



CONFERENCE

Theme : Leveraging AI and
IoT in a Smart Digital Society



Book of Abstracts

IAIT2018

**The 10th International Conference
on Advances in Information Technology**

10-13 DECEMBER 2018

BANGKOK, THAILAND



PREFACE

In today's inter-connected global environment, digital technologies are fast becoming ubiquitous in everyday life. The rapid emergence of aging societies around the world prompts more urgent needs for having more affordable and easy to set up "Smart Digital Societies", in which assistive technologies are used inside homes and offices with high performance and efficiency obtained by leveraging Artificial Intelligence (AI) and Internet of Things (IoT) solutions and platforms. Adoption of IoT and AI technologies such as those found in smart tracking devices, smartphones, and other embedded devices, enhances existing information systems and adds the dimension of mobility. Such advances expand the horizon of endless possibility in research and development in a Smart Digital Society.

The 10th International Conference on Advances in Information Technology: IAIT2018 is collocated with CsBio2018 and the 2nd Deep Learning and Artificial Intelligence Winter School 2018 at the KMUTT Knowledge Exchange for Innovation Center, Khlongsan, Bangkok Thailand. There are about 150 people from academics and industries alike expected to attend these co-located events. It provides great opportunity for IAIT participants to meet researchers and practitioners in other related fields as well.

There are 46 papers submitted to the review process. There are 20 papers from 11 countries are accepted and published in the proceedings. Many thanks go to all authors for their submissions and everyone who participated in this year's event. Our thanks also go to the many people who helped make this conference happens including our reviewers, Honorary Chair, International Advisory Committee, International Program Committee, all Chairs, distinguished keynote speakers, and the editorial team at ACM. We hope that IAIT will continue to be a forum for the stimulating exchange of ideas to enable us to build future IT applications that benefit mankind.

Nipon Charoenkitkarn, General Chair of IAIT2018

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PROGRAM

Tuesday, 11 December 2018

Opening Ceremony and Keynote Speech

- 8.30-9.00 Registration
- 9.00-9.15 **Opening Ceremony**
- 9.15-10.15 **Keynote Speech:** *Kunihiko Fukushima*,
Fuzzy Logic Systems Institute, Japan
Topic: Deep CNN Neocognitron for Artificial Vision Senior Research Scientist
- 10.15-10.30 Coffee Break
- 10.30-11.15 **Keynote Speech:** *Limsoon Wong*,
National University of Singapore, Singapore
Topic: Dealing with Confounders in Omics Analysis
- 11.15- 12.00 Open Session (CsBio2018 session and DLAI2 Winter School session)
- 12.00 -13.00 Lunch

Session A: Smart e-services and Internet Applications

Chair: *Assistant Professor Dr. Narongrit Waraporn*

- 13.00-14.30 **Quality of Smartphone User Experience Analysis: Focusing on Smartphone Screen Brightness Level for the Elderly**
Thawanrut Sutika, Suree Funilkul, Tuul Triyason and Montri Supattatham
- An Architectural Design of ScratchThAI A conversational agent for Computational Thinking Development using Scratch**
Kantinee Katchapakirin and Chutiporn Anutariya
- Exploring the Antecedents of Computer Programming Self-Efficacy**
Pruthikrai Mahatanankoon
- Satja: Thai Elderly Speech Corpus for Speech Recognition**
Suphunnee Prajongjai, Tuul Triyason and Pornchai Mongkolnam
- 14.30-14.45 Coffee Break

Session B: Smart Networks and Computing Platform Technologies

Chair: *Dr. Tuul Triyason*

- 14.45-17.00 **Collaborative Filtering for Personalised Facet Selection**
Siripinyo Chantamunee, Kok Wai Wong and Chun Che Fung
- Node-to-node Disjoint Paths in Twisted Crossed Cubes**
Hiroki Nagashima, Kousuke Mouri and Keiichi Kaneko

Fault-tolerant Routing Methods in Crossed Cubes

Koji Otake, Kousuke Mouri and Keiichi Kaneko

A Security Model based Authorization Concept for OPC Unified Architecture

Kevin Wallis, Marc Merzinger, Christoph Reich and Christian Schindelbauer

Track 4: Smart Visual Media

Emotion in A Century: A Review of Emotion Recognition

Thanyathorn Thanapattheerakul, Katherine Mao, Jacqueline Amoranto and Jonathan Hoyin Chan

18.00-20.00 **Banquet**

Wednesday, 12 December 2018

8.30-9.15 Registration

9.15-10.30 **DLAI2 Speaker:** *Sansanee Auephanwiriyaikul,*
Chiang Mai University, Thailand
Topic: String Grammar Fuzzy Clustering in Data Analysis

10.30-10.45 Coffee Break

Session C: Smart Networks and Computing Platform Technologies

Chair: *Dr. Tuul Triyason*

10.45-12.00 **A Policy Revocation Scheme for Attributes-based Encryption**
Phyo Wah Wah Myint, Swe Zin Hlaing and Ei Chaw Htoon

Quality Provisioning in the Internet of Things Era: Current State and Future Directions

Debajyoti Pal, Vajirasak Vanijja and Vijayakumar Varadarajan

Security-Driven Information Flow Modelling for Component Integration in Complex Environments

Veronika Kupfersberger, Thomas Schaberreiter and Gerald Quirchmayr

An Ontology-based Approach for Plant Disease Identification System

Watanee Jearanaiwongkul, Chutiporn Anutariya and Frederic Andres

12.00 – 13.00 Lunch

Session D: Smart Data Management and Analytics

Chair: *Assistant Professor Dr. Bunthit Watanapa*

13.00-14.30 **An Improved English-Thai Translation Framework for Non-timing Aligned Parallel Corpora Using Bleualign with Explicit Feedback**
Ryan Coughlin, Rachsuda Setthawong and Pisal Setthawong

Trigger Detection System for American Sign Language using Deep Convolutional Neural Networks

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A Deep Look into Logarithmic Quantization of Model Parameters in Neural Networks

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Stock Selection Using Association Rules on Cash Flow and Accrual Financial Indicators

Amontep Wijitcharoen, Praisan Padungweang, Bunthit Watanapa and Sanit Sirisawatvatana

14.30-14.45 Coffee Break

Session E: Smart Data Management and Analytics

Chair: Associate Professor Dr. Xiangmin Zhang

14.45-16.00 **Enhancing GLSLIM Using User Preference Change Marking Algorithm**

Chayapol Moemeng, Rachsuda Setthawong and Thitipong Tanprasert

A Proposal of CS-index Approach for SPARQL Queries Considering Chain and Star Shaped Subgraphs

Khin Myat Kyu, Kay Thi Yar and Aung Nway Oo

Sentiment Analysis of Big Data using Hadoop MapReduce: A survey

Mariam Khader, Arafat Awajan and Ghazi Al-naymat

Thursday, 13 December 2018

9.00- 17.00 Ayutthaya Round Trip

Keynote Speakers

Deep CNN neocognitron for artificial vision

KUNIHICO FUKUSHIMA, Senior Research Scientist, Fuzzy Logic Systems Institute, Iizuka, Fukuoka, Japan,
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Recently, deep convolutional neural networks (deep CNN) have become very popular in the field of visual pattern recognition. The neocognitron, which was first proposed by Fukushima (1979), is a network classified to this category. It is a hierarchical multi-layered network. Its architecture was suggested by neurophysiological findings on the visual systems of mammals. It acquires the ability to recognize visual patterns robustly through learning.

Although the neocognitron has a long history, improvements of the network are still continuing. This talk discusses the recent neocognitron, focusing on differences from the conventional deep CNN.

Some other functions of the visual system can also be realized by networks extended from the neocognitron. For example, by adding top-down connections to the neocognitron, function of selective attention can be introduced. The ability of recognizing and completing partly occluded patterns can also be realized.

Biography

Kunihiko Fukushima received a B.Eng. degree in electronics in 1958 and a PhD degree in electrical engineering in 1966 from Kyoto University, Japan. He was a professor at Osaka University from 1989 to 1999, at the University of Electro-Communications from 1999 to 2001, at Tokyo University of Technology from 2001 to 2006; and a visiting professor at Kansai University from 2006 to 2010. Prior to his Professorship, he was a Senior Research Scientist at the NHK Science and Technology Research Laboratories. He is now a Senior Research Scientist at Fuzzy Logic Systems Institute (part-time position), and usually works at his home in Tokyo.

He received the Achievement Award, Distinguished Achievement and Contributions Award, and Excellent Paper Awards from IEICE; the Neural Networks Pioneer Award from IEEE; APNNA Outstanding Achievement Award; Excellent Paper Award, and Academic Award from JNNS; INNS Helmholtz Award; Pioneer Award from ELM2017; and so on. He was the founding President of JNNS (the Japanese Neural Network Society) and was a founding member on the Board of Governors of INNS (the International Neural Network Society). He is a former President of APNNA (the Asia-Pacific Neural Network Assembly).

He is one of the pioneers in the field of neural networks and has been engaged in modeling neural networks of the brain since 1965. His special interests lie in modeling neural networks of the higher brain functions, especially the mechanism of the visual system. In 1979, he invented “neocognitron”, which is a deep CNN (convolutional neural network) and acquires the ability to recognize visual patterns through learning. The extension of the neocognitron is still continuing. By the introduction of top-down connections and new learning methods, various kinds of neural networks have been developed. When two or more patterns are presented simultaneously, the “Selective Attention Model” can segment and recognize individual patterns in turn by switching its attention. Even if a pattern is partially occluded by other objects, we human beings can often recognize the occluded pattern. An extended neocognitron can now have such human-like ability and can, not only recognize occluded patterns, but also restore them by completing occluded contours. He also developed neural network models for extracting visual motion and optic flow, for extracting symmetry axis, and many others. He is recently interested in new learning rules for neural networks.

Dealing with Confounders in Omics Analysis

LIMSOON WONG, Kwan-Im-Thong-Hood-Cho-Temple Chair Professor of Computer Science, School of Computing, National University of Singapore, Singapore

The Anna Karenina effect is a manifestation of the theory–practice gap that exists when theoretical statistics are applied on real-world data. In the course of analyzing biological data for differential features such as genes or proteins, it derives from the situation where the null hypothesis is rejected for extraneous reasons (or confounders), rather than because the alternative hypothesis is relevant to the disease phenotype. The mechanics of applying statistical tests therefore must address and resolve confounders. It is inadequate to simply rely on manipulating the P-value; indeed, we show how/why this can be the wrong thing to do!) We discuss three mechanistic elements (hypothesis statement construction, null distribution appropriateness, and test-statistic construction) with real-life examples in computational biology, and suggest how they can be designed to foil the Anna Karenina effect to select phenotypically relevant biological features. (This talk is based on joint work with Wilson Wen Bin Goh.)

Biography

Limsoon Wong is Kwan-Im-Thong-Hood-Cho-Temple Chair Professor in the School of Computing at the National University of Singapore (NUS). He was also a professor (now honorary) of pathology in the Yong Loo Lin School of Medicine at NUS. Limsoon currently works mostly on knowledge discovery technologies and their application to biomedicine and data analytics. He is a Fellow of the ACM, inducted in 2013 for his many contributions to database theory and computational biology. His other recent awards include the 2003 FEER Asian Innovation Gold Award for his work on treatment optimization of childhood leukemias, and the ICDT 2014 Test of Time Award for his work on naturally embedded query languages. He co-founded Molecular Connections Pvt Ltd in India in the early 2000s and served as the company's chairman for a decade and a half, helped helm the steady growth of the company to over 2000 engineers, scientists, and curators, and some 400x increase in value. Limsoon received his BSc(Eng) in 1988 from Imperial College London and his PhD in 1994 from University of Pennsylvania.

String Grammar Fuzzy Clustering in Data Analysis

SANSANEE AUEPHANWIRIYAKUL, Computer Engineering Department, Faculty of Engineering,
Biomedical Engineering Institute, Chiang Mai University, Chiang Mai, Thailand,
sansanee@eng.cmu.ac.th

Data Analysis is a process to analyze data in terms of representing, describing, evaluating, interpreting data using statistical methods. What if the data do not come in the form of statistical representation or a vector of numbers but are in the form of syntactic data, how do we analyze those data? One of the pattern recognition research branches is the syntactic pattern recognition that is able to deal with this type of data set. Each sample in syntactic data set is normally represented as a string. The strings in the same data set can have different lengths. Also, the string does not have any mathematical meaning that we can calculate as if they are vectors of numbers. There are several syntactic pattern recognition methods. However, one of the syntactic pattern recognition methods that is used in many applications is a string grammar clustering method since it is easy to implement and is understandable to humans.

In this talk, we will introduce a set of string grammar clustering algorithms developed at Computational Intelligence Research Laboratory, Chiang Mai University. We also show applications of these algorithms in several real-world problems, e.g., sign language translation system, face recognition, and health applications.

Biography

Sansanee Auephanwiriyaikul (S'98–M01) received the Ph.D. degree in computer engineering and computer science from the University of Missouri, Columbia, in 2000. She is currently an Associate Professor in the Department of Computer Engineering, Chiang Mai University, Thailand. Dr. Auephanwiriyaikul is a senior member of the Institute of Electrical and Electronics Engineers (IEEE). She is an Associate Editor of the IEEE Transactions on Fuzzy Systems, and is an Editorial Board of the Neural Computing and Applications, an Editorial Board of the International Journal of Computational & Neural Engineering, and an Editorial Board of the Engineering Journal, Chiang Mai. She was a Guest Editor of the Journal of Advanced Computational Intelligence and Intelligent Informatics in 2004. She was a General Chair of the IEEE International Conference on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB 2016). She was a Technical Program Chair, Organizing Committee in several major conferences including the IEEE International Conference on Fuzzy Systems as well. She is also a chair of the IEEE Computational Society – Women in Computational Intelligence and a member of six important IEEE organizations, i.e., Fuzzy System Technical Committee, Bioinformatics and Bioengineering Technical Committee, Data Mining and Big Data Analytics, Distinguished Lecture Program, Webinars, and Student Activities – IEEE Computational Society. As a part of these committee members, she has to promote the research, development, education, and understanding of the technology, including the creation of the theory and models as well as their applications. She was a member of IEEE P1855 Workgroup for Fuzzy Markup Language Standardization as well.

As a role of administrator, Dr. Auephanwiriyaikul has worked in promoting research in the Chiang Mai University as a director of Research Administration Center (2010 – 2012), a director of Biomedical Engineering Center (2007 – 2010) and a Computer Engineering Department Head (2013 – 2017). Now she is an associate director at the Biomedical Engineering Institute, Chiang Mai University (2017 –). As a role of researcher, she has written many conference papers that have been published in several major conferences, e.g., the IEEE International Conference on Fuzzy Systems and journal papers published in several major journals including IEEE Transactions on Biomedical Engineering. She wrote several textbooks in Thai including Digital Image Processing, as well.

Full Paper, Oral Presentation

Stock Selection Using Association Rules on Cash Flow and Accrual Financial Indicators

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Traditionally, decision makers use accrual-based financial indicators, which are based on historical information, to evaluate stocks. This passive information can provide only partial intelligence to the decision makers. Taking cash-based insights as integral part of analytic would yield a more complete information to robustly indicate the performance of a company. In this study, we propose a systematic framework for financial information mining that actively considers the interaction among traditional financial ratios and cash flow signaling in identifying stocks that outperform the average market return in the arriving period. Association detection method is adopted to ensure the mined rules be reliable and practical. The experimental results show that cash flow is a needed integral component in all mined rules that effectively indicate out-ranked stocks.

Keywords: Association rule, stock selection, cash flow, financial analysis

ACM Reference Format:

Amontep Wijitcharoen, Praisan Padungweang, Sanit Sirisawatvatana, and Bunthit Watanapa. 2018. Stock Selection Using Association Rules on Cash Flow and Accrual Financial Indicators. In *The 10th International Conference on Advances in Information Technology (IAIT2018)*, December 10–13, 2018, Bangkok, Thailand. ACM, New York, NY, USA, 5 pages. <https://doi.org/10.1145/3291280.3291781>

Enhancing GLSLIM Using User Preference Change Marking Algorithm

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In this paper, we proposed a data preparation method, User Preference Change Marking (UPCM) algorithm, which aims to boost the performance of top-N recommendation. Integrating with a global-local recommendation, our method shows that the prepared datasets favor the recommendation method significantly. Global-and-local recommendation method not only considers the item-item similarity but also the user cluster one. The method uses two important characteristics of data to discover the trend of user preferences: (i) categorical dimension of the data, such as movie genre, product catalog, etc, and (ii) timestamp of the relation, such as timestamp of when a user rated a movie. The categorical dimension is useful in projecting additional information about the rating instead of focusing on the item relation solely. The timestamp is used to calculate rating frequencies and then activity trend. These two combined help our algorithm to remove inactive users from the dataset. As a result, the prediction performance is improved especially for the users who provide sufficient rating data.

Keywords: recommender system, data preparation, global-local model

ACM Reference Format:

Chayapol Moemeng, Rachsuda Setthawong, and Thitipong Tanprasert. 2018. Enhancing GLSLIM Using User Preference Change Marking Algorithm. In *The 10th International Conference on Advances in Information Technology (IAIT2018)*, December 10–13, 2018, Bangkok, Thailand. ACM, New York, NY, USA, 5 pages. <https://doi.org/10.1145/3291280.3291798>

Quality Provisioning in the Internet of Things Era: Current State and Future Directions

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Recently there has been a tremendous growth in various Internet of Things (IoT) applications like healthcare, surveillance systems, environment monitoring, smart grids, and much more. These applications vary significantly not only with respect to their functionalities, but also in terms of the underlying technologies. The traditional approaches of evaluating the Quality of Experience (QoE) of multimedia services focus heavily on the end-user experience that might not be suitable for the IoT context. IoT focuses more on Machine-to-Machine (M2M) communication, rather than Machine-to-Human or Human-to-Machine (M2H/H2M) scenarios. Therefore, we propose to extend the existing QoE concepts, by including novel influential factors like Quality of Data (QoD), and Quality of Information (QoI), along with minimizing the requirements for carrying out subjective tests for evaluating the IoT applications. Along with presenting a taxonomy of the influential factors that can affect the QoE of the IoT applications, a quality centric cross-layered IoT framework is also proposed. The overall aim of this work is to provide an initial direction as to what can be the influential factors in an IoT context, and how quality provisioning can be done, along with discussing the current challenges and future research directions.

Keywords: Internet of Things, Quality of Experience, Quality of Data, Quality of Information, Subjective evaluation

ACM Reference Format:

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Trigger Detection System for American Sign Language using Deep Convolutional Neural Networks

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Automatic trigger-word detection in speech is a well known technology nowadays. However, for people who are incapable of speech or are in some silence zone, such voice activated trigger detection systems find no use. We have developed a trigger detection system using the 24 static hand gestures of the American Sign Language (ASL). Our model is primarily based on Deep Convolutional Neural Network (Deep CNN) as they are capable of capturing interesting visual features at each hidden layer. We aim at constructing a customisable switch that can turn 'on' if it finds a given trigger gesture in any video that it receives and stays 'off' if it does not. The model was trained on images of various hand gestures in a multi-class classification setting. This allows the user to choose a custom trigger gesture for oneself. To test the efficiency of such a model in the trigger detection process, we have made 7,000 videos (each 10s long) consisting of random images from the test set which were never shown to the model during the training process. It is experimentally shown that such a system has a better performance than the other state-of-the art techniques used in static hand gesture image recognition tasks. This approach also finds real-time application and can be applied to develop small scale devices which trigger any particular response by capturing the gestures made by the people.

Keywords: Gesture Trigger Detection, American Sign Language, Deep Convolutional Neural Networks

ACM Reference Format:

Debasrita Chakraborty, Deepankar Garg, Ashish Ghosh, and Jonathan H. Chan. 2018. Trigger Detection System for American Sign Language using Deep Convolutional Neural Networks. In *The 10th International Conference on Advances in Information Technology (IAIT2018)*, December 10–13, 2018, Bangkok, Thailand. ACM, New York, NY, USA, 6 pages. <https://doi.org/10.1145/3291280.3291783>

Node-to-node Disjoint Paths in Twisted Crossed Cubes

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The twisted crossed cube is a variant of the hypercube. It is promising as a topology of interconnection networks for massively parallel systems. In this paper, we propose an algorithm that constructs n disjoint paths between an arbitrary pair of nodes in an n -dimensional twisted crossed cube. We also prove that the algorithm is correct, its time complexity is $O(n^2)$, and the lengths of the paths constructed are at most $4n - 8$. In addition, we conducted a computer experiment to evaluate our algorithm. Experimental results showed that the maximum path lengths are at most $3n + 1$.

Keywords: Container problem, Dependable computing, Hypercube, Interconnection network, Parallel computing

ACM Reference Format:

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A Deep Look into Logarithmic Quantization of Model Parameters in Neural Networks

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Based on the fact that parameters of pre-trained neural networks naturally have non-uniform distributions, logarithmic quantization of network parameters achieves better classification results than linear quantization of the same resolution. In our practice, we found that the logarithmic quantization suffers huge accuracy decrease on small size neural networks. This is because the parameters of trained small neural networks are not highly concentrated around 0. In this paper, we analyse in depth the attributes of logarithmic quantization. In addition, existing compression algorithms highly rely on retraining which requires heavy computational power. In such a situation, we propose a new logarithmic quantization algorithm to mitigate the deterioration on neural networks which contain layers of small size. As the result, our method achieves the minimum accuracy loss on GoogLeNet after direct quantization compared to quantized counterparts.

Keywords: Neural Networks Compression, Logarithmic Quantization, Computer Vision, Deep Learning

ACM Reference Format:

Jingyong Cai, Masashi Takemoto, and Hironori Nakajo. 2018. A Deep Look into Logarithmic Quantization of Model Parameters in Neural Networks. In *The 10th International Conference on Advances in Information Technology (IAIT2018)*, December 10–13, 2018, Bangkok, Thailand. ACM, New York, NY, USA, 8 pages. <https://doi.org/10.1145/3291280.3291800>

An Architectural Design of ScratchThAI: A conversational agent for Computational Thinking Development using Scratch

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Scratch is a visual, block-based programming language, adopted as a computational thinking development tool in elementary education among many countries. Thailand has also recently included Scratch as part of the computing science course in its basic education. However, Thailand is facing a shortage of ICT teachers who are skillful in Scratch programming, especially in small provincial schools. This research aims to overcome the shortage by developing ScratchThAI, a Scratch tutorial chatbot. It is designed to assist young learners directly through a messaging platform. By giving supports through a textual conversation, more relevant advice, knowledge, and resources could be provided precisely. Different levels of each computational thinking concept are extracted and evaluated by the designed assessment algorithm. Extra predefined exercises are assigned based on the analyzed learner's strengths and weaknesses in order to actively improving the learner's understanding. Moreover, gamification is incorporated to engage and motivate young learners in computational thinking development.

Keywords: Computational thinking development, Virtual Scratcher, Scratch Tutoring Chatbot, Virtual Teaching Assistant, AI in Education, Educational Technology, Game-Based Learning, Personalized Learning

ACM Reference Format:

Kantinee Katchapakirin and Chutiporn Anutariya. 2018. An Architectural Design of ScratchThAI: A conversational agent for Computational Thinking Development using Scratch . In The 10th International Conference on Advances in Information Technology (IAIT2018), December 10– 13, 2018, Bangkok, Thailand. ACM, New York, NY, USA, 7 pages. <https://doi.org/10.1145/3291280.3291787>

A Security Model based Authorization Concept for OPC Unified Architecture

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Cybersecurity becomes ever more important since the industry is transforming towards an Industrial Internet of Things (IIoT). Essential parts of the whole security concept are securing the communication between clients and servers on different business layers, like plant floor network and enterprise network, separation of information model and authorization model and to keep the management of security policies as easy as possible. A widespread used service-oriented architecture for the IIoT is Open Platform Communications Unified Architecture (OPC UA) which supports confidentiality, integrity, application authentication, user authentication and user authorization.

We present a novel security model based authorization concept for OPC UA where a Privilege Management Infrastructure (PMI) is used to grant user authorizations. Furthermore, drawbacks of OPC UA revision 1.04 are pointed out and security models are introduced which extract the security dependencies from the information model to improve maintainability, usability and transparency. Security models are implemented within OPC UA, so no additional technologies are needed and the OPC UA specification remains backward compatible.

Keywords: IIoT, Industry 4.0, OPC UA, PKI, PMI, Security Models

ACM Reference Format:

Kevin Wallis, Marc Merzinger, Christoph Reich, and Christian Schindelbauer. 2018. A Security Model based Authorization Concept for OPC Unified Architecture. In *The 10th International Conference on Advances in Information Technology (IAIT2018)*, December 10–13, 2018, Bangkok, Thailand. ACM, New York, NY, USA, 8 pages. <https://doi.org/10.1145/3291280.3291799>

A Proposal of CS-index Approach for SPARQL Queries Considering Chain and Star Shaped Subgraphs

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The interlinking nature of web-scale RDF data makes a challenge on storage and retrieving of these data efficiently. Even though different storage and query processing techniques have been proposed, query processing on complex linking structured (RDF) data requires many join operations when the input query is large (with respect to number of triple patterns). One solution to this problem is to reduce the number of joins by indexing. Indexing is an effective technique to reduce data searching space and retrieve data as fast as possible. In this paper, we propose an indexing scheme of chain and star (CS-index) and querying approach for SPARQL queries. The proposed approach could support both chain and star shaped queries. It employs graph pattern based technology: the RDF data graph is firstly decomposed into chain and star shaped subgraphs based on the structural information of each vertex. These subgraphs are stored as index, called CS-index. When a SPARQL query is given, it is decomposed into query subgraphs based on common join variable among all triple patterns. And the query results are retrieved by matching these query subgraphs against with CS-index. The proposed approach tends to minimize the query execution time by reducing the number of join operations as well as reduce memory usage for storing data.

Keywords: RDF, SPARQL query, graph-based index

ACM Reference Format:

Khin Myat Kyu, Kay Thi Yar and Aung Nway Oo . 2018. A Proposal of CS-index Approach for SPARQL Queries Considering Chain and Star Shaped Subgraphs. In *The 10th International Conference on Advances in Information Technology (IAIT2018)*, December 10–13, 2018, Bangkok, Thailand. ACM, New York, NY, USA, 7 pages. <https://doi.org/10.1145/3291280.3291789>

Fault-tolerant Routing Methods in Crossed Cubes

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In this study, we propose two methods for fault-tolerant routing in the crossed cube. The first method, Method 1, at each node that has the message to the destination node, its neighbor nodes into the set of the forward neighbor nodes, the set of the sideward neighbor nodes, and the set of the backward neighbor nodes by calculating the distances from the neighbor nodes to the destination node. Then, Method 1 chooses one of the neighbor nodes and forwards the message to the node. Based on the observation of the execution of Method 1, we found that the routing tends to fail at the nodes with 3 hops to the destination node. Hence, we have introduced another method, Method 2, that executes the depth-first search at the nodes that are at 3 hops to the destination node. By adopting a simple fault-tolerant routing method, Simple, as the baseline, we conducted a computer experiment in 11-, 12-, and 13-dimensional crossed cubes, CQ_{11} , CQ_{12} , and CQ_{13} . As a result, Method 1 showed better ratios of successful routings than a baseline method by at most 0.0973 in CQ_{11} , 0.2082 in CQ_{12} , and 0.139 in CQ_{13} , respectively. Also, Method 2 showed better ratios than a baseline method by at most 0.1195 in CQ_{11} , 0.2366 in CQ_{12} , and 0.674 in CQ_{13} , respectively. The average path lengths were also improved by Method 1 compared to the baseline method by at most 2.35 in CQ_{11} , 2.07 in CQ_{12} , and 3.63 in CQ_{13} , respectively. Moreover, Method 2 improved them by 1.89 in CQ_{11} , 1.61 in CQ_{12} , and 3.12 in CQ_{13} , respectively.

Keywords: Dependable computing, Faulty Nodes, Hypercube, Interconnection network, Parallel computing

ACM Reference Format:

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Sentiment Analysis of Big Data using Hadoop MapReduce: A survey

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Sentiment analysis is the process of analyzing people's sentiments, opinions, evaluations and emotions by studying their written text. It attracts the interest of many researchers, since it is useful for many applications, ranging from decision making to product evaluation to mention a few. Sentiment analysis can be conducted using machine-learning techniques, lexicon-based techniques or hybrid techniques that combines both. As people are more reliant on social networks such as Twitter, this has become a valuable source for sentiment analysis. However, the existence of big data frameworks require adaptation of these techniques to run within such frameworks. This paper reviews sentiment analysis techniques, focusing on the MapReduce-based analysis techniques. We found that the Naïve Bayes algorithm was the most used machine learning technique for extracting sentiments from big datasets because of its high accuracy rates. However, the dictionary-based techniques achieved better results in terms of execution time.

Keywords: Big Data, Dictionary Based Analysis, Machine Learning, MapReduce Framework, Naïve Bayes, Sentiment Analysis.

ACM Reference Format:

Mariam Khader, Arafat Awajan and Ghazi Al-naymat. 2018. Sentiment Analysis of Big Data using Hadoop MapReduce: A survey. In *The 10th International Conference on Advances in Information Technology (IAIT2018)*, December 10–13, 2018, Bangkok, Thailand. ACM, New York, NY, USA, 8 pages. <https://doi.org/10.1145/3291280.3291795>

A Policy Revocation Scheme for Attributes-based Encryption

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Attributes-based encryption (ABE) is a promising cryptographic mechanism that provides a fine-grained access control for cloud environment. Since most of the parties exchange sensitive data among them by using cloud computing, data protection is very important for data confidentiality. Ciphertext policy attributes-based encryption (CP-ABE) is one of the ABE schemes, which performs an access control of security mechanisms for data protection in cloud storage. In CP-ABE, each user has a set of attributes and data encryption is associated with an access policy. The secret key of a user and the ciphertext are dependent upon attributes. A user is able to decrypt a ciphertext if and only if his attributes satisfy the access structure in the ciphertext. The practical applications of CP-ABE have still requirements for attributes policy management and user revocation. This paper proposed an important issue of policy revocation in CP-ABE scheme. In this paper, sensitive parts of personal health records (PHRs) are encrypted with the help of CP-ABE. In addition, policy revocation is considered to add in CP-ABE and generates a new secret key for authorized users. In proposed attributes based encryption scheme, PHRs owner changes attributes policy to update authorized user lists. When policy revocation occurs in proposed PHRs sharing system, a trusted authority (TA) calculates a partial secret token key according to a policy updating level and then issues new or updated secret keys for new policy. Proposed scheme emphasizes on key management, policy management and user revocation. It provides a full control on data owner according to a policy updating level what he chooses. It helps both PHRs owner and users for flexible policy revocation in CP-ABE without time consuming.

Keywords: Attributes-based encryption (ABE), Ciphertext policy attributes-based encryption (CP-ABE), Trusted authority (TA), Cloud server.

ACM Reference Format:

Phyo Wah Wah Myint, Ei Chaw Htoon and Swe Zin Hlaing. 2018. A Policy Revocation Scheme for Attributes-based Encryption. In *The 10th International Conference on Advances in Information Technology (IAIT2018)*, December 10–13, 2018, Bangkok, Thailand. ACM, New York, NY, USA, 8 pages. <https://doi.org/10.1145/3291280.3291792>

Exploring the Antecedents to Computer Programming Self-Efficacy

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Computer programming is mandatory for all computer-related disciplines and many STEM (Science, Technology, Engineering, and Mathematics) majors. Data collected from 151 undergraduate computer science (CS) and information systems (IS) students enrolled in an introductory computer programming class reveal that grit and passion influence programming self-efficacy for male students. Only obsessive passion is the primary predictor of programming self-efficacy among female students. The paper discusses possible ramifications for teaching computer programming to undergraduate students.

Keywords: Computer programming, computer science, education, grit, information systems, passion, self-efficacy

ACM Reference Format:

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An Improved English-Thai Translation Framework for Non-timing Aligned Parallel Corpora Using Bleualign with Explicit Feedback

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One significant resource for language translation using Statistical Machine Translation (SMT) is parallel corpora. SMT model works well with timing aligned parallel corpora. However, imperfectly aligned sentences in the bilingual corpus typically leads to poorer translation in the final translation after training the SMT model. A major challenge in effectively applying non-timing aligned parallel corpora in the SMT model has not been thoroughly researched. The goal of this paper is to improve the accuracy of an English to Thai Statistical Machine Translation (SMT) model by improving the sentence alignment of parallel corpora. This work proposes an improved English-Thai translation framework for non-timing aligned Parallel corpora using an improved alignment algorithm: Bleualign with explicit user feedback. The generated model can then be applied to the Moses SMT training system to generate English-Thai translation. This experiment uses both English and Thai subtitles obtained from TED (www.ted.com) to build the parallel corpora. The TED corpora sentences are not timing aligned, and this research will try to generate an alignment model to be applied on the Moses SMT training system. The result shows that the model using our proposed algorithm outperforms two traditional alignment models: Gale-Church, Bleualign with the highest BLEU score of 0.36.

Keywords: statistical machine translation (SMT), phrase alignment, non-timing parallel corpora, English-Thai translation framework

ACM Reference Format:

Ryan Coughlin, Rachsuda Setthawong and Pisal Setthawong. 2018. An Improved English-Thai Translation Framework for Non-timing Aligned Parallel Corpora Using Bleualign with Explicit Feedback. In *The 10th International Conference on Advances in Information Technology (IAIT2018)*, December 10–13, 2018, Bangkok, Thailand. ACM, New York, NY, USA, 8 pages. <https://doi.org/10.1145/3291280.3291794>

Collaborative Filtering for Personalised Facet Selection

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An overwhelming number of facet values causes difficulties in providing an efficient search filter in dynamic facet search. It requires effort and time from the searchers to examine the list in order to select their interested facets. Personalised facet selection provides a list of relevant facet which is related to the user's interests. However, personalisation may not be possible to determine a user's current interest from the user's profile or the user's history search only. In some cases, due to insufficient information to identify users' current interests, the need of associating community opinions with personal interests is necessary. This study aims to investigate the incorporation of a collaborative approach to personalise facet selection. Collaborative Filtering is employed to address the issue of limited profile information and the approach has been widely used in recommender systems. Experiments were conducted on a benchmark Movie dataset using user ratings as the representation of user preferences and evaluated by rating prediction accuracy and computational time. The results show that Collaborative Filtering should improve the performance of personalised facet selection.

Keywords: Facet Selection, Collaborative Filtering, Personalization

ACM Reference Format:

Siripinyo Chantamunee, Kevin Wong and Chun Che Fung. 2018. Collaborative Filtering for Personalised Facet Selection. In Proceedings of International Conference Advances in Information Technology (IAIT2018). Bangkok, Thailand, 5 pages. <https://doi.org/10.1145/3291280.3291796>

Satja: Thai Elderly Speech Corpus for Speech Recognition

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Thai language is the official language of Thailand. At present, about 70 million speakers are located in Thailand and the southern parts of China, Yunnan, Guizhou, and Guangxi. The Thai language is a tonal language. Thai Language is a challenging language for speech processing technology. Because the Thai spoken language database is limited and also lacks a specific speech corpus, such as a children's speech database, elderly speech, accents spoken in each region, etc. This research develops the Thai elderly speech named Satja meaning is truth of speech. The content of this corpus is a voice command. There are 50 speakers, 24 males and 26 females, covering six regions in Thailand, aged 60-85 years. In addition, the database of elderly voice was compared to non-elderly voice. For a model training, we used CMUSphinx and tested with Sphinx4. We found that when the elderly speech was tested with the elderly model, it was more accurate when experimented than the model trained by the non-elderly people.

Keywords: Speech corpus development, Speech recognition system, Thai language, Elderly

ACM Reference Format:

Suphunnee Prajongjai, Tuul Triyason and Pornchai Mongkolnam. 2018. Satja: Thai Elderly Speech Corpus for Speech Recognition. In The 10th International Conference on Advances in Information Technology (IAIT2018), December 10–13, 2018, Bangkok, Thailand. ACM, New York, NY, USA, 7 pages. <https://doi.org/10.1145/3291280.3291793>

Emotion in A Century: A Review of Emotion Recognition

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Emotion plays an important role in our daily lives. Ever since the 19th century, experimental psychologists have attempted to understand and explain human emotion. Despite an extensive amount of research conducted by psychologists, anthropologists, and sociologists over the past 150 years, researchers still cannot agree on the definition of emotion itself and have continued to try and devise ways to measure emotional states. In this paper, we provide an overview of the most prominent theories in emotional psychology (dating from the late 19th century to the present day), as well as a summary of a number of studies which attempt to measure certain aspects of emotion. This paper is organized chronologically; first with an analysis of various unimodal studies, followed by a review of multi-modal research. Our findings suggest that there is insufficient evidence to neither prove nor disprove the existence of coherent emotional expression, both within subjects and between subjects. Furthermore, the results seem to be heavily influenced by both experimental conditions as well as by the theoretical assumptions that underpin them.

Keywords: Emotion, Theory of Emotion, Measure of Emotion, Emotion Recognition

ACM Reference Format:

Thanyathorn Thanapattheerakul, Katherine Mao, Jacqueline Amoranto and Jonathan Hoyin Chan. 2018. Emotion in A Century: A Review of Emotion Recognition. In *The 10th International Conference on Advances in Information Technology (IAIT2018)*, December 10–13, 2018, Bangkok, Thailand. ACM, New York, NY, USA, 8 pages. <https://doi.org/10.1145/3291280.3291788>

Quality of Smartphone User Experience Analysis: Focusing on Smartphone Screen Brightness Level for the Elderly

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Quality of experience is a measure of the overall level of customer or user satisfaction with products or services. By and large, the indication of quality of user experience can be measured by using subjectivity measurement and objectivity measurement. This paper aims to study a factor focusing on the brightness level of a smartphone screen used indoors which affects the elderly's smartphone use in terms of quality of experience. The data were collected from 30 samples who were elderly people, measured by using subjectivity measurement. The result indicates that the function of automatic screen brightness adjustment in the selected smartphones such as Apple iPhone 6, Sony Xperia Z3, the Samsung Galaxy Note5, and Asus Zenphone6, used in low-light environments, regarding the quality of experience in the elderly, was significantly different from that of adolescents.

Keywords: QoE, Quality of Experience, Smartphone, Elderly, Screen Brightness

ACM Reference Format:

Thawanrut Sutika, Suree Funilkul, Tuul Triyason and Montri Supattatham. 2018. Quality of Smartphone User Experience Analysis: Focusing on Smartphone Screen Brightness Level for the Elderly. In *The 10th International Conference on Advances in Information Technology (IAIT2018)*, December 10–13, 2018, Bangkok, Thailand. ACM, New York, NY, USA, 6 pages. <https://doi.org/10.1145/3291280.3291784>

Security-Driven Information Flow Modelling for Component Integration in Complex Environments

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Conceptualising and developing a new software solution is always a daunting task, even more so when existing technologies of inter-national partners are to be integrated into a unique and holistic product, as is the case in many international research and innovation projects. The individual requirements not only of each tool, but of the resulting solution as a whole, must be considered as well as the problem domain. The approach presented in this paper uniquely combines existing structuring and modelling techniques, resulting in an information flow model and interface definition specifications appropriate for international projects. It is based on an approach developed for an EU cybersecurity project and for its specific requirements, but due to its flexibility seen as appropriate for other domains as well. Complex systems consisting of different existing software solutions are represented in a conceptual model of their internal processes and the connecting information flows, thereby facilitating further software development and adaptations. Additionally, the exact identification and accounting of all information flows are essential requirements for modelling according to security and privacy by design principles, as for example prescribed by privacy and impact assessment guides and required by the General Data Protection Regulation (GDPR).

Keywords: Security by Design, Complex Systems, Security Model, Information Flow Model, Framework Design, Software Component Integration

ACM Reference Format:

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An Ontology-based Approach to Plant Disease Identification System

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Disease identification in plants is an important issue for farmers in terms of plant production and the reduction of losses in crop field. To deal with this issue, a number of systems and techniques for identifying plant diseases have been proposed. However, most of them mainly concentrate on image-based pattern recognition rather than focusing on the observed abnormalities of plant diseases. In other words, they have not employed ontology for semantic detection of plant disease. Current systems do not support farmers to find disease names w.r.t. the semantics of an infected plant. In this work, we proposed an ontology-based approach to modeling plant diseases and demonstrate our approach by developing a rice disease ontology. The ontology helps identifying plant diseases from existing symptoms on plants. To construct the ontology, we reused the domain knowledge related to symptoms of plant diseases from reliable sources. The proposed ontology is modeled in Web Ontology Language (OWL). We also develop a system architecture compatible with the modeled ontology. Finally, we illustrate the usage of our ontology in DL Query for disease retrieval, given that a farmer's observation has already been transformed into an OWL concept. The retrieved results of DL Query make use of subsumption relationship among concepts and properties defined in the ontology.

Keywords: Plant disease identification; Knowledge representation; Ontology

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