, the tongue tip, tongue body back, upper lip, and lower lip—might be sufficient.

1. INTRODUCTION

Although most talkers produce speech effortlessly, the underlying coordination required to produce fluent speech is very complex involving dozens of muscles spanning the diaphragm to the lips. How exactly speech is produced is still poorly understood [1]. One major barrier to speech production research has been the logistic difficulty of tongue motion data collection [2]. Fortunately, recent advances in electromagnetic tracking devices have made speech production data collection more feasible. Tongue tracking using electromagnetic technology is accomplished through the placement of small sensors (or pellets) on the surface of the tongue. In prior work, the number of tongue sensors and their locations has been justified based on long-standing assumptions about tongue movement patterns, or the specific purpose of the study. It is, however, not clear how many sensors are adequate for a particular study because the individual articulator's contribution to the articulatory distinctiveness of phoneme production has rarely been studied.

Determining a minimal set of tongue sensors is important for optimizing (1) silent speech interface technologies designed to assist individuals with laryngectomy

Minimum Clock Period 64 Bit Binary Counter

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Abstract

In this project, brand-new synchronous binary counting forms with a single minimum counting period are designed. Several applications call for a synchronous binary counter because of its speed and ability to support a wide bit-width. Fundamentally, early counters had a limited counting rate due to enormous fan-outs and lengthy carry chains, especially when the counter's size is not modest. It uses a single-bit Johnson counter to reduce hardware issues overall, then copies it to reduce propagation latency brought on by large fan-outs. In this paper, re programmable the clock utilized in it for various applications functioning at different clock rates and there'll be a variation within the delay values because the clock is reprogrammed the critical may varies for various rates. The counter output results are obtained for various bit up to 64 and therefore the design provides various clock rates with variations in area and delay.

An Effective Water-Filling Algorithm for Power Distribution in Cognitive Radio Systems Based on OFDM

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Abstract— In this study, we offer a new water-filling technique for cognitive radio systems that use OFDM, or orthogonal frequency division multiplexing. Because the cognitive radio power allocation problem has additional power limits than the classic OFDM system does, the usual water-filling technique cannot be used directly for power allocation in a cognitive radio system. To get over these restrictions, a novel iterative water-filling algorithm is given in this paper. Iterative water-filling has a significant computational complexity, though. As a result, we investigate the characteristics of the water-filling algorithm and suggest a simple approach that utilises either power-increment or power-decrement water-filling processes. Simulation results show that our proposed algorithms can achieve the optimal power allocation performance in less time than the iterative water-filling algorithms.

Keywords- cognitive radio, orthogonal frequency division multi- plexing, water-filling algorithm, power allocation.

1. INTRODUCTION

With the rapid development of wireless communications, frequency spectrum is becoming a very precious resource, and scarcity of the spectrum is a serious problem. Traditionally, spectrum allocation is governed by the Federal Communication Commission's (FCC) which regulates the usage of the radio spectrum in the US. In some cases, the spectrum bands are not efficiently utilized because licensed users do not always occupy their spectrum and unlicensed users are not allowed to operate in such spectrum bands. This governance leads to unbalanced spectrum utilization [1].

Although most talkers produce speech effortlessly, the underlying coordination required to produce fluent speech is very complex involving dozens of muscles spanning the diaphragm to the lips. How exactly speech is produced is still poorly understood [1].

Design of MATLAB/Simulink Modeling of Fixed-PitchAngle Wind Turbine Simulator

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Abstract

This article presents a simulator model of a fixed pitch wind turbine model. The proposed dynamic model consists of wind turbine profiles based on the mechanical power and torque of the wind turbine. The purpose of this research is to develop and design a fixed angle wind turbine simulator. An analytical model representing a wind turbine simulator is derived to describe the simulation results using MATLAB/Simulink. The system was simulated to verify the performance of a fixed pitch wind turbine simulator at rated speed. A wind turbine simulator can control an induction generator model. It refers to the properties of electricity. The wind turbine simulator can display mechanical power and torque characteristics according to wind speed. The torque from the wind turbine simulator can be used to drive an induction generator to produce a predetermined active power to the load.

Keywords: Wind energy; wind turbine simulator; pitch angle; induction generator

Coordinated Spectrum Sensing Using Correlation in Cognitive Radio Networks

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Abstract—In order to reduce energy consumption, (CORN) 2, a correlation-based, optimum sensing scheduling algorithm, is created for cognitive radio networks. A metric for measuring the accuracy of spectral availability information is known as a sensing quality metric. It is demonstrated that the ideal scheduling algorithm may match the demands for sensing quality while minimising the cost of sensing (e.g., energy usage, sensing duration). In order to achieve this, (CORN)2 makes use of a novel virtual queue model for sensing deficiencies and takes advantage of the correlation between the spectrum measurements of a certain secondary user and its cooperating neighbours. Furthermore, it is demonstrated that the suggested method can produce an optimal distributed solution under a few straightforward presumptions.. In addition to the theoretically proved performance guarantees, the proposed algorithm is also evaluated through simulations.

1. INTRODUCTION

Today's wireless networks are characterized by a fixed spectrum assignment policy. However, a large portion of the assigned spectrum is used sporadically and geographical variations in the utilization of assigned spectrum range from 15% to 85% with a high variance in time. The limited available spectrum and the inefficiency in the spectrum usage necessitate a new communication paradigm to exploit the existing wireless spectrum opportunistically. This new networking paradigm is referred to as cognitive radio networks (CRNs). Based on the ambient spectrum information, cognitive radio users (or secondary users (SUs)) communicate via available channels without disrupting the communication of spectrum owners (or primary user (PUs)).

To assess the spectral availability while maintaining efficient operation of CRNs, effective spectrum sensing solutions are required. Recently, spectrum sensing solutions have been developed to provide high detection probability and mini- mize false alarm rates, where mainly physical layer metrics are considered. In general, spectrum sensing solutions can be classified as *cooperative* and *non-cooperative*. More specifically, cooperative solutions rely on multiple SUs to exchange spectrum occupancy information through individual local measurements. This can be achieved through cluster- based architectures, wherein the CRN is divided into clus- ters and each cluster-head makes a decision on the availability of channels. Spectrum availability is assessed by leveraging spectrum utilization information from different cluster heads

Conference on
MSA Transformer

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Abstract

Unsupervised protein language models, trained using millions of different sequences, learn the structure and function of proteins. The protein language models studied so far have been trained to make inferences about individual sequences. A long-standing approach in computational biology has been to make inferences about a family of evolutionarily related sequences by fitting a model to each family independently. In this work we combine these two paradigms. We present a protein language model that takes as input a set of sequences in the form of a multiple sequence alignment. The model overlaps the attention of rows and columns in the input sequences and is trained on a variant of the masked language modeling target in many protein families. The model performance outperforms state-of-the-art unsupervised structure learning methods and the parameter efficiency is much higher than previous state-of-the-art protein language models.

Keywords: Protein; Language model; Computational biology

An Exploratory study of feature interaction faults

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Abstract— There hasn't been much study that looks at what constitutes a feature interaction at the code level, despite the fact that testing for feature interactions in configurable software has received a lot of attention in the literature. Because of this, we do not know how often interaction faults are in actual code, how to seed interaction faults, or whether current interaction testing methodologies are successful in identifying the defects they are designed to find.

With the development of a whitebox criterion for an interaction fault, we take a first step in that direction. We conduct an exploratory investigation on hundreds of field-reported defects in two open source systems using this criterion as our guide. We discover that just three of the 28 defects that seem to be caused by interactions between features are actually so. We look into the remaining 25 and discover that, while they may have been found without interaction testing, changing the system configuration increases a test suite's ability to find problems, making these flaws more obvious. In light of both interaction and non-interaction faults, we describe the advantages of interaction testing. In order to simulate interaction faults based on the faults we observe in practise, we conclude by talking about a number of mutations.

Keywords-Interaction Testing, Configurable Software, Muta-tion Testing

1. INTRODUCTION

Configurable software systems, software systems with fea- tures that can be enabled or disabled, constitute an important class of software, one that is becoming more prominent. The software testing literature has paid special attention to con- figurable systems because, in addition to the kinds of faults present in other systems, they may contain faults caused by interactions of features [1]–[3]. These faults are termed feature interaction faults, or just interaction faults when the meaning is clear from context. Interaction faults can only be exposed under some combinations of system features [1]–[3] and the space of possible configurations is usually too large to exhaust (for instance, in GCC, the optimizer alone has roughly 10^{61} configurations [4]). Consequently, the research community has invested considerable effort in devising effective, but inexpensive testing methods [1]–[3],

[5] with the most prominent being combinatorial interaction testing (CIT) [6], [7]. There is a growing body of empirical work on CIT with new methods and techniques to improve and extend interaction testing appearing rapidly.

An Optimal Joint Resource Allocation and Task Scheduling Heuristic in Grids and Clouds Based on Tabu Search

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Abstract— As consumer demand for large-scale processing, storage, and network capabilities rises, the development of Grid/Cloud networks has increased. Thus, it is becoming crucial to figure out how to increase resource utilisation in the Grid/Cloud to fulfil more user task requests. Our analysis in this paper aims to reduce the costs consumers pay while using Grid/Cloud networks to get the resources they need. To handle the problem of joint resource allocation and task scheduling in Grid/Cloud networks, we put forth a Tabu search based heuristic and evaluate its effectiveness. Analysis and comparison of the experimental data with the Best-Fit method that we first suggested in previous work. The findings demonstrate that the Tabu search-based heuristic method will perform as well as or better than the Best-Fit heuristic and that both will approximate optimal solutions to the related MILP (Mixed Integer Linear Programming) solutions. Also, under various work scheduling regulations, the Tabu search-based heuristic will often reduce the traffic blockage rate by 4%–30% when compared to the Best-Fit technique.

INTRODUCTION

Grid/Cloud networks provide dynamically scalable re- sources as a service over the Internet. Resource allocation in distributed Grid/Clouds has become an important problem involving resource modeling, resource selection and optimiza- tion, resource offering and treatment, resource discovery and monitoring [1]. For the resource selection and optimization challenges, the provider needs to fulfill all requirements and optimize the usage of the infrastructure when given the infor- mation regarding Grid/Cloud resource availability at hand. We will focus on the resource selection and optimization problem in the Grid/Cloud network from the customer's perspective in this paper.

Several research studies have been carried out on the resource allocation problems for the Grid/Cloud networks with various distinct objectives or approaches [2][3]. Different from other works, our contributions in this paper are based on a new resource allocation model we designed in our previous work [4]. New job structures are supported in the model, in which each job consists of a number of sequential tasks or

parallel tasks or both. In addition, temporal parameters were introduced in the Grid/Cloud resource scheduling model. The objective of our model is to minimize the expenditure for each user while obtaining enough joint resources to execute their submitted jobs, while making the Grid/Cloud providers accept as many job requests from users as possible.

The rest of this paper is organized as follows. Section II presents the model of the joint resource allocation problem concisely. Section III describes the proposed Tabu search based heuristic for solving our problem. In Section IV we evaluates the performance of Tabu search algorithms on two network topologies, and compare the performance with the Best-Fit method and MILP results obtained in IBM ILOG CPLEX in our previous work. Section V provides the conclusion.

Comfortable Approach Distance: A Preliminary Model Based on Personal and Environmental Variables

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Abstract— The model of "comfortable distance" presented in this study captures the situations and variables known to influence personal space in human-human and human-robot interactions, as well as any linkages between them. The "comfortable distance" model was synthesised with three different types of inputs: environmental circumstances, personal characteristics, and agent factors in the first documented human-robot interaction (HRI) survey on approach distance. Four agent factors—angle of approach, height of agent, speed of approach, and gaze—are used as tuning parameters to create behaviours with the proper distances. The model is composed of seven personal factors—gender, age, mood, personality, pet ownership, robot experience, and sitting or standing—and five environmental conditions—lighting, ceiling height, indoor/outdoor, room size, and barrier height. At the moment, HRI researchers often concentrate on one element at a time (for instance, approach angle or approach speed), without taking into account the prior work in related domains, such psychology and other social sciences. As a result, the HRI community has overlooked environmental issues. As new factors are discovered, the "comfortable distance" model, a new tool for HRI researchers, can be expanded to include them. Researchers will learn about variables that were previously ignored in the field of HRI thanks to this survey, which will also enable future researchers to think about the effects of identified variables to design experiments that are more thorough.

Keywords—Interaction Control in Robotic Systems; Human Factors and Evaluation Methodologies.

1. INTRODUCTION

The purpose of this literature review is to examine the relevant works from psychology and human-robot interaction in order to determine the factors that might affect a general model of comfortable approach distance. Papers were included in this review only if they are directly applicable to approach distance specifically, rather than proxemics in general. The result of this review is the creation of a preliminary a model for comfortable approach distance (see Figure 1). This work is based on the CASA (computers are social actors) model
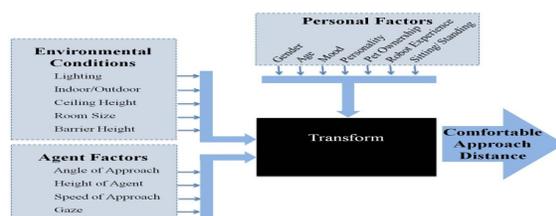
Figure1.“Comfortable Distance” Model, incorporating the environmental conditions, agent factors, and personal factors identified from the literature.

Power Conversion Using the Cockcroft-Walton Voltage Multiplier Rectenna Analytical Model

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Abstract

A voltage multiplier rectifier and antenna are combined to form a voltage multiplier rectenna, which is used to convert AC to DC. It is a crucial component of the RF energy collecting system. Low conversion efficiency is a characteristic of conventional rectennas. In order to examine the voltage and current output of rectifier stages for efficiency improvement, this work provides a novel analytical mode created for RF energy harvesting systems. The design includes a seven-stage voltage multiplier rectification circuit. The Schottky diode HSMS 285-C was selected for the circuit modeling voltage multiplier circuit. Advanced Design System (ADS) simulation was used to validate the equations of the theoretical model solved with MATLAB code. The fabricated system was tested for an input power range of 10 µW to 100 mW; the maximum output power is 0.2577 mW with maximum efficiency of 29.85%.

Keywords: AC–DC power converter; Cockcroft–Walton; rectenna; rectifier; RF energy harvesting; voltage multiplier

Pancreatic Cancer Protein Databases for Data Mining

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Abstract: As many protein databases are non-relational and most data mining and machine learning techniques assume that the input data is a sort of relational database that may also be represented as an ARFF file, data mining of protein databases presents unique obstacles. In order to make protein databases suitable for various data mining and machine learning technologies, we created a technique to reorganise protein databases. We were able to use decision tree and support vector machine classifiers on a pancreatic protein database thanks to our restructuring technique. We achieved over 73% accuracy in predicting if a protein is associated with pancreatic cancer using the SVM classifier that combined the use of GO terms and PFAM families to characterise proteins.

Key–Words: Pancreatic cancer, proteins, GO terms, PFAM families, data mining, decision trees, support vector machines

INTRODUCTION

Data mining is increasingly applied to non-relational databases [10, 12, 14, 19, 20]. The long-term goal of our research group is to develop data mining meth- ods that are generally applicable to protein structure and function [11], protein evolution [18] as well as medical data [15, 16]. In the present paper, a prelimi- nary version of which was presented in [1], we focus on a pancreatic cancer-related protein database, which was collected by Robert Powers and Bradley Worley, in the Department of Chemistry at the University of Nebraska-Lincoln, based on earlier pancreatic cancer research [3, 4, 5, 6, 9, 17, 22]. Pancreatic cancer was chosen as a test case because it has the lowest survival rate among different types of cancer. Data mining was used to investigate the relationship among anoma- lous proteins, which have unusually high or low lev- els in pancreatic patients. Early recognition of some patterns developing among these anomalous proteins may allow treatment to start earlier and increase the survival rate of pancreatic cancer patients.

Data mining of protein databases poses special challenges because many protein databases often con- tain set data types, whereas most data mining and ma- chine learning algorithms assume relational database inputs.

Design Options for Excitation Winding in Multiple-Pole Cylindrical Rotor Synchronous Machines

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Abstract

This article includes information on the design and finite element studies of two potential excitation winding configurations for cylindrical rotor synchronous machines. It focuses specifically on multiple-pole synchronous machines since there are less slots available for excitation winding when there are more machine poles present. As a result, all adverse impacts are highlighted. It is possible to compare the design outcomes on these topologies. The contrast compares a novel sine-wave current volume excitation with a conventional topology of excitation winding.

Keywords: Synchronous motor; Cylindrical rotor; Excitation system; Harmonics, Modeling

An Empirical Comparison of the Fault-Detection Capabilities of Internal Oracles

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Abstract

Due to their reliance on features like concurrency and peripheral devices like sensors, modern computer systems are vulnerable to many forms of runtime defects. Testing is still a common way to find flaws in these systems, although most runtime flaws are hard to spot with standard testing oracles that look solely at programme output. We empirically examine the use of internal test oracles in this work: fault-finding oracles that keep an eye on specific features of internal program and system states. We evaluate tradeoffs between internal oracles that produce inaccurate reports regarding defects by comparing their relative efficacy to that of output-based oracles and to other internal oracles (false positives and false negatives). Our findings have a number of ramifications that researchers and test engineers should take into account while looking for runtime errors.

1. INTRODUCTION

Modern computer systems ranging from personal computers to consumer electronic devices are becoming increasingly complex. These systems are utilizing high-performance multi-core processors to ensure adequate responsiveness and perfor- mance. They also utilize a full array of peripheral devices and sensors to support required features. Competition for market share means that new features are frequently added to these systems, making their product life-cycles last only one to two years. Short life-cycles imply frequent updates to the various runtime systems these systems utilize.

The foregoing characteristics can result in runtime faults that are difficult to identify and correct. While verification techniques such as model checking have been effective for detecting such faults in certain contexts, it is still challenging to use these techniques in practice. For example, model checking can suffer from state-space explosion when used on non-trivial programs. As such, applying it to a system that includes hardware components, one or more operating systems, device drivers, shared libraries, and runtime systems (e.g., virtual machines and dynamically linked libraries) is difficult. We believe that testing is a more practical alternative for assessing and finding faults in these systems.

To effectively test modern systems, software engineers must be able to observe complex interactions between applications, low-level hardware, OS events, and runtime systems. As an illustration, consider a data race between application code and a device driver [1].

A Three-Phase Induction Motor Speed Control System: Design and Simulation

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Abstract

A wide range of applications, including fans, milling machines, transportation, etc., are increasingly using three-phase induction motors. It is crucial that speed is maintained constant at a desired fixed value in applications requiring precision speed control, such as robots, centrifugal pumps, mills, and other high-performance applications. There are other methods for controlling speed in the literature, but this study focuses on the design of a straightforward PI controller and how it may be used to regulate the speed of a three-phase induction motor. A controller design that applies the Phase margin (PM) as the stability criterion is employed. The cross-over frequency and phase margin of the open loop gain of motor and controller are specified in order to develop a stable control system. The three-phase induction motor model is presented and modified for the purpose of control. A comparative analysis between the motor performance with and without the PI controller was performed. The unit step response of the speed control loop is characterized by rise time, settling time, steady state error and peak overshoot of 0.0253s, 0.19s, 2.22e-14% and 24.03% respectively. Simulation results show that the speed of the uncontrolled motor changed whereas that of the controlled motor returned quickly to its initial value after the motor is subjected to load disturbances in steady state.

Keywords: Controller, Induction motor, Model, Speed control, Steady state.

A Lateral Wave Channel Model for Wireless Underground Sensor Networks

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Abstract— An new class of wireless sensor networks (WSNs) known as wireless underground sensor networks (WUSNs) utilises sensor nodes that are buried underground and interact with one another via the soil. Characterizing the underground channel is the main obstacle in the creation of effective communication protocols for WUSNs. None of the models in use today completely account for the many aspects of electromagnetic signal propagation in the soil medium. Three key factors that affect underground communication are highlighted in this paper: lateral waves, which have not yet been studied for WUSNs, direct, reflected, and reflected waves. In light of this, a closed-form three-wave (3W) channel model is created based on the principles of EM signal transmission through soil. The 3W channel model, which cannot be described in closed-form, is demonstrated to correspond well with both underground testbed trials and EM analysis.

INTRODUCTION

With the development of wireless sensor networks (WSNs), applications in constrained environments have gained consid- erable interest. One such area is wireless underground sensor networks (WUSNs), where the sensor motes are buried under soil and communicate with each other through soil. The novel applications of WUSNs include intelligent irrigation, environ- ment monitoring, infrastructure monitoring, localization, and border patrol [1]. Especially in precision agriculture, WUSNs are envisioned to be a critical factor in improving water use efficiency by providing real-time information about soil properties

For the design of WUSNs, an underground channel model, which captures the impacts of the soil medium on communi- cation, is essential. Accordingly, the topology of the network, its communication protocols, and application parameters can be determined. Moreover, a channel model is critical for the evaluation of WUSN solutions. Compared to terrestrial WSNs, the lossy communication medium in WUSNs, which contains soil, air and water, incurs significantly higher attenuation. Moreover, the permittivity of the medium changes over time and space according to soil moisture Thus, the established channel models for over-the-air communication cannot be directly applied to underground situations. We have developed a two-path underground channel model for WUSNs. However, this model does not capture *lateral waves*, which manifest themselves in shallow deployments. In this work, we provide a closed-form channel model for underground

Crane Charades: Behavior Recognition Using Backpack-Mounted Sensor Platforms, Poster Abstract

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ABSTRACT

There are only about 575 whooping cranes left in existence, and they are a native to North America. Recent efforts have been made to give ecologists a tool to investigate the complex behaviour of the endangered species. Like many species, cranes make easily recognisable movements when they are preening, migrating, behaving territorial, or under threat. The preliminary research presented in this publication demonstrates that crane on-board behaviours can be identified using sensor data provided by the CraneTracker, a novel sensing platform. Ecologists will have a more detailed understanding of what happens during a crane's everyday existence if they can recognise these actions.

1. INTRODUCTION

The Whooping Crane (Grus americana) is one of the most endangered species native to North America. Of the 575 in existence, 279 are from the original migratory Aransas- Wood Buffalo population (AWBP). These birds conduct a 4, 000km annual migration from southern Texas to northern Canada, often flying 950 km/day during migration. The other portion of the cranes exist in captivity or re-introduced in Wisconsin, Florida, and Louisiana.

Recently, conservation efforts have centered on utilizing new tracking and monitoring technology to assist researchers in answering concerns regarding the newly re-introduced population in WI. The data collected from these efforts is intended to reveal potential causes of mortality, inability to reproduce in the wild, and possible impact a human domi- nated landscape on these birds.

Presently, Whooping Cranes' inability to reproduce is the most pressing threat to the success of the reintroduction efforts. There are a several explanations for these problems. First, it has been suggested that black-flies in the breeding grounds in Canada may be harassing birds, forcing them to flee from their nests. Second, the birds may be physically unable to complete incubation due to the lack of energy resources. They are compelled to leave their eggs to find food resources away from their territory.

Resonant Wireless Power Transmission from a UAV to Ground Sensors

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Abstract— Due to its security, lack of interference, and efficiency at medium ranges, wireless magnetic resonant power transmission is an emerging technology with several advantages over conventional wireless power transfer technologies. In this study, we create a wireless magnetic resonant power transfer system that allows unmanned aerial vehicles (UAVs) to power and replenish batteries of wireless sensors and other devices that are located remote from the electrical grid. We take on the challenges of integrating and equipping this system on a UAV with constrained payload capacities and create a controller that increases the received power as the UAV moves into and out of range. We use a UAV to experimentally transmit roughly 5W of power from our prototype wireless power transfer system to a base station.
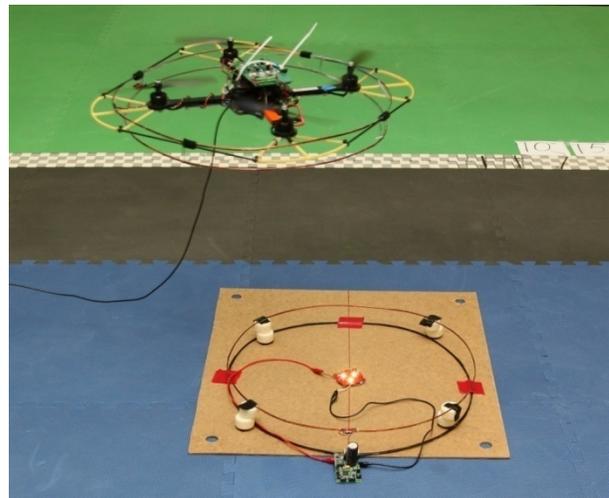
INTRODUCTION

The idea of wireless power transfer is more than a centuryold [1], but resonant medium ranged wireless power transfer has been receiving much more attention in recent years due tothe increase in popularity and availability of battery-powered, handheld electronics [2], [3]. The prospect of this technologybeing used to recharge electronic devices while in range of the electric grid and appropriate power providing stations is exciting, but also captivating is the prospect using unmanned aerial vehicles (UAVs) to provide wireless power to remote locations.

As early as 1964 wireless power was used to supply energyto a flying helicopter [4] and recently has been used to enable a 12 hour, record-length flight [5]. In this paper, we investigate the reverse problem of supplying energy to ground sensors from a UAV, as shown in Fig. 1. While otherresearchers are correct in aiming to expand the practicality of wireless power technology by increasing transfer power and efficiency [6], this paper offers new means of deliveryto broaden applications.

Regional Network Testbed's Dynamic Circuit Construction Experience

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Abstract— In this paper, we discuss how we enabled the establishment of dynamic circuits in the GpENI network. The GpENI network research testbed is a collaboration of numerous academic institutions in the midwest of the USA. The University of Nebraska-Lincoln is responsible for allocating dynamic circuits among the participating universities on the GpENI network. In addition to our demonstration efforts at the GENI engineering conferences, we outline numerous possibilities considered for deploying dynamic circuits via the GpENI network. In order to develop inter-domain dynamic circuits, UNL also worked with the ProtoGENI project of the University of Utah and the Mid-Atlantic Crossroads (MAX) facility of Washington, DC.

INTRODUCTION

Great Plains Environment for Network Innovation (GpENI) [1] [2] is an international programmable testbed in the midwest of United States. The University of Nebraska-Lincoln (UNL), University of Kansas (KU), Kansas State University (KSU) and University of Missouri Kansas City (UMKC) are the par-ticipating universities in the midwest along with various other universities in Europe and Asia. UNL is involved in enabling GpENI to provision dynamic circuits among its participating universities. Each GpENI site has a Netgear Ethernet switch which will be used for the creation of dynamic circuits. UNL has also collaborated with ProtoGENI [3] project of University of Utah and Mid-Atlantic Crossroads (MAX) facility of Wash-ington DC to create inter-domain dynamic circuits. DYNES project is a recent and similar effort to create a dynamic circuit testbed in US.

The paper is organized as follows. In Section II we describe the background concepts involved in this paper and in Section III we explain the options for creating dynamic circuit network service in GpENI. In Section IV we describe the options for creating dynamic circuit network service between GpENI and MAX and we explain a demo configuration for transferring large scientific data using Dynamic Circuit Network in SectionV and we conclude the paper in Section VI.

The major components of DRAGON software are VLSR (Virtual Label Switched Router), NARB (Network Aware Resource Broker), ASTB (Application Spe- cific Topology Builder), RCE (Resource Computation Engine). As DRAGON provides the capability to create circuits that span across various domains the NARB acts as the entity that represents a local domain or Autonomous System (AS). In each domain each switch needs to be configured separately for creating a circuit and hence VLSRs acts as the entity controlling the switches. The RCE and ASTB are used for computing the resources required for creating circuits. Hence a particular DRAGON domain will have a NARB and one or more VLSR depending upon the number of switches in the domain.

The Separate Study of Fourier Transform Components for Electric Power Assessment

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Abstract

In order to streamline the computing processes that are typically necessary to process the preliminary sampled waveform of instantaneous power, this study presents a substantiation of an approach for the evaluation of apparent power components. According to the findings of completed studies, it is possible to compute both active and reactive power by analyzing the estimated sine and cosine Fourier transform components. The limitations on the length of the examined signal and the frequencies of the auxiliary trigonometric functions that are used to generate the Fourier transform components that are utilized to evaluate active and reactive power are also discussed in this work. The compliance with these restrictions allows us to eliminate the undesirable bias of active and reactive power estimation caused by the refusal from the decomposition of the analyzed waveform of the instantaneous power by applying the complete system of orthogonal trigonometric functions, as the evaluation of components of the apparent power is attained based on separate analysis of sine and cosine Fourier transforms calculated for the analyzed signal. The results of carried out simulations illustrate the frequency dependencies of sine Fourier transform calculated for the case of compliance with the re- strictions, which allow to attain the highest accuracy of estimation and for the case when the duration of analyzed signal does not fit these restrictions.

Keywords: Cosine Fourier transform component; Signal; Frequency

A Literature Review on Switching Transient Mitigation by Controlled Switching

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Abstract

One of the key ingredients in any nation's economic prosperity is energy. To meet the growing energy needs of the country, the electrical power system network is growing daily for this reason. In a power system, various equipment kinds are present. A circuit breaker is a piece of protective switching equipment, and as such, it is crucial to the functioning of the power system. Frequent switching of capacitors and reactors through a circuit breaker is necessary to maintain an acceptable reactive power for voltage control in EHV and UHV systems. Only in these specific applications may switching transients happen regularly. In addition to this, energising unloaded transformers and transmission lines causes inrush current and over voltages in the system. This condition causes mechanical and electrical strains and can occasionally result in equipment failure. Switching transients can now be reduced economically and technically by controlled switching. A review of the literature on switching transients and controlled switching aspects is included in this work. For the literature review, various controllers catalogues, conferences, CIGRE reports, and IEEE Transactions are recommended.. This survey is helpful for the researchers working in the area of controlled switching, circuit breaker manufacturers, controller manufactures and power utilities.

Keywords: Preinsertion resistor; Reignition; Restrike; Controlled switching; RDDS; Mechanical scatter; Making window; Making instant; Adaptive control

2.5 GHz vs. 3.65 GHz Mobile Wi MAX Spectrum   Performance Comparison

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Abstract— A well-liked broadband option with many uses is mobile WiMAX. The Federal Communications Commission (FCC) in the US presently grants licences for Mobile WiMAX in a number of frequency bands, the most common of which are 2.5 GHz and 3.65 GHz. Due to its substantial commercial use, a sizable amount of research has been done in the 2.5 GHz range. Yet, despite being a more advantageous alternative for many applications, particularly due to its licence requirements, no such work - academic or industry - has been documented for 3.65 GHz. For the benefit of network planners, engineers, and academics, we give a thorough comparison of these two frequency bands in this study. According to our findings, 2.5 GHz Mobile WiMAX generally offers a larger coverage area, the attractive licensing options for 3.65 GHz may present an interesting alternative for many deployment scenarios and applications.

 Keywords-Mobile WiMAX; 2.5 GHz; 3.65 GHz; Comparison; Throughput; CINR; Coverage; License Requirements

1. INTRODUCTION

Mobile WiMAX [1] has emerged as one of the most popular last mile solutions in broadband networking. Since being introduced in 2005, the protocol has gone through several advancements and now is an attractive choice for realizing ITU's worldwide 4G standardization goals.

Mobile WiMAX has been given a lot of attention by the research community. It provides high datarate and large coverage with features like QoS, handover, HARQ and vehicular mobility support, making it a cost-effective and reliable solution for a wide range of applications. Our research team at the University of Nebraska-Lincoln's Advanced Telecommunications Engineering Laboratory has been studying design, implementation and simulation of difference aspects of Mobile WIMAX [2-7] with the primary objective of designing broadband solutions for the North American railroad industry. Mobile WiMAX is a good prospective standard to deliver mobile video streaming [8, 9], VOIP [10] and broadcasting services [11]. In [12], the authors explore the prospect of using Mobile WiMAX as a broadband solution for wireless tactical broadband networks for the Finnish Defense Forces. In [13, 14], the authors present some field and laboratory test results of WiMAX equipment in different environments.

Towards Robust Vision Transformer

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Abstract

Recent advances in the Vision Transformer (ViT) and its advanced variants have shown that self-aware networks outperform traditional convolutional neural networks (CNN) for most vision tasks. However, current ViTos focus on standard accuracy and computational cost, but there is a lack of research on model internal effects on model stability and generality. In this work, we systematically evaluate ViT components based on how they affect the robustness of competing instances, frequent corruptions, and distributional changes. We have discovered that some components can compromise durability. By leveraging robust components as building blocks of ViTs, we propose **Robust Vision Transformer (RVT)**, which is a new vision transformer and has superior performance with strong robustness. Inspired by the findings during the evaluation, we further propose two new plug-and-play techniques called position-aware at- tention scaling and patch-wise augmentation to augment our RVT, which we abbreviate as RVT*. The experimental results of RVT on ImageNet and six robustness bench- marks demonstrate its advanced robustness and generalization ability compared with previous ViTs and state-of- the-art CNNs. Furthermore, RVT-S* achieves Top-1 rank on multiple robustness leader boards including ImageNet-C,ImageNet-Sketch and ImageNet-R.

Keywords:
ImageNet-C; ImageNet-Sketch; ImageNet-R; RVT; Networks

Continent: Cellular Sensor Networks for Migratory Bird Monitoring

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ABSTRACT

In this work, CraneTracker, a cutting-edge sensor technology for tracking migratory birds, is introduced. The station is intended to track Whooping Cranes, an endangered bird that travels 4, 000 kilometres between southern Texas and north-central Canada every year as part of its migration. For reliable, continental-scale information delivery during migration, CraneTracker has a wide range of sensors, a multi-modal radio, and power control circuitry. The application of cellular technology in inexpensive sensor platforms enhanced by a low-power transceiver for ad-hoc networking is driven by the demand for widespread connectivity. A novel class of cellular sensor networks (CSNs) for time-sensitive and mobile This platform generates sensing apps. Via field trials with wild Sandhill Cranes, Siberian Cranes, and wild Turkeys, the CraneTracker is assessed. Experimental analyses reveal significant insights into the movements and habits of migratory animals and show the potential of energy-harvesting CSNs for wildlife monitoring across wide geographic areas. The created platform is anticipated to advance ecological research as well as expand the application domain of sensor networks and support next research applications.

Keywords

Wireless sensor networks, cellular, tracking

1. INTRODUCTION

The Whooping Crane (Grus americana) is one of the most endangered bird species native to North America. As of spring 2011, there are only 575 birds in existence, with no more than 279 individuals in the Aransas-Wood Buffalo Population (AWBP). The AWBP is the only wild migratory population and the source of the nearly 300 birds that are in captivity or have been released in efforts to re-establish the species in Wisconsin, Florida and Louisiana [9]. These birds conduct an annual migration of 4, 000 km (2,500 miles) between southern Texas and north-central Canada, during which they travel as much as 950 km/day (600 miles/day). Tracking and monitoring the cranes during migration reveals potential causes of mortality, and the impact of changing habitat on bird behaviors. This knowledge is of prime im- portance to conservation efforts.

Migratory bird tracking has many system, hardware, and software design challenges. The tracking devices must be lightweight and compact so that bird behaviors are not im- pacted. The extremely high mobility during migration cre- ates severe challenges in maintaining communication links with the birds. Moreover, it is very difficult to recapture a bird once the device is attached. Hence, a tracker must operate reliably under unpredictable environmental condi- tions during the deployment.

Recognition of Words from Continuous Articulation Using Symbolic Representations for Time-Series Data

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Abstract

Although still in experimental stage, articulation-based silent speech interfaces may have significant potential for facilitating oral communication in persons with voice and speech problems. An articulation-based silent speech interface converts articulatory movement information to audible words. The complexity of speech production mechanism (e.g., co- articulation) makes the conversion a formidable problem. In this paper, we reported a novel, real-time algorithm for recognizing words from continuous articulatory movements. This approach differed from prior work in that (1) it focused on word-level, rather than phoneme-level; (2) online segmentation and recognition were conducted at the same time; and (3) a symbolic representation (SAX) was used for data reduction in the original articulatory movement time- series. A data set of 5,900 isolated word samples of tongue and lip movements was collected using electromagnetic articulograph from eleven English speakers. The average speaker-dependent recognition accuracy was up to 80.00%, with an average latency of 302 miliseconds for each word prediction. The results demonstrated the effectiveness of our approach and its potential for building a real-time articulation- based silent speech interface for clinical applications. The across-speaker variation of the recognition accuracy was discussed.

Index Terms: silent speech recognition, laryngectomy, support vector machine, SAX, time-series

Introduction

Persons who lose their voice after laryngectomy (a surgical removal of the larynx due to the treatment of cancer) or who have speech impairment struggle with daily communication [1]. In 2012, more than 52,000 new cases of head and neck cancers (including larynx, pharynx, etc.) were estimated in the United States [2]. Currently, there are only limited treatment options for these individuals, which include (1) "esophageal speech", which involves oscillation of the esophagus and can be difficult to learn; (2) electrolarynx, which is a mechanical device resulting in a robotic-like voice; and (3) augmented and alternative communication (AAC) devices (e.g., text-to-speech synthesizers operated with keyboards), which are limited by slow manual text input [1]. New assistive technologies are needed to provide a more efficient oral communication mode with natural voice for those individuals.

Real-Time Wireless Sensor Networks Design: Stochastic Performance Trade-offs

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Abstract—Future sensing applications necessitate a careful assessment of network performance trade-offs in order to provide the desired guarantees for the implementation of real-time wireless sensor networks (WSNs). Current research sheds light on performance measurements in terms of predicted delay and other first-order statistics. The stochastic nature of the wireless channel and the queuing mechanisms, which provide non-deterministic delay, throughput, and network lifetime, are what distinguish WSNs, though. Probabilistic consideration of these performance indicators and their inherent trade-offs is crucial for the design of WSNs with predictable performance. Furthermore, it is essential to provide stochastic guarantees because every deployment could lead to a different reality..

In this study, a stochastic network design approach is used to quantify the trade-offs between latency, throughput, and longevity. To this purpose, the quantile and quantile interval, two novel probabilistic network design measures, are defined to represent, respectively, the dependability and predictability of the performance metrics. In-depth analyses are carried out to investigate the performance trade-offs in real-time WSNs.

1. INTRODUCTION

Wireless sensor networks (WSNs) have been utilized in many applications as both a connectivity infrastructure and a distributed data generation network due to their ubiquitous and flexible nature. Increasingly, a large number of WSN applications are investigated with various real-time performance requirements for different network services specific to low-cost hardware and unpredictable environmental conditions [1]. These requirements necessitate a comprehensive analysis of the real-time performance guarantees provided by the network.

In this paper, we explore and quantify the probabilistic performance trade-offs in the design of real-time WSNs with an anycast protocol. More specifically, we consider the trade-offs between end-to-end communication delay, the network lifetime, and throughput of the network. To quantify the *dependability* of a probabilistic real-time network, a *quantile*-based measure is defined, which defines the end-to-end delay or the network lifetime that can be achieved with at least probability p. Moreover, to quantify the *predictability* of a network, a *quantile interval*-based measure is defined, which captures the difference in end-to-end delay or network lifetime between two quantiles p_1 and p_2. We aim to answer questions such as: how does the maximum network lifetime change if we want to improve the predictability of the end-to-end delay? If we require such a network to operate for longer than 6 months with at least

a probability of 0.8, what would be the minimum network density to satisfy these requirements? What are the tradeoffs between stochastic requirements of network lifetime and end-to-end delay? To the best of our knowledge, this work is the first to quantify the probabilistic performance trade-offs in WSNs. The remainder of this paper is organized as follows: In Sec. II, the models used to derive the stochastic end-to-end delay and network lifetime for an anycast protocol is briefly described, and related work is discussed. Then, in Sec. III, the problem definition is provided and the evaluation methodology is described. The evaluation results of the probabilistic analysis models and our major findings are presented in Sec. IV. Finally, the paper is concluded in Sec. V.

A Framework for Observable and Controllable Testing of Modern Systems

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Abstract— Due to their reliance on features like concurrency and peripheral devices like sensors, modern computer systems are vulnerable to many forms of runtime defects. Finding flaws in these systems is still frequently accomplished through testing. Yet, often used testing methods that run the programme while using test inputs and examine programme outputs to find errors are unsuccessful. Instead than relying on observable faulty outputs, test engineers must be able to monitor faults as they occur in order to test for concurrency and temporal defects. They also need to be able to govern interleavings between threads or processes so that they are deterministic. By enhancing their observability and controllability, this research will offer a framework that enables engineers to efficiently test for subtle and intermittent problems in contemporary systems.

1. INTRODUCTION

Modern computer systems are highly concurrent, memory intensive, and sensor intensive. For example, most computer systems currently employ multi-core processors, making con- current programming a natural way for developers to achieve higher performance. Furthermore, today's embedded systems ranging from consumer electronics to safety-critical devices are equipped with various sensors and peripherals to enable advanced features. These characteristics make these systems very complex and can result in both functional and temporal[1] faults that can be difficult to identify, isolate, and correct. Despite advances in the area of software verification such as model checking, such complexities make these verification techniques infeasible; therefore, testing is still commonly used to assess and find faults in these systems.

To efficiently and effectively test software, developers must be able to *observe* and *control* execution. Where *observability* is concerned, *test oracles* are needed to inspect system behav- ior for correctness. Unfortunately, testing for faults in modern systems is difficult simply because the classes of faults (e.g., data races) that occur in these systems are often "intermittent" making the traditional testing approaches of using *output-based* oracles ineffective.

execution and do not monitor events occurring in lower-level software components such as device drivers and OS modules. As such, they are not capable of revealing subtle faults that can appear in hardware, device drivers, and kernels. In addition, these approaches can obscure lower-level information as they rely on instrumentation which can perturb lower-level system states (e.g., cache, bus, and register usage).

Recently, researchers have investigated test oracles that can detect the presence of faults at internal points in program execution instead of by observing program outputs .These *internal oracles* detect whether data or system state manipulations lead the system into some potentially incorrect state. Monitoring internal states rather than outputs should be more effective because it can increase the probability of fault detection. However, internal oracles (as well as output-based oracles) can also fail to detect the presence of faults (producing *false negatives*), and signal the presence of anomalies that are *not* faults (producing *false positives*). There has been little work investigating the relative effectiveness and tradeoffs of internal oracles in practice.

High-Current Pulse Discharge Physical Mechanisms in a Conductor: A Detailed Mathematical Model

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Abstract

The flow of an aperiodic pulse current with an amplitude of 100 kA via a conductor with a circular cross-section is explored and described by a novel mathematical model. It is demonstrated how a brief electric discharge with an aperiodic shape influences the conductor's cross-sectional current density distribution, leading to the formation of considerable thermal forces, mechanical stresses, and strains, as well as non-uniform heating. The link between electromagnetic, thermal, and mechanical events is demonstrated using the created mathematical model, providing a clearer understanding of the multiphysics processes occurring. The maximum values of the current den- sity are calculated, which on the surface of the conductor reach values of 47 kA/mm^2, while the temperature rise of a copper conductor with a diameter of 2.44 mm is no more than 80°C at high temperature gradients, which causes the appearance of thermal stresses that have value (40–50)% of the value of the short-term strength limit of electrical copper. Utilization of this model allows to more accurately determining the required conductor cross-section based on the characteristics of electromagnetic, thermal and mechanical processes. It is shown that the simplified model (the condition for the uniform distribution of the current over the cross-section) gives significantly underestimated values of temperatures and does not take into account temperature deformations.

Keyword: Conductor; Mechanical stress; Electromagnetic; Thermal

Bound Tightening and Solution Reuse for Efficient Analysis of Evolving Systems

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ABSTRACT

Formal verification has long been used by software developers to ensure the reliability and validity of their system designs. Their models must adapt as the system changes, frequently through predictable, domain-specific operations, necessitating that system designers repeatedly carry out the same formal proof on related system models. Modern formal verification methods can be costly in scale, and the price is increased by additional analysis. In this paper, a novel analysis method—implemented in the SoRBoT tool—is presented. It automatically identifies domain-specific optimizations, which can significantly lower the cost of frequently analyzing evolving systems. Different from all prior approaches, which focus on either tightening the bounds for analysis or reusing all or part of prior solutions, SoRBoT's automated derivation of domain-specific optimizations combines the benefits of both solu- tion reuse and bound tightening while avoiding the main pitfalls of each. We experimentally evaluate SoRBoT against state-of-the- art techniques for verifying evolving specifications, demonstrating that SoRBoT substantially exceeds the run-time performance of those state-of-the-art techniques while introducing only a negligi- ble overhead, in contrast to the expensive additional computations required by the state-of-the-art verification techniques.

KEYWORDS
Formal analysis, bounded verification, speculative analysis

1 INTRODUCTION

Formal verification has long been used by software developers to ensure the reliability and validity of their system designs. Their models must adapt as the system changes, frequently through predictable, domain-specific operations, necessitating that system designers repeatedly carry out the same formal proof on related system models. Modern formal verification methods can be costly in scale, and the price is increased by additional analysis. In this paper, a novel analysis method—implemented in the SoRBoT tool—is presented. It automatically identifies domain-specific optimizations, which can significantly lower the cost of frequently analyzing evolving systems. Different from all prior approaches, which focus on either tightening the bounds for analysis or reusing all or part of prior solutions, SoRBoT's automated derivation of domain-specific optimizations combines the benefits of both solu- tion reuse and bound tightening while avoiding the main pitfalls of each. We experimentally evaluate SoRBoT against state-of-the- art techniques for verifying evolving specifications, demonstrating that SoRBoT substantially exceeds the run-time performance of those state-of-the-art techniques while introducing only a negligi- ble overhead, in contrast to the expensive additional computations required by the state-of-the-art verification techniques.

Conference on Image Transformer

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Abstract

Image Generation has been successfully used as an autoregressive sequence generation or transformation problem. Recent work has shown that self-awareness is an effective way to model text sequences. In this work, we generalize the recently proposed self-attention-based model architecture Transformer to a formulation modeling an image formation sequence with observable probability. By limiting the self-attention mechanism to local neighborhoods, we greatly increase the size of images that the model can handle in practice, maintaining significantly larger receptive fields per layer than typical convolutional neural networks. Although conceptually simple, our generation models significantly outperform ImageNet's image generation state of the art, improving ImageNet's best published negative log from 3.83 to 3.77. We also present results on image super-resolution at high magnification using our architecture's encoder-decoder. In human evaluation studies, we find that the images generated by our super-resolution model deceive human observers three times more often than the prior art.

Keyword: ImageNet; Convolutional neural networks; Architecture Transformer

Discovering Appropriate Programs: Semantic Search for Lightweight and Incomplete Specification

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Abstract— It's a typical effort for programmers to find appropriate code that can be reused. Syntactic and semantic techniques predominate in the code search literature. Syntactic search queries are simple to construct, but the outcomes are frequently ambiguous or unrelated. On the other side, a semantic search might produce pertinent results, but present approaches are either expensive since potentially matching code must be executed to confirm congruence with the parameters or they only produce exact matches. In this paper, we present a semantic search methodology where programmers specify lightweight, incomplete specifications and an SMT solver automatically finds programmes from a repository, encoded as constraints, that meet the specifications. The search for compatible apps is quick because to the repository's automatic offline encoding. When there are no or few exact matches, the programme encodings encompass a range of degrees of abstraction to permit partial matching. We implement this strategy on a portion of the Yahoo Pipes mashup language, and as the study develops, we intend to apply our methods to other conventional programming languages.

Keywords-semantic search; program composition; code reuse; SMT solvers; constraints

1. INTRODUCTION

Programmers face many challenges when approaching a new problem, including learning new languages, APIs, and environments. Often, the problem being solved is not novel. With the increasing number of large and publicly accessible code repositories, the existence of similar, if not exact solutions is likely. Yet, the costs of code reuse in terms of finding and integrating code often outweigh the benefits. Search engines are the most common way for developers to find suitable code, but frequently return irrelevant re-sults that still must be evaluated by the developers. Semantic search by specification is effective for finding relevant code but often requires developers to write complex specifications. Other semantic search techniques that support partial specifications, such as test cases are costly and unsalable since code needs to be executed to identify matches, and also unable to identify approximate matches when no code meets the partial specification.

To address these limitations, we propose an approach for semantic search in which developers specify lightweight, incomplete specifications in the form of input/output pairs.

An RFID Localization Experiment Using Propagation Models in Real-Time

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Abstract— In order to overcome the limitations of the received signal strength technique, this work introduces a real-time localization system (RTLS) that makes use of effective multiple propagation models. Using received signal strength readings and reference tags for range, RTLS is applied to an active RFID system. The RTLS does not require any new hardware or changes to the RFID reader or tags; it is only implemented in software that post processes the signal strength data that was received from the reader. The suggested approach, which employs various propagation models, enhances RTLS performance. Results for a four-reader system spanning a 4.5 by 5.5 metre room in two dimensions are shown. Both single-tag and dual-tag situations for the tag object are developed. It has been established that tag multiplicity—two tags for the target object—improves system performance by lowering the number of inaccurate measurements of received signal intensity caused by misaligned tags. The results of the studies demonstrate that the suggested system outperforms other comparable systems and achieves a localization accuracy within 1 metre in more than 50% of the experiments. Three-dimensional space extension research that is currently being conducted is discussed, and findings are provided.

Index Terms—RFID, RTLS, localization, triangulation, RSSI, propagation modeling.

1. INTRODUCTION

RFID represents a way of identifying objects or people using radio waves. The simplicity of this technology opens the door for extensive applications of a RFID system over widespread areas. Mass development of RFID technology has occurred after strong demands for accelerating research and applications. Applications include animal tracking,e- passports, automotive security, automated libraries, healthcare and pharmaceutical tracking, vehicle tolling, and access control. The increased breadth of RFID applications has lead to many efforts for creating addtional functionality using RFID systems. Real-time localization is one of the most desired additional features for RFID.

Localization is the process of determining the unknown position of an object based upon measurements gathered in the environment. A real-time localization system (RTLS) is a system that determines the position in real-time.

An Empirical Assessment of Internal Oracles' Fault-Detection Capabilities

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Abstract: Due to their reliance on features like concurrency and peripheral devices like sensors, modern computer systems are vulnerable to many forms of runtime defects. Testing is still a common way to find flaws in these systems, although most runtime flaws are hard to spot with standard testing oracles that look solely at programme output. In this study, we empirically explore the use of internal test oracles—oracles that track certain characteristics of internal programme and system states in order to look for errors. We evaluate tradeoffs between internal oracles that produce inaccurate reports regarding defects by comparing their relative efficacy to that of output-based oracles and to other internal oracles (false positives and false negatives). Our findings have numerous implications that academics and test engineers should take into account while testing for runtime faults.

INTRODUCTION

Modern computer systems ranging from personal computers to consumer electronic devices are becoming increasingly complex. These systems are utilizing high-performance multi-core processors to ensure adequate responsiveness and perfor- mance. They also utilize a full array of peripheral devices and sensors to support required features. Competition for market share means that new features are frequently added to these systems, making their product life-cycles last only one to two years. Short life-cycles imply frequent updates to the various runtime systems these systems utilize.

The foregoing characteristics can result in runtime faults that are difficult to identify and correct. While verification techniques such as model checking have been effective for detecting such faults in certain contexts, it is still challenging to use these techniques in practice. For example, model checking can suffer from state-space explosion when used on non-trivial programs. As such, applying it to a system that includes hardware components, one or more operating systems, device drivers, shared libraries, and runtime systems (e.g., virtual machines and dynamically linked libraries) is difficult. We believe that testing is a more practical alternative for assessing and finding faults in these systems.

To effectively test modern systems, software engineers must be able to observe complex interactions between applications, low-level hardware, OS events, and runtime systems. As an illustration, consider a data race between application code and a device driver. This class of fault may intermittently result in observable incorrect outputs when a particular interleaving between an application and an interrupt is executed, rendering traditional testing approaches using oracles that examine only execution output unreliable. To detect such a fault, engineers must be able to observe when the interrupt handler and device driver access a shared variable and determine whether the access adheres to a specific correctness property.

Control of Parallel-connected AC to DC Converter withDroop Technique for DC Microgrid Application

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Abstract
This paper presents the control of a single-phase AC-DC converter using a rotary reference control methodology, where the phase angle obtained from a single-phase phase-locked circuit is used for axis transformations. Then the Id, Iq current and output voltage of the inverter are controlled by PI control strategy. The DC microgrid under study consists of two AC-DC converter modules connected in a parallel topology using floating control technology. Matlab/Simulink based simulation results show that the Id , Iq currents can be controlled by the proposed PI controllers. Therefore, achieves zero balance error and simple power calculation. Also, the actual power sharing between the two converters is realized in such a DC microgrid system with a parallel converter topology with a floating controller, while the output voltage is maintained at 600 V by a PI controller on the secondary control plane.

Keyword: Matlab/Simulink; DC microgrid; PI controller; Methodology

Double-Sided Linear Induction Motor Control usingSpace Vector Pulse Width Modulation Technique

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Abstract

This paper presents the design and construction of a double sided linear induction motor (DSLIM) rated at 500 W, 300 Vmax 50 Hz. power rating. The mean space vector pulse width modulation control technique is applied to a 3-phase voltage inverter using a real-time control interface board (DS110) from dSPACE GmbH, Germany, and is controlled using MATLAB/SIMULINK. The experimental results show that the prototype DSLIM model with a 3-phase voltage source inverter works successfully and efficiently. It can control the DSLIM correctly for both motor speed and rotation control.

Keywords: Double Side Linear Induction Motor; Space Vector Pulse Width Modulation

A High Performance Hybrid Optical Network Architecture for Data Centers is known as HyScaleII

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Abstract— The demand for highly scalable data centre network (DCN) architectures with high throughput and minimal network complexity has increased as a result of the enormous growth in data-intensive cloud applications. In this study, we suggest HyScaleII to enhance HyScale's functionality. The HyScaleII DCN design has the majority of the desirable characteristics of a data centre, including high scalability, low diameter, high bisection width, fault-tolerance, and minimal network complexity. It is built on a switch-centric high performance hybrid optical network. In addition, we provide the HySII routing method, which takes advantage of HyScaleII's structural characteristics. In our tests, HyScaleII outperformed HyScale by an average of 50% and 13.8% in aggregate throughput and packet loss ratio, respectively.

I. INTRODUCTION

Mega data centers supporting 100,000 or more servers have received significant interest in recent years due to the tremendous growth and popularity of data-intensive cloud applications.This motivates the investigation of *data center network* (DCN) architectures for efficiently intercon- necting large number of servers. The three important design goals of such architectures are: *scalability*, *fault-tolerance*, and *high network bandwidth.*

The amount of data transferred within a data center has also exponentially increased in recent years. It is reported that for about every byte of data communicated over the Internet, at least 1MB of data is communicated within a data center. Thus, DCN architectures are expected to provision reliable high-bandwidth communications. Electrical networks in data centers are increasingly becoming a bottleneck for supporting high-volume high-speed data transfers. Therefore, the use of Optical Circuit Switching (OCS) in DCN architectures have been recently propagated for supporting such high on-demand bandwidth communications However, optical burst switching (OBS) has not received much attention in DCN architectures

DCN architectures are broadly classified into *server-centric* and *switch-centric* architectures. In *server-centric* architectures, servers perform both computation and routing of data. The design goals of servers are not intended to support high-speed, high-bandwidth routing. Moreover, using servers as both computing and routing nodes may prevent the servers not needed for computation from being turned off or put to a low-energy state.

Application of Data Science to Uncover Ancient Minoan-Indus Valley Trade Routes Implied by Common Weight Measures

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ABSTRACT

In order to identify potential long-distance trade routes between Bronze Age civilizations in the Mediterranean region and India, this study uses data mining of weight measures. As a consequence, a new northern route connecting the Indus Valley and Minoan civilizations, via the Black Sea, is uncovered. The proof for a strong and vibrant connection between Bronze Age civilizations is increasing, and this discovery adds to that evidence..

KEYWORDS

Data mining, Indus Valley civilization, Minoan civilization, Traderoute, Weight measure

1 INTRODUCTION

A better understanding of the economies of ancient civilizations can be gained by learning about long-distance trade relations. For instance, the Minoans on the island of Crete exchanged cumin (Cuminum cyminum) with India and vervet monkeys and baboons with eastern Africa (Urbani, and Dionisios [12]), as well as lead ingots between Sardinia and Israel (Yahalom-Mack et al. [13]). Their names spread as loanwords along with the exotic products [1]. However, only a tiny portion of commerce between ancient civilizations involved exotic goods. Analyzing the weights that were applied at different places can provide a more sophisticated understanding of the intensity of trade relations.

Ialongo and associates recently. [4] published an analysis of the Bronze Age weight system and argued that an essentially common weight system spread from Mesopotamia to the west all the way to Ireland and to the east all the way to the Indus Valley Civilization. They gave a mathematical analysis that suggests that as merchants trav- eled from one place to another, they took their balance scales and weights with them and allowed the local merchants to copy these weights. Therefore, the main mode of weight exchange was succes- sive copies being made throughout a huge trade zone that did not have a central authority over it. That is surprising and contradicts earlier assumptions that the introduction of a unified weight sys- tem requires a central authority that is intent to standardize trade within the realm of some kingdom or empire by fixing a standard weight to which every other weight must be adjusted.

Conversion of web tables to a relational database

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ABSTRACT

HTML tables are widely used to display data on the web. The indexing property of such tables is used to precisely determine the frequently intricate headers. Via the factoring of isolated headers, category hierarchies are retrieved. Web tables are imported into a relational database after being transformed into a canonical form. With the given method, any SQL query may be created for the collection of induced relational tables.

INTRODUCTION

Recent estimates of the number of tables on the web range from hundreds of millions to billions. That is Big Data! Combining and querying this data is a tantalizing goal. To bring it closer, we propose two algorithmic techniques for structured pattern recognition of HTML and spreadsheet tables from heterogeneous sources. The first algorithm recognizes multi-column row headers and multi-row column headers by analyzing row, column and cell relationships in the entire table. It is an order of magnitude more accurate than previous table segmentation methods based on statistical classification of appearance features that represent only cell formatting. The second algorithm determines the often-hierarchical category structure that maps the 2-D table into a multi-category data cube.

These operations allow importing ordinary tables into a relational database in a canonical format that is expressive and flexible enough for arbitrary queries. We use the MS Access database system to demonstrate that the algorithmically processed HTML tables can be directly queried with SQL. We determine the latent table structure and execute queries with the following processing pipeline:

1. isolate row and column headers by locating the *minimum indexing point* of the table;
2. extract the category information required by a data cube view by *factoring* header labels;
3. transform the table to a *canonical* form that is agnostic as to which categories will be subsequently considered relational tuples or attributes;
4. import the canonical tables into a *relational database*;
5. Formulate SQL *queries* on one or more tables.

To avoid parsing possibly idiosyncratic HTML code, we convert web tables to CSV tables that preserve their grid structure but lose most cell formatting information and unmerge all spanning cells. Although rendered versions of either file type can be readily parsed by human readers, neither representation explicitly ties the data (value) cells to their row and column headers. Since we don't rely on formatting information, we import arbitrary HTML tables from heterogeneous sources into MS Excel in CSV format, analyze them with Python programs, and then upload and query them in MS Access. We report experiments on 200 web tables from ten large statistical web sites from six countries on which we already have reliable ground truth and commensurable results.

Run-Time Adaptation Space Reduction through Analysis of Potential Utility Bounds

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ABSTRACT

Dynamic programming or similar methods are frequently used by self-adaptive systems to choose the best adaptations at run-time. The "curse of dimensionality" affects these methods, raising the cost of run-time adaptation choices. To lessen the number of potential adaptations that need to be taken into account for each run-time adaptation decision, we suggest a novel strategy that enhances the cutting-edge proactive self-adaptation techniques. The approach, realized in a tool called THAllIUm, employs a combination of auto- mated formal modeling techniques to (i) analyze a structural model of the system showing which configurations are reachable from other configurations and (ii) compute the utility that can be gen- erated by the optimal adaptation over a bounded horizon in both the best- and worst-case scenarios. It then constructs triangular possibility values using those optimized bounds to automatically compare adjacent adaptations for each configuration, keeping only the alternatives with the best range of potential results. The ex- perimental results corroborate THAllIUm's ability to significantly reduce the number of states that need to be considered with each adaptation decision, freeing up vital resources at run-time.

KEYWORDS
Formal methods; self-adaptive systems; run-time adaptation; multi-objective optimization

1 INTRODUCTION
Self-adaptive systems are becoming more pervasive, particularly in applications such as autonomous vehicles and medical or IoT devices [19, 24, 36, 57]. These systems need to quickly adapt to an uncertain, dynamic environment without external intervention, which is especially challenging given the nearly infinite situations such environments may present, the short window of time available to adapt, and the potentially limited computing resources available for making adaptation decisions at run-time.

In an ideal scenario where adaptations are instantaneous and immediately beneficial, a reactive self-adaptive system can respond effectively after a change in the environment has been detected. However, in cases such as provisioning a new cloud-based virtual machine [40], the adaptations enacted by the system may take some time, requiring a proactive approach which can account for the latency of adaptation tactics [51]. While such proactive, latency- aware (PLA) approaches promise to improve the overall fitness of the adaptations chosen [15, 45], they need to look ahead and predict future states of the environment. Recent approaches to PLA self- adaptive systems model the environment as a stochastic process independent of the state of the system [45]. Adaptation decisions can then be made via stochastic planning using the predictions of future states of the environment as input.

Robotic System Failure Rate Reduction Using Inferred Invariants Monitoring

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Abstract— System monitoring can aid in the detection of anomalies and the prevention of failures. Yet, given the complexity of today's robotic systems, creating monitors for them can be exceedingly challenging. This problem is addressed in this study using a method that synthesises monitors from system invariants that are automatically inferred. The method is unique in that it derives invariants from the observation of the messages exchanged between system nodes, and the invariants' kinds are specifically designed to correspond to the geographical, temporal, and operational attributes of robotic systems. Furthermore, systems constructed using publish-subscribe architectures can easily incorporate the created monitor. The method has been used to a system where a UAV lands on a moving platform, and it has been shown to drastically minimise the number of collisions in unexpected landing scenarios.

INTRODUCTION

Monitoring a system for anomalies is a common approach to detect conditions that may lead to failures and to take corrective actions. Such monitors must be carefully crafted by engineers with the domain knowledge to understand what could constitute abnormal behavior. This process becomes increasingly challenging as the system and its operating scenarios increase in complexity.

Consider, for example, the scenario illustrated in Figure 1 where a small unmanned aerial vehicle (UAV) is autonomously following and attempting to land on a moving platform whose location is continuously fed to the UAV. A typical landing test consists of the UAV starting a few meters away from the platform, finding and following the moving platform, and then initiating the landing sequence. Using a standard message passing system such as ROS (Robot Operating System) [5], this system contains over thirty nodes that communicate through dozens of message channels.

An engineer developing a monitor to detect anomalies for this kind of system is likely to focus on a small subset of the variables and relationships between variables. For example, a monitor crafted for this system would likely check whether the positions of the UAV and the platform are aligned when landing is initiated, and the speed of the platform is less than a safe maximum. There are, however, many other aspects of the system worth monitoring that are more subtle and may not be considered by the engineer given the number of variables and relationships involved. For example, it may help to ensure that the platform is horizontal and not rotating when landing, the UAV's angles are not greater than a
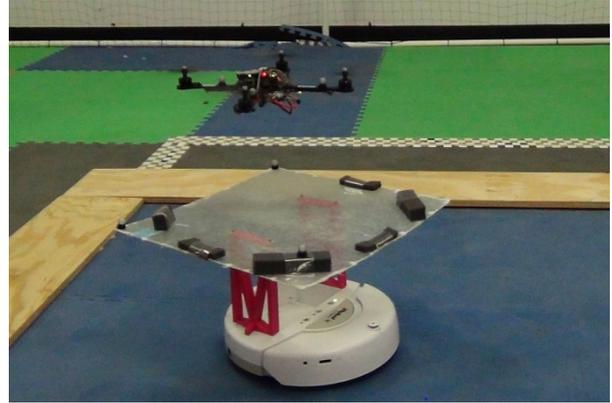
Fig. 1: UAV attempting to land on moving platform.

multiple of the UAV's commanded velocity, there is only one landing platform reporting its location, and the platform is unoccupied and able to support the weight of the UAV.

It is unlikely that the system engineer will consider all possible variables and relationships. To alleviate this challenge, we propose an approach to automate the synthesis of monitors from the traces of robotic systems. The approach is inspired by existing software engineering approaches for automated invariant inference [7]. The core idea of this type of approach is to infer system invariants from traces collected during system execution, iteratively instantiating potential invariants from a set of template invariants utilizing the trace values, and dropping or refining the ones that are falsified by other trace values. For example, given a template invariant *varX* $\leq$ *constant* and a trace of six variable-value pairs collected from time $t1$ to time $t6$, $tr = \{t1 : a = 1, t2 : b = 3, t3 : a = 1, t4 : a = 2, t5 : a = 1, t6 : a = -1\}$, the approach would instantiate the invariant template as $a \leq 1$ after reading the value of a at $t1$ and further support it until $t6$ when value $a = -1$ is observed and it becomes necessary to refine the invariant to $a \geq -1$; for variable b an invariant may not be reported as there may not be enough values to support that instantiation. Given a set of traces, the inferred invariants provide a characterization of the behavior of the system as exhibited in those traces.

Existing techniques to automatically infer invariants have been shown useful for generating generic invariants like the one illustrated above to act primarily as a function's pre and post conditions. The application of these techniques to large distributed robotic systems, however, has been limited. We conjecture that this is due to the focus on the generation of low level invariants which is impractical in these large

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ABSTRACT: A novel problem of influence maximization in trajectory databases that is very useful in precise location- aware advertising is studied. It finds k best trajectories to be attached with a given advertisement and maximizes the expected influence among a large group of audience. It is showed that the problem is NP-hard and proposes both exact and approximate solutions to find the best set of trajectories. In the exact solution, an expansion-based framework is devised that enumerates trajectory combinations in a best-first manner and propose three types of upper bound estimation techniques to facilitate early termination. In addition, a novel trajectory index is proposed to reduce the influence calculation cost. To support large k, a greedy solution is proposed with an approximation ratio of (1-1/e), whose performance is further optimized by a new proposed cluster-based method. A threshold method that can support any approximation ratio ∈ (0, 1] is also proposed. In addition, the problem is extended to support the scenario when there are a group of advertisements. In this experiment, real datasets are used to construct user profiles, motion patterns and trajectory databases. The experimental results verified the efficiency of proposed methods.

KEYWORDS: influence maximization, trajectory database, location aware advertising

INTRODUCTION

Influence maximization in a social network is a key algorithmic problem behind online viral marketing. By word- of-mouth propagation effect, it finds a set of k seeds to maximize the expected influence among all the users. It has attracted significant attention from both academic and industry communities due to its potential commercial value, such as viral marketing rumor control and information monitoring. The first attempt to transplant the concept of influence maximization is made from social-aware advertising to location- aware advertising. Each user or audience ui in this scenario is associated with an interest profile as well as motion patterns which assumptions are available. This problem can also be used to support route recommendation where k best routes with the maximum advertising effect are returned. The paper formulates the trajectory influence maximization problem and proves it to be NP-hard. To find the exact top-k trajectories, an expansion- based framework that enumerates the trajectory combinations in a best-first manner is proposed. The algorithm starts by calculating the influence score of each trajectory With respect to the advertisement. The trajectories are then sorted by the influence and accessed accordingly. In each iteration, combinations with the new trajectory are enumerated. If a combination contains fewer than k trajectories, it is considered incomplete and we estimate it supper bound influence from the unvisited trajectories. If a combination is complete, we calculate its exact influence. The algorithm terminates when the upper bound influence score of all the incomplete combinations are smaller than the best result ever found. The three types of upper bound estimation to facilitate early termination is proposed.

Cassandra: Proactive Conflict Minimization through Optimized Task Scheduling

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Abstract— Conflicting changes frequently result in software conflicts, which slow down projects. Workplace awareness tools' core tenet has been to spot possible conflicts early, when changes are still small and simpler to handle. Conflicts still arise in this method, though, and must be resolved by developers. We describe a novel conflict reduction method that anticipates possible conflicts, encodes them as constraints, and then solves the constraint space to suggest a group of conflict-minimal development options for the team. To characterise the distribution of disagreements and efforts to resolve them, we present a study of four open source projects in this article. The design and application of our conflict minimization technique in Cassandra, our prototype, are then described. We demonstrate that in the four open source test subjects, Cassandra would have been able to correctly resolve the majority of conflicts. By using the strategy on a simulated collection of scenarios with greater than usual occurrence of conflicts, we show the effectiveness of our approach.

INTRODUCTION

Conflicting changes in parallel software development occur frequently despite advances in communication and coordina- tion environments [1]–[3]. Conflicting changes typically occur because of breakdowns in an understanding of how one's work fits with others' changes. For example, two developers can edit the same file concurrently (direct conflict) or an interface that was presumed to be stable is changed without appropriate noti- fications to developers using it (indirect conflict) [4]

The state of practice aims for conflict resolution. Configu- ration management (CM) systems allow each individual to check out files and work on their changes in local workspaces that are periodically synchronized with the repository. While such a loose synchronization protocol enables rapid parallel development, it also allows developers to inadvertently make conflicting changes. Automated diff and merge techniques[5]–
[7] help in resolving direct conflicts, but often require manual intervention [3], [4], [8]. Resolution of indirect conflicts is not currently supported.

Our analysis of four popular open source projects reveals that conflicts are a regular occurrence. In the projects analyzed merge conflicts ranged from 7.6% to 19.3%. Of the clean merges 2.1% to 14.7% had build failures, and 5.6% to 35% of correct builds incurred test failures. Resolving these conflicts took substantial effort, typically spanning multiple days.

An Algorithm for Incremental Phylogenetic Trees Based on Recurrent Species Insertions

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Abstract

In this study, we provide a novel phylogenetic tree generation method that creates phylogenetic trees by repeatedly inputting species one at a time. Using DNA or protein sequences, the incremental phylogenetic tree approach can be used. Computer simulations demonstrate that the novel technique outperforms the widely used Neighbor Joining and UPGMA algorithms.

Keywords- Data structure, Distance matrix, Phylogenetic tree,Protein.

INTRODUCTION

CURRENT phylogeneti ctree constructionalgorithms are not incremental and have to be rerun from the

Beginning whenever a new species is added to the database. Moreover, a rerun from the beginning isnecessary even if the new species is aligned with the alreadyused species. In this paper, we develop an incrementalalgorithm that inserts new species one-by-one into a growing phylogenetic tree.

Our inspiration for such an incremental phylogeneticalgorithm is the way biologists usually classify any newlydiscovered species. Starting from the root node of the existing classification tree, the newly discovered species is compared with existing species and always an appropriate branch is chosen to go one level down in the classification hierarchy. Eventually we reach one of the existing species, which is the closest relative. It is next to that nearest relative where the newspecies is normally inserted.

Our aim is to develop a computer algorithm that uses the above paradigm but works with both DNA sequences and proteins. As the genomes of a growing number of species are sequenced and become part of DNA and protein databases molecular biology increasingly augments, although not completely replaces, morphological considerations.

Reliable phylogenetic tree constructions are needed for a diverse set of studies, including theoretical studies on the rate of evolution in various phyla and applied studies aimed at developing medical diagnosis methods [6] and pharmaceutical development.

Big Data and cloud computing resource management frameworks use several methodologies

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Abstract

The increased use of technology today has completely digitalized our lives, causing data to rise at an accelerated rate. Such multidimensional datasets are valuable because of the knowledge they may contain and the possibility for producing decision-making insights. Planning for the future and predicting shifting market trends and client requirements can be accomplished by enterprises by analysing this enormous amount of data from many sources. There are other alternative computing infrastructures that can be used in a variety of application sectors, while the Hadoop framework is a well-known platform for processing huge datasets. How to categorise big data resource management systems in the context of a cloud computing environment is the study's main topic. We outline some essential traits that define large data frameworks as well as the problems and difficulties they face. To determine the utilisation scenarios for these platforms, we apply a variety of evaluation measures from multiple perspectives. The investigation produced some intriguing results that are at odds with the online literature that is already available.

INTRODUCTION

We live in the information age, an Important measurement of present times is the amount of data that is generated everywhere around us. Data is becoming increasingly valuable. Enterprises are aiming at unlocking data's hidden potential and deliver competitive advantage Stratistics MRC projected that the data analytics and Hadoop market, which accounted for $8.48 billion in 2015, is expected to reach at $99.31 billion by 2022 [2]. The global bigdata market has estimated that it will jump from $14.87 billion in 2013 to $46.34 billion in 2018 [3]. Gartner has predicted that data will grow by 800 percent over the next five years and 80 percent of the data will be unstructured (e-mails, documents, audio, video, and socialmedia content) and 20 percent will bestructured (e-commerce transactions and contact information) [1].

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Comparing Platforms for Protein-Guided Assembly on a Campus Cluster and the Open Science Grid Using the Pegasus Workflow Management System

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Abstract— Large-scale, intricate computing processes can be effectively managed with the use of scientific procedures. Scientific workflows are frequently carried out on distributed platforms, such as campus clusters, grids, and clouds, due to their high resource requirements. Using the Pegasus Workflow Management System, we construct a scientific process for blast2cap3, the protein-guided assembly, in this research (Pegasus WMS). Because blast2cap3 is modular, we may divide the current serial approach into a number of tasks, some of which can be carried out in parallel. The University of Nebraska Campus Cluster, Sandhills, and the Open Science Grid are the next two distributed execution platforms where this approach is put into use (OSG). We contrast and assess how well the built workflow functions on the two platforms. Additionally, we look into the impact of the quantity of The results of the testing demonstrate that blast2cap3's execution time is reduced by more than 95% when implemented using Pegasus WMS as opposed to existing serial implementation. Our process experimental runs perform more quickly on Sandhills even though OSG has more computational resources. Also, the 300 transcript clusters chosen provide the best performance using the Sandhills resources.

INTRODUCTION

The advances in life sciences and information technologies have led to proliferation of scientific data that needs to be stored and analyzed. The analysis of this so called "big data" is done by using a complex set of multitude of software tools. A sequential series of these tools is known as an *analysis pipeline* [29]. The "big data" is too large to be processed by using only local computational resources. A possible approach to this problem is to make better use of multiple distributed resources including multi-core computers.

Scientists use various workflow systems to conduct their research modularly. This indicates that the whole scientific workflow can be decomposed into multiple sub-workflows that can be executed in parallel on distributed resources. Each workflow is composed of computational tasks, the order of execution of which is determined by the dependencies among the tasks [1]. The advantages of scientific workflows include automated complex analysis, real-time results and improved time performance that allow scientists to easily design, execute, debug, modify and re-run their experiments [17].

Cloud computing is defined by twenty-one specialists

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ABSTRACT: A novel problem of influence maximization in trajectory databases that is very useful in precise location- aware advertising is studied. It finds k best trajectories to be attached with a given advertisement and maximizes the expected influence among a large group of audience. It is showed that the problem is NP-hard and proposes both exact and approximate solutions to find the best set of trajectories. In the exact solution, an expansion-based framework is devised that enumerates trajectory combinations in a best-first manner and propose three types of upper bound estimation techniques to facilitate early termination. In addition, a novel trajectory index is proposed to reduce the influence calculation cost. To support large k, a greedy solution is proposed with an approximation ratio of (1-1/e), whose performance is further optimized by a new proposed cluster-based method. A threshold method that can support any approximation ratio $\in$ (0, 1] is also proposed. In addition, the problem is extended to support the scenario when there are a group of advertisements. In this experiment, real datasets are used to construct user profiles, motion patterns and trajectory databases. The experimental results verified the efficiency of proposed methods.

KEYWORDS*:* influence maximization, trajectory database, location aware advertising

1. INTRODUCTION

Influence maximization in a social network is a key algorithmic problem behind online viral marketing. By word- of-mouth propagation effect, it finds a set of k seeds to maximize the expected influence among all the users. It has attracted significant attention from both academic and industry communities due to its potential commercial value, such as viral marketing rumor control and information monitoring. The first attempt to transplant the concept of influence maximization is made from social-aware advertising to location- aware advertising. Each user or audience ui in this scenario is associated with an interest profile as well as motion patterns which assumptions are available. This problem can also be used to support route recommendation where k best routes with the maximum advertising effect are returned. The paper formulates the trajectory influence maximization problem and proves it to be NP-hard. To find the exact top-k trajectories, an expansion- based framework that enumerates the trajectory combinations in a best-first manner is proposed. The algorithm starts by calculating the influence score of each trajectory With respect to the advertisement. The trajectories are then sorted by the influence and accessed accordingly. In each iteration, combinations with the new trajectory are enumerated. If a combination contains fewer than k trajectories, it is considered incomplete and we estimate it supper bound influence from the unvisited trajectories. If a combination is complete, we calculate its exact influence. The algorithm terminates when the upper bound influence score of all the incomplete combinations are smaller than the best result ever found. The three types of upper bound estimation to facilitate early termination is proposed.

Data from an Uncertain Water Reservoir mined Temporally

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ABSTRACT

In order to learn from past human operations and develop automated reservoir policies for the operation of water reservoirs in the future, this study describes the difficulties of data mining uncertain water reservoir data. Uncertain data are frequently present in records of human activities in water reservoirs. As an illustration, the measured amounts of water released and maintained in the water reservoirs are often uncertain, that is, they are constrained by some minimum and maximum values. While only monthly or weekly amounts are frequently recorded, the time of release is also unpredictable. The use of temporal data mining with inflow and rainfall data from several earlier months helped to boost the efficiency of data mining of uncertain water reservoir data. Also, other data were compared in the tests. The experiments also compared several different data classification methods for robustness in the case of uncertain data.

Keywords
Spatio-temporal data, uncertainty, history, water reservoir, classifiers and prediction.

1. INTRODUCTION

Water reservoir operators perform a complex task trying to balance the need to retain plenty of water for irrigation and other uses of water while preventing an overflow of the reservoir that could cause flooding of the surrounding area. As a result water reservoir operators accumulate a certain set of skills and knowledge that are not easy to express mathematically. Hence even though many water researchers studied water reservoir operations (see Section 2.1), there is currently no good automation of water reservoirs. In this paper, we apply temporal data mining as a new approach to learn from human water reservoir operators. In theory, a data mining algorithm could learn general policies of handling the water reservoirs, and the learned policies could be automated in the future, avoiding occasional errors in human judgment and saving costs in human operators. In practice, the data mining task for water reservoirs is more complicated than for regular data mining tasks because water reservoir data is typically uncertain. For example, the recorded amounts of water released and retained in the water reservoirs are typically uncertain, i.e., they are bounded by some minimum and maximum values. Moreover, the time of release is also uncertain, i.e., typically only monthly or weekly amounts are recorded.