



IAT 2023

The 13th International Conference
on Advances in Information Technology

THE 13TH INTERNATIONAL CONFERENCE ON ADVANCES IN
INFORMATION TECHNOLOGY

Book of Abstract

6th - 9th December 2023, Bangkok, Thailand.

Preface

The 21st century has ushered in a rapid wave of technological advancements, revolutionizing the way we interact with information and communication technologies. These innovations have not only reshaped our understanding of the digital landscape, but have also spurred remarkable efforts to leverage these technologies in unprecedented ways, catering to the diverse needs of end users. Fostering eco-friendly sustainability, evolution of social networking and the mobile convergence numerous prominent sectors, including the financial technologies and healthcare services, have harnessed the power of information and communication technologies. This year, the 13th International Conference on Advances in Information Technology (IAIT2023) delves into the heart of this digital revolution under the theme "Digital Transformation: Technologies Shaping and Driving the New Normal."

Organized by the School of Information Technology at King Mongkut's University of Technology Thonburi in Bangkok, Thailand, IAIT2023 provides a significant platform for researchers, Ph.D. students, academics, and industry professionals from across the globe to convene, collaborate, and share their knowledge. As we navigate the new normal shaped by the COVID-19 pandemic, organizations worldwide are accelerating their digital initiatives in ensuring sustainability and resilience.

This conference aims to explore the myriad facets of digital transformation, shedding light on the impact of these technologies on individuals and society as a whole. By focusing on topics such as AI/ML, cybersecurity, data science, and other emerging technologies, IAIT2023 seeks to foster interdisciplinary research ideas and knowledge exchange. Through a diverse range of discussions, presentations, and collaborative sessions, the conference endeavors to create a dynamic environment where participants can engage deeply with the transformative potential of digital technologies.

IAIT2023 represents a culmination of efforts from researchers, scholars, and professionals who have relentlessly pursued excellence in their respective fields. The organizing committee extends heartfelt gratitude to all keynote speakers, invited speakers, authors, reviewers, program committee members, and supporting staff whose unwavering dedication has made this event possible. We would also like to express our sincere appreciation to the entire team at ACM for their invaluable support.

As we embark on this exciting journey of exploration and discovery, we believe that IAIT2023 will not only serve as a platform for knowledge dissemination but also inspire innovative solutions that will shape our digital future. Together, let us embrace the challenges and opportunities presented by the new normal, leveraging the power of digital transformation to create a more resilient, sustainable, and connected world.

International Conference on Advances in Information Technology (IAIT2023)

6th – 9th December 2023

IAIT2023: 6 th December 2023 (Registration open from 10:00 to 16:00)			
IAIT2023: 7 th December 2023			
8.30 – 9.00	Opening Ceremony		
9.00 – 9.45	Keynote Speaker (Prof. Dr. Samir Chatterjee) Title: Healthcare Innovation with Design and Artificial Intelligence: From Idea to Research to Commercialization		
9.45 – 10.30	Keynote Speaker (Assoc Prof. Dr. Supavadee Aramvith) Chulalongkorn University, Thailand Title: Multimedia Analytics and Processing Research Unit		
10.30 – 10.45	Refreshment break		
Session 1: AI-based Assistance Systems Session Chair: Dr. Thinagaran Perumal Universiti Putra, Malaysia (RoomX01)		Session 2: Digital Leadership, and Technologies for Society 5.0 Session Chair: Dr. Debajyoti Pal KMUTT, Thailand (Room X02)	
10.45 – 11.05	Enhancing Novelty in ChatGPT Responses: Incorporating Random Word Brainstorming (EasyChair#2/ACM#2) Pittawat Taveekitworachai and Ruck Thawonmas	10.45 – 11.05	Formulating Analytical Governance Frameworks: An Integration of Data and AI Governance Approaches (EasyChair#12/ACM#7) Thanika Kanying, Sotarath Thammaboosadee and Rojjalak Chuckpaivong
11.05 – 11.25	Am I Fighting Well? Fighting Game Commentary Generation With ChatGPT (EasyChair#45/ACM#14) Chollakorn Nimpattavanong, Pittawat Taveekitworachai, Ibrahim Khan, Thai Van Nguyen, Ruck Thawonmas, Worawat Choensawat and Kingkarn Sookhanaphibarn	11.05 – 11.25	Digital Space Economic Transformation Design: An Innovation Ecosystem Approach (EasyChair#17/ACM#20) Watanyoo Suksa-Ngiam, Vajirasak Vanijja, Bunthit Watanapa and Ussanai Nithirochananont
11.25 – 11.45	Adaptive Background Music According to the Player's Arousal for DareFightingCE (EasyChair#50/ACM#34) Jun Tanabe, Ibrahim Khan, Thai Van Nguyen, Chollakorn Nimpattavanong and Ruck Thawonmas	11.25 – 11.45	Detecting New Points of Interest Using Taxi GPS Data (EasyChair#47/ACM#40) Khomchan Phattanarat and Veera Muangsin (Online)
11.45 – 12.05	A Modified Snake Optimizer Algorithm with Otsu-based Method for Satellite Image Segmentation (EasyChair#57/ACM#26) Jiahao Fu and Rachsuda Setthawong (Online)	11.45 – 12.05	Minecraft Video Aesthetics Quality Assessment Model (EasyChair#23/ACM#35) Ryosuke Hasegawa, Lian Yu, Jun Tanabe and Ruck Thawonmas
12.05 – 12.25	SpreadQuery: A User-Friendly Database Query System Utilizing Spreadsheet Software (EasyChair#49/ACM#24) Somchai Chatvichienchai	12.05 – 12.25	Unlocking the Black Box: Exploring the Use of Generative AI (ChatGPT) in Information Systems Research (EasyChair#37/ACM#17) Rohani Rohan, Faruk Lawal Ibrahim Dutsinma, Kittiphan Puapholthep and Debajyoti Pal
Lunch break (12:25 – 13:25)			

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13.30 – 14.15	<p>Invited Speaker (Dr. Prachya Boonkwan)</p> <p>National Electronics and Computer Technology Center (NECTEC), Thailand</p> <p>Title: Transformer-based Large Language Models</p>		
14.15 – 15.00	<p>Invited Speaker (Assoc Prof. Dr. Thinagaran Perumal)</p> <p>Universiti Putra, Malaysia</p> <p>Title: Consumer Centric Internet of Things: Innovation and Future of Computing</p>		
15:00 – 15:15	Refreshment break		
<p>Session 3: Data Analysis and Pattern Recognition</p> <p>Session Chair: Dr. Bunthit Watanapa</p> <p>KMUTT, Thailand (Room X01)</p>		<p>Session 4: Human-Technology and Future of Work</p> <p>Session Chairs: Dr. Samir Chatterjee</p> <p>Claremont Graduate University, USA (Room X02)</p>	
15.15 – 15.35	<p>Unsupervised Crack Segmentation with Candidate Crack Region Identification and Graph Neural Network Clustering (EasyChair#14/ACM#31)</p> <p>Hein Thura Aung and Wuttipong Kumwilaisak</p>	15.15 – 15.35	<p>Exploring the Potential of ChatGPT as a Dungeon Master in Dungeons & Dragons tabletop game (EasyChair#4/ACM#3)</p> <p>Tuul Triyason</p>
15.35 – 15.55	<p>Framework for Choosing a Supervised Machine Learning Method for Classification Based on Object Categories: Classifying Subjectivity of Online Comments by Product Categories (EasyChair#15/ACM#18)</p> <p>Alexandre St-Vincent Villeneuve and Michel Plaisent</p>	15.35 – 15.55	<p>Hardware Performance Analysis of N-bit CLA on FPGA and Programmable SoC (EasyChair#1/ACM#1)</p> <p>Piyali Saha, Sudip Ghosh, Debajyoti Pal and Hafizur Rahaman</p> <p>(Online)</p>
15.55 – 16.15	<p>Validation of Candlestick Patterns as a Technical Indicator for Commodity Traders, Proposal of Improved Candlestick Encoding, and Data Mining Improved Candlestick Patterns (EasyChair#16/ACM#9)</p> <p>Jinchun Lu, Rachsuda Setthawong and Pisal Setthawong</p>	15.55 – 16.15	<p>University Students' Acceptance and Usage of Generative AI (ChatGPT) from a Psycho-Technical Perspective (EasyChair#34/ACM#15)</p> <p>Faruk Lawal Ibrahim Dutsinma, Rohani Rohan, Unhawa Ninrutsirikun and Debajyoti Pal</p>
16.15 – 16.35	<p>Article Feed Recommendation System for Thai Social Media Application Using Article Context Based on Deep Learning (EasyChair#19/ACM#12)</p> <p>Pannawit Athipatcharawat, Dhata Muangrux, Ekapol Chuangsuwanich and Pittipol Kantavat (Online)</p>	16.15 – 16.35	<p>Massive Online Testing Framework: A Case Study of the Thai National Examination (EasyChair#53/ACM#36)</p> <p>Vajirasak Vanijja, Noppol Pilukruangdet, Sanit Sirisawatvatana and Vithida Chongsuphajaisiddhi</p>
16.35 – 16.55	<p>Association Rule Mining for Power Outages Caused by Animals and Vegetation in Electrical Distribution Systems (EasyChair#28/ACM#39)</p> <p>Peerapat Chavthai, Pisut Raphisak and Siriporn Katithummarugs</p>	16.35 – 16.55	<p>Code-Mixing Strategies for Computer Mediated Communication with Non-Native Speakers (EasyChair#65/ACM#25)</p> <p>Mondheera Pituxcoosuvann, Yohei Murakami and Shinnosuke Yamada</p>
18:30 to 21:00 Banquet (Great Harbor, Icon Siam)			

Schedule



December 8th, 2023

IAIT2023: 8th December 2023			
9.00 – 9.45		Invited Speaker (Dr. Eugene Aw Cheng Xi) UCSI University, Malaysia Title: Generative AI for tomorrow's marketing: Future research agenda	
9.45 – 10.30		Invited Speaker (Assoc Prof. Dr. Sansanee Auephanwiriyakul) Chiang Mai University, Thailand Title: String Grammar Fuzzy Clustering in Data Analysis	
10.30- 10.45		Refreshment break	
Session 5: Machine/Deep Learning in Healthcare and Medical Informatics Session Chair: Dr. Chonlameth Arpnanondt KMUTT, Thailand (Room X01)		Session 6: AI and Computational Intelligence Session Chair: Dr. Vajirasak Vanija KMUTT, Thailand (Room X02)	
10.45 – 11.05	Predicting Three Types of Freezing of Gait Prediction Using Deep Learning (EasyChair#62/ACM#30) Wen Tao Mo and Jonathan H. Chan (Online)	10.45 – 11.05	Scenario Fidelity and Perceived Driver Mental Workload: Can Workload Assessment be Crowdsourced? (EasyChair#5/ACM#4) Haoyan Jiang, Sachi Mizobuchi and Mark Chignell (Online)
11.05 – 11.25	A Data-Driven Approach to Detect Dehydration in Afghan Children Using Deep Learning (EasyChair#11/ACM#6) Ziaullah Momand, Debajyoti Pal and Pornchai Mongkolnam	11.05 – 11.25	Power and Delay Efficient Hardware Implementation with ATPG for Vedic Multiplier Using Urdhva Tiryagbhyam Sutra (EasyChair#36/ACM#23) Anchit Arun, Ananya Chakraborty, Priyanka Dutta, Debajyoti Pal, Tridibesh Nag, Debasis De, Sudip Ghosh and Hafizur Rahaman (Online)
11.25 – 11.45	Segment-based and Patient-based Segmentation of CTPA Image in Pulmonary Embolism using CBAM ResU-Net (EasyChair#22/ACM#21) Theeraphat Trongmethaeratt, Kanjanajak Sukprasert, Kotee Netiwongsanon, Tanawan Leeboonngam and Kanes Sumetpipat	11.25 – 11.45	Alaryngeal Speech Generation Using MaskCycleGAN-VC and Timbre-Enhanced Loss (EasyChair#58/ACM#32) Hnin Yadana Lwin, Wuttipong Kumwilaisak, Chatchawarn Hansakunbuntheung and Nattanun Thatphithakkul
11.45- 12.05	Predicting Blood Drop Height and Volume using Physics Equations, VGG-19, and XGBoost (EasyChair#25/ACM#22) Phatsakorn Ukanchanakitti, Nattapong Winaichatsak, Natthawin Cho and Kanes Sumetpipat	11.45-12.05	Impact of Different Discrete Sampling Strategies on Fitness Landscape Analysis Based on Histograms (EasyChair#63/ACM#28) Vojtech Uher and Pavel Kromer
12.05- 12.25	ClusteredSHAP: Faster GradientExplainer based on K-means Clustering and Selections of Gradients in Explaining 12-Lead ECG Classification Model (EasyChair#51/ACM#27) Bo-Yu Mo, Sirapop Nuannimnoi, Angger Baskoro, Azam Khan, Jasmine Ariesta Dwi Pratiwi and Ching-Yao Huang	12.05-12.25	Randomization of Low-discrepancy Sampling Designs by Cranley-Patterson Rotation (EasyChair#64/ACM#29) Pavel Kromer and Vojtech Uher
Lunch break (12:25 – 13:25)			
13:30- 14:15	Keynote Speaker (Prof. Dr. EL-SAYED M. EL-ALFY) University of Petroleum and Minerals (KFUPM), Saudi Arabia Title: Edge Intelligence and Deep Learning Applications (online)		
14:15-14:30	Refreshment break		

Schedule

Session 7: Deep learning and its Various Applications Session Chair: Dr. Pisal Setthawong Assumption University, Thailand		Session 8: Data and Software Engineering, and Cybersecurity Session Chair: Dr. Eugene Aw Cheng Xi UCSI University, Malaysia	
14.00 – 14.20	Spam Article Detection on Social Media Platform Using Deep Learning: Enhancing Content Integrity and User Experience (EasyChair#10/ACM#5) Panuwat Chiawchansilp and Pittipol Kantavat (Online)	14.00 – 14.20	KHMER CALLIGRAPHY STYLE TRANSFER USING SKELGAN (EasyChair#26/ACM#19) Chanarin Heng and Worasait Suwannik
14.20 – 14.40	Impact of External Factors on Air Passenger Demand Prediction Using Machine Learning (EasyChair#13/ACM#8) Sutthiya Lertyongphati (Online)	14.20 – 14.40	An Implementation of Phrase Fill-in-blank Problem for Test Code Reading Study in Java Programming Learning Assistant System (EasyChair#18/ACM#38) Xiqin Lu, Nobuo Funabiki, Khaing Hsu Wai, Soe Thandar Aung, Mustika Mentari and Wen-Chun Kao
14.40 – 15.00	Dual-Stage OOD Detection Learning with an Unsupervised Start (EasyChair#31/ACM#10) Jaturong Kongmanee, Thanyathorn Thanapattheerakul and Mark Chignell	14.40 – 15.00	Exploring User Experience with Voice Assistants: Impact of Prior Experience on Voice Assistants. (EasyChair#44/ACM#11) Lawal Ibrahim Dutsinma Faruk, Suree Funilkul, Pornchai Mongkolnam, Prateep Puengwattanapong and Debajyoti Pal
15.00 – 15.20	Automated Stock Trading System using Technical Analysis and Deep Learning Models (EasyChair#46/ACM#37) Weerapat Buachuen and Pittipol Kantavat	15.00 – 15.20	Designing a vulnerability threat detection scanner with the use of machine learning models (EasyChair#35/ACM#16) Olga Ussatova, Vladislav Karyukin, Aidana Zhumabekova, Yenlik Begimbayeva and Nikita Ussatov
15.20 – 15.40	Attention-driven Text-guided Image Manipulation (EasyChair#54/ACM#33) Jiayu Su, Zhiqiang Zhang, Qiang Han, Xin Cheng, Wanlin Zhao, Wei Zhang and Wenxin Yu	15.20 – 15.40	Enhancing Cybersecurity Resilience: A Comprehensive Analysis of Human Factors and Security Practices Aligned with the NIST Cybersecurity Framework (EasyChair#42/ACM#13) Rohani Rohan, Borworn Papasratom, Wichian Chutimaskul, Jari Hautamäki, Suree Funilkul and Debajyoti Pal
16.30	Closing ceremony and Prize Distribution (Best paper + Best presented paper/session)		
IAIT2023: 9 th December 2023 Ayutthaya Full Day Tour (Roundtrip) Visit "Thailand's World Heritage (Additional Payment Needed)"			

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Enhancing Novelty in ChatGPT Responses: Incorporating Random Word Brainstorming

Pittawat Taveekitworachai

Ritsumeikan University
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ABSTRACT

This paper presents a new approach to increasing the novelty in ChatGPT responses. ChatGPT has proven to be effective in generating natural language responses; however, ensuring response novelty remains challenging. Our proposed method incorporates random word brainstorming in prompts to introduce more diversity in ChatGPT responses. Through a questionnaire-based evaluation, we compared the preference for solution ideas generated using the standard approach and our proposed approach, finding a consistent preference for our technique in 65% of the 20 problems. The results suggest the effectiveness of our proposed approach. We also explored the use of GPT models as evaluators, with GPT-3.5 achieving 48.15% accuracy and GPT-4 achieving 51.85% accuracy when compared to human preferences from the questionnaire. These results suggest the potential of leveraging GPT models as noisy evaluators. For future work, we recommend focusing on prompt engineering and word list design to further improve performance. Overall, incorporating random words in prompts can effectively increase novelty in ChatGPT responses.

CCS CONCEPTS

• Computing methodologies → Natural language generation.

KEYWORDS

ChatGPT, Random word brainstorming, Prompt engineering

Am I Fighting Well? Fighting Game Commentary Generation With ChatGPT

Chollakorn Nimpattanavong Ritsumeikan University Kusatsu, Shiga, Japan Thai Van Nguyen Ritsumeikan University Kusatsu, Shiga, Japan	Pittawat Taveekitworachai Ritsumeikan University Kusatsu, Shiga, Japan Ruck Thawonmas Ritsumeikan University Kusatsu, Shiga, Japan Kingkarn Sookhanaphibarn Bangkok University Pathum Thani, Thailand	Ibrahim Khan Ritsumeikan University Kusatsu, Shiga, Japan Worawat Choensawat Bangkok University Pathum Thani, Thailand
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ABSTRACT

This paper presents a new approach for leveraging ChatGPT in fighting game commentary generation task. Commentary generation often relies on deep learning techniques, which typically demand extensive data to achieve effectiveness. Large language models (LLMs) have become essential due to their remarkable ability to process data efficiently, thanks to their extensive training on vast datasets. Our proposed approach integrates the use of LLMs, specifically the GPT-3.5 model, for generating commentaries through the utilization of various prompts with data from the open-source fighting game, DareFightingICE. Four prompt variants are employed to assess the effectiveness of each prompt components. Objective evaluation using natural language metrics reveals that different prompt components significantly affect the generated commentaries. Additionally, subjective evaluation through a questionnaire reveals that prompts without parameter definitions received the highest preference from human evaluators. These results suggest that LLMs exhibit versatility in generating fighting game commentaries and hold promise for broader applications.

CCS CONCEPTS

- Computing methodologies → Natural language generation.

KEYWORDS

Fighting Game, DareFightingICE, ChatGPT, Prompt Engineering, Commentary Generation

Adaptive Background Music According to the Player's Arousal for DareFightingICE

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ABSTRACT

This paper presents a system that adapts the background music of a fighting game according to the player's arousal. The system uses a model to estimate the player's arousal based on events in the game and accordingly changes the pitch, tempo, and volume of the music. The system does not use AI music generation or arrangement but modifies existing music in real time. We experiment to evaluate the impact of different arousal durations on the player's immersion and music preference. The results show that a duration of 10 seconds is the most suitable for fighting games, as it increases the immersion and matches the music with the game situation.

CCS CONCEPTS

- Applied computing → Sound and music computing.

KEYWORDS

Adaptive Music, Game Music, Fighting Game, DareFightingICE, Emotion, Arousal

A Modified Snake Optimizer Algorithm with Otsu-based Method for Satellite Image Segmentation

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Computer Science Department, Assumption
University, Thailand

ABSTRACT

Image segmentation is an important step in image analysis that aims to segment regions of interest in an image by assigning a label to individual pixels sharing certain characteristics. Otsu-based method is a well-known thresholding technique that selects a threshold to segment regions by maximizing the variance between classes. Despite its advantages of considerably effectiveness and stability, its major drawback is high computational cost. This paper proposes a Modified Snake Optimizer algorithm (MSO), which can dynamically and efficiently tune Snake Optimizer (SO) parameters. To address the aforementioned drawback, MSO is applied with Otsu threshold method (MSO-Otsu) in segmenting satellite images which helps analyze the snow-covered areas of mountain ranges in China. The experimental results show that the proposed MSO, in general, outperformed the traditional SO when applying to benchmark functions, and the proposed MSO-Otsu outperforms the traditional Otsu-based method in segmentation results and convergence time.

CCS CONCEPTS

• Computing methodologies → Artificial intelligence; Computer vision; Computer vision problems; Image segmentation

KEYWORDS

Otsu, Snake Optimizer, Image segmentation, satellite image

SpreadQuery: A User-Friendly Database Query System Utilizing Spreadsheet Software

Somchai Chatvichienchai

Dept. of Information Security, Faculty of Information System, University of Nagasaki
Japan

ABSTRACT

In the context of digital transformation, effective decision-making is paramount for corporate adaptability and growth. Spreadsheet software provides a familiar platform for accessing, analyzing, and visualizing data. In many instances, decision-making hinges on the analysis of information derived from organizational databases. Nevertheless, the essential data for analysis within spreadsheet software is obtained through computer programs. This scenario often requires program modification and additional development to accommodate evolving data query demands. To address this challenge, this paper introduces SpreadQuery, a spreadsheet-based query system designed to empower users to query databases without requiring expertise in the SQL database language. SpreadQuery aims to alleviate the challenges of effort, time, and code development by employing spreadsheet software as a user-friendly interface, while effectively managing data through backend relational database management systems. By bridging the gap between user requirements and data accessibility, SpreadQuery presents a cost-effective and time-efficient solution for crafting intricate queries and displaying query results using customizable spreadsheet templates.

CCS CONCEPTS

• Information systems • Information retrieval • Users and interactive retrieval

KEYWORDS

Databases, Query, Spreadsheet, Access control

Formulating Analytical Governance Frameworks: An Integration of Data and AI Governance Approaches

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ABSTRACT

This study underscores the importance of standard data analytics governance within organizations to leverage the potential of increasing volumes of big data. Even though Thailand has operative frameworks for data governance and AI governance, there lacks a concrete framework specifically for analytics governance. To fill this void, the research utilizes the Data Governance Framework from the Digital Government Development Agency (DGA), the Artificial Intelligence Governance for e-Business and Digital Services from the Electronic Transactions Development Agency (ETDA), and the Data Management Capability Assessment Model (DCAM) within the Analytics Management section. The design and evaluation of the analytics governance framework are carried out using feedback from experts via a questionnaire. The ultimate objective of this study is to pinpoint the relevant components necessary for formulating an analytics governance framework in organizations in Thailand, which have already implemented data governance.

CCS CONCEPTS

• General and reference → Document types; Surveys and overviews; Cross-computing tools and techniques; Design; • Social and professional topics → Professional topics; Management of computing and information systems; Project and people management; Systems analysis and design; • Applied computing → Computers in other domains; Computing in government; • Information systems → Data management systems; Information integration.

KEYWORDS

Data Analytics, Analytics Governance, AI Governance, Data Governance, Analytics Management

Digital Space Economic Transformation Design: An Innovation Ecosystem Approach

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ABSTRACT

Economic development is fueled by technological innovation. The digital space economic transformation is expected to be the new economic strategy for Thailand. The transformation involves integrating the value chain of the digital and space technology domains. This research constructed a conceptual economic model via the literature review and will provide a model to be validated in design science research, which will guide policy designers and provide policy suggestions for the government in the future. The research issue is how Thailand can create an innovative environment for the digital space economy. The ecosystem construct, which serves as the study's theoretical underpinning, illustrates how an economic system comprises many sub-systems (groups of players), including institutions for education, research, innovation, governmental organizations, entrepreneurs, financiers, and consumers.

CCS CONCEPTS

• Social and professional topics → Computing/technology policy; Commerce policy; Governmental regulations.

KEYWORDS

Digital space economy, innovation ecosystem, transformation, policy design, Thailand

Detecting New Points of Interest Using Taxi GPS Data

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ABSTRACT

Nowadays, online mapping services, such as navigation, rely significantly on points of interest (POIs) data to enhance their utility and efficiency. However, maintaining an up-to-date POI dataset is a challenging task. Recognizing this, we observed that taxi pick-up and drop-off locations often align with POIs, like markets, schools, and department stores. This research proposes a method for detecting potential new POIs by using taxi GPS data alongside an existing POI dataset. The process consists of extracting pick-up and drop-off points from taxi GPS data, clustering them using an adaptive DBSCAN algorithm, and finding the representative point for each cluster. Subsequently, these representative points are compared with the nearest POIs in the current dataset to identify new POIs candidates. Experimental analysis using diverse GPS data distributions showed that areas with greater population and density were more effective in identifying POIs than sparser areas. As a result, our proposed method and the developed tool can augment existing POI datasets by recognizing locations poised to emerge as new POIs.

KEYWORDS

Point of Interest, Taxi GPS Data, DBSCAN, Online Map

Minecraft Video Aesthetics Quality Assessment Model

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ABSTRACT

We propose the Minecraft Video Aesthetic Quality Assessment Model (MCVQA), a tool designed to assess the aesthetic quality of Minecraft videos (MC videos) comprehensively. We explain the meticulous processes, including creating purpose-built datasets, implementing sophisticated feature extraction techniques, and finetuning model hyperparameters. We validate MCVQA's efficacy through a two-step approach: accuracy validation and an information recommendation system. In conclusion, first, using the datasets created in this study, an impressive 63.6% alignment was observed between the "best" shot types assigned by the user and the model's predictions. Subsequently, the usefulness of MCVQA as a recommendation system was validated, and a remarkable accuracy of 58.3% was confirmed.

CCS CONCEPTS

• Computing methodologies → Image processing.

KEYWORDS

Minecraft, MCVQA, MC videos, Aesthetics, Recommendation

Unlocking the Black Box: Exploring the use of Generative AI (ChatGPT) in Information Systems Research

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ABSTRACT

With the gaining popularity of generative AI tools like ChatGPT and their usage across several domains and disciplines, the question that naturally arises is how it can help the Information Systems (IS) researchers? Measuring hidden or latent constructs is one critical and primitive aspects of the IS domain that has always been challenging due to its abstractness. How good or bad these specially trained AI-based models are with respect to their conceptual understanding capabilities of specific IS constructs together with their usage for the purpose of testing IS theories is an unknown area. We set out to explore these unknown aspects in this work by conducting two separate experiments with ChatGPT using the already proven and robust Technology Acceptance Model (TAM) as the reference. Our results suggest that ChatGPT has good conceptual understanding of the presented latent constructs, although there might be certain validity issues in case of complex models. Therefore, it shows promise in the broader aspect of testing theories, but not without its limitations that we present in this research.

CCS CONCEPTS

• Information systems; • Social and professional topics; • Applied computing.

KEYWORDS

ChatGPT, information systems, latent constructs, scale, technology acceptance model

Unsupervised Crack Segmentation with Candidate Crack Region Identification and Graph Neural Network Clustering

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ABSTRACT

This paper introduces an innovative approach to unsupervised crack segmentation. Our method initiates with the application of image processing techniques to identify potential crack regions within the images. Leveraging the Canny edge detection algorithm, we delineate edges within the images, followed by the implementation of morphological image processing to eliminate noise. Subsequently, contour analysis is employed to pinpoint candidate crack regions with precision. These identified regions are then input into our unsupervised crack segmentation model, which relies on graph neural network clustering to delineate and categorize the cracks effectively. Experimental results on the CRACK500 dataset [19] showcased the robustness of our approach, evidenced by a Mean Intersection over Union (MIoU) score of 65.88 and a Mean Absolute Error (MAE) of 0.7. Moreover, the proposed method gave comparable results with the state-of-the-art supervised crack segmentation algorithms.

CCS CONCEPTS

• Computing methodologies → Image segmentation.

KEYWORDS

Crack segmentation, Graph neural networks, Unsupervised learning, Image processing, Infrastructure assessment

Framework for Choosing a Supervised Machine Learning Method for Classification Based on Object Categories: Classifying Subjectivity of Online Comments by Product Categories

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ABSTRACT

The core objective of this research is to develop a methodology for selecting a supervised machine learning classification technique based on the specific categories of objects that need to be classified. The study focuses on product categories extracted from Amazon's Product Reviews database, which are utilized to evaluate the subjectivity of post-purchase feedback. The primary supervised machine learning methods are utilized to efficiently perform the classification task. The resulting insights will enable the prioritization and choice of the best approach based on the selected categories. In the context of accelerated technological adoption due to the COVID-19 pandemic, this research contributes by showcasing how AI/ML can play a pivotal role in enhancing decision-making processes across various sectors and highlighting the significance of adapting to emerging technologies for sustainable growth.

CCS CONCEPTS

• Information systems → Information systems applications → Decision support systems → Data analytics

KEYWORDS

Consumer Behavior Online Review, Online Product Review Supervised Machine Learning, Subjectivity, Product Evaluation Classification

Validation of Candlestick Patterns as a Technical Indicator for Commodity Traders, Proposal of Improved Candlestick Encoding, and Data Mining Improved Candlestick Patterns

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ABSTRACT

Traders in financial markets utilize many different technical indicators. One of the most widely used technical indicators in trading is the candlestick pattern, which is the graphical representation of the price movement of a pre-determined time period. The candlestick patterns are widely used by traders to help identify trends, reversals, and signals for entry and exit for creating profitable trading strategies in financial markets. Though candlestick patterns are popular in financial circles, this study aims to use data mining approaches to further scrutinize candlestick patterns with real-world trading data. The study would first examine the effectiveness of some existing well-known candlestick patterns by checking whether the price movements would match the predicted state after the patterns occur. If a pattern is declared as a bullish pattern (e.g., HAMMER), the ratio between increase and decrease should exceed a threshold value to confirm the declaration. With the results of the existing patterns as the benchmark, the study aims to utilize data-mining techniques to search for new candlestick patterns that may perform better than the popular patterns that had been proposed. Data-mining approaches were used in which an encoding method was applied to allow more detailed candlestick patterns to be defined, and to facilitate the pattern-finding process. To validate the newly proposed candlestick patterns, the proposed candlesticks were benchmarked against the original patterns with real trading data.

CCS CONCEPTS

Applied computing • Law, social and behavioral sciences • Economics

KEYWORDS

candlestick patterns, financial market, pattern encoding.

Article Feed Recommendation System for Thai Social Media Application Using Article Context Based on Deep Learning

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ABSTRACT

In recent years, social media applications have exhibited significant growth in the number of users. To enhance content alignment with user preferences, it is important to develop a sophisticated recommendation system. Neural networks have become pivotal in enhancing the performance of recommendation systems. However, the utilization of auxiliary information and text data remains markedly underexplored, especially in the context of Thai recommendation systems. This study aims to bridge this gap by developing a recommendation system tailored for Thai social media applications. Our focus is on leveraging supplementary information and analyzing text features to gain deeper insights into user preferences while also addressing the challenges of complexity and computational time associated with handling large social media datasets. We propose the utilization of article content through the use of Contextualized Word Embedding (Multilingual Universal Sentence Encoder) and Principal Component Analysis (PCA) within the Deep and Cross Network framework, referred to as 'DCN with MUSE & PCA.' Our experiments, conducted on a real-world Thai social media application dataset, indicate that the proposed model outperforms the baseline model in terms of performance.

CCS CONCEPTS

• Computing methodologies → Neural networks.

KEYWORDS

Machine Learning, Deep Learning, Recommendation System, Natural Language Processing, Social Network

Association Rule Mining for Power Outages Caused by Animals and Vegetation in Electrical Distribution Systems

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ABSTRACT

Power outages have a negative impact on both consumers and electricity providers. The outage statistics show that the leading causes of power outages are animals and vegetation. Both leading outage causes are statistically linked to weather conditions. The outage data is retrieved from the Outage Management System (OMS) database recorded by the Provincial Electricity Authority, Thailand. The total number of instances is 495,274. The local hourly weather data is retrieved from www.worldweatheronline.com. This paper applied the association rule mining to search for the relations between weather conditions and the power outages caused by animals and vegetation. The Chi-square test was applied to determine the rules with a p-value of 0.05. The results showed that animal-caused power outages tend to occur during normal weather conditions, with calm winds and good visibility. Power outages due to vegetation often happen during bad weather conditions, rainy days, or the rainy season. The discovered association rules allow utility operators to make maintenance plans for the distribution system.

CCS CONCEPTS

• Information systems → Information systems applications → Data mining → Association rules

KEYWORDS

Association rule mining, Chi-square Test, Power Distribution System, Power Outage

Exploring the Potential of ChatGPT as a Dungeon Master in Dungeons & Dragons tabletop game

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ABSTRACT

The emergence of advanced AI language models has opened up new possibilities for the integration of artificial intelligence in various domains, including tabletop role-playing games. This research explores the potential of ChatGPT, a widely-used large language model, as a Dungeon Master (DM) in the popular role-playing game Dungeons & Dragons (D&D). The study aims to evaluate the narrative generation capabilities, player engagement, and overall player satisfaction when ChatGPT is employed as the DM. Data analysis involved reviewing the recorded gameplay sessions, transcribing dialogue, and categorizing qualitative feedback provided by both the new players and experienced DMs. The preliminary study demonstrates that ChatGPT has the potential to act as a Dungeon Master (DM) and provide a fast introduction to the experience of playing Dungeons & Dragons for new players. It can quickly generate engaging content and stimulate new players to further study and delve into advanced gameplay rules in the future.

CCS CONCEPTS

- Human-centered computing → Natural language interfaces.

KEYWORDS

ChatGPT, Dungeons & Dragons, Dungeon Master, AI-driven DMing

Hardware Performance Analysis of N-bit CLA on FPGA and Programmable SoC

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ABSTRACT

Carry Look Ahead Adders (CLA) minimize duration opposed with various adders through transmitting carry preceding the total output, which leads to better results. They increase efficiency by lowering the duration it takes to figure out carry bits. In comparison, the ripple carry adder calculates the carry bit inside its total bit, as well as every single bit needs to wait till the previous carry bit has been computed before considering both the outcome and extra bits. This paper focuses on simulation and its hardware implementation for N-bit CLA with comparison for different bits for their time delay, area, and power performance. The simulation was done using AMD-Xilinx ISE 14.7 tool for Spartan 3E based FPGA and Zynq 7000 PSoC using Verilog HDL and the performance improvements in propagating the carry and generating the sum was observed when compared with the other traditional CLA implementations. Finally, we were able to demonstrate the fact that the proposed generic CLA implementations were more efficient among similar existing in the research literatures.

CCS CONCEPTS

Computing methodologies → Parallel computing methodologies; • Hardware → Very large-scale integration design.

KEYWORDS

CLA, FPGA, HDI, Verilog, AMD- XLINX 14.7, SoC

University Students' Acceptance and Usage of Generative AI (ChatGPT) from a Psycho-Technical Perspective

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ABSTRACT

The emergence of ChatGPT as a generative AI tool has revolutionized the educational scenario by bringing in unprecedented changes. In this respect exploring the factors that affect the adoption and acceptance of ChatGPT services for educational purpose is of utmost importance. Accordingly, in this work we take a hybrid psycho-technical approach by considering the technological (perceived usefulness, ease of use and facilitating conditions), contextual (perceived humanness and novelty value), and psychological (agreeableness, extraversion, openness, conscientiousness, and neuroticism) gratifications of ChatGPT use. Data is collected from a sample of university students who use ChatGPT regularly across two Asian countries. The data analysis is done using Partial Least Squares Structural Equation Modelling. Results indicate that among the technical factors only perceived usefulness successfully predicts ChatGPT usage. Both the contextual factors of humanness and novelty use significantly explain ChatGPT usage. Finally, among the psychological factors' openness, agreeableness, and neuroticism determine the usage scenario, however, the latter two are found to be negatively associated with ChatGPT usage.

CCS CONCEPTS

• Artificial Intelligence Tools; • Human Computer Interaction; • Psychology;

KEYWORDS

ChatGPT, higher education, novelty value, personality, perceived humanness

Massive Online Testing Framework: A Case Study of the Thai National Examination Massive Online Testing Framework

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ABSTRACT

In the dynamic landscape of education, the integration of online platforms for high-stakes assessments has become pivotal. Fueled by technological advancements, educational institutions now transcend traditional boundaries of time and space in standardized testing. This paper explores the transformative impact of the Massive Online Testing Framework (MOTF) through an in-depth case study of its deployment in a national testing scenario. By seamlessly integrating Computer-Based Examination (CBE) modes for thousands of examinees, coupled with stringent security protocols and real-time monitoring systems, the MOTF demonstrates its robustness and scalability. This study not only presents the successful application of MOTF in the Thai National Test but also provides a blueprint for future innovations, emphasizing the fusion of traditional methodologies with cutting-edge technology in high-stakes assessments.

CCS CONCEPTS

Software and its engineering → Software organization and properties; Software system structures; Software architectures; Space-based architectures

KEYWORDS

Massive Online Testing System, Security Protocol, Education Technology

Code-Mixing Strategies for Computer Mediated Communication with Non-Native Speakers

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ABSTRACT

Code-mixing, the practice of seamlessly blending multiple languages or language varieties in communication, is a common linguistic phenomenon among bilingual and multilingual individuals. However, applying code-mixing when communicating with monolingual speakers presents a challenge. This research introduces and discusses two strategies for the automated translation of Japanese sentences into code-mixed Japanese. The primary objective is to facilitate comprehension for non-native Japanese speakers who possess some level of proficiency in the language. The study is motivated by the broader goal of enhancing cross-cultural communication within a multilingual context. By enabling non-native speakers to understand messages conveyed by Japanese individuals, the research seeks to promote more inclusive and accessible interactions in intercultural chat systems. These strategies, when successfully implemented, can bridge language gaps, foster cultural exchange, and enrich cross-cultural communication.

CCS CONCEPTS

• Human-centered computing • Collaborative and social computing • Collaborative and social computing systems and tools

KEYWORDS

Computer mediated communication, Computer supported collaborative work, Intercultural collaboration

Predicting Three Types of Freezing of Gait Events Using Deep Learning Models

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ABSTRACT

Freezing of gait is a Parkinson's Disease symptom that episodically inflicts a patient with the inability to step or turn while walking. While medical experts have discovered various triggers and alleviating actions for freezing of gait, the underlying causes and prediction models are still being explored today. Current freezing of gait prediction models that utilize machine learning achieve high sensitivity and specificity in freezing of gait predictions based on time-series data; however, these models lack specifications on the type of freezing of gait events. We develop various deep learning models using the transformer encoder architecture plus Bidirectional LSTM layers and different feature sets to predict the three different types of freezing of gait events. The best performing model achieves a score of 0.427 on testing data, which would rank top 5 in Kaggle's Freezing of Gait prediction competition, hosted by THE MICHAEL J. FOX FOUNDATION. However, we also recognize overfitting in training data that could be potentially improved through pseudo labelling on additional data and model architecture simplification.

CCS CONCEPTS

• Computing methodologies, Machine learning • Applied computing, Life and medical sciences

KEYWORDS

Parkinson's Disease, Freezing of Gait, Machine Learning

A Data-Driven Approach to Detect Dehydration in Afghan Children Using

Deep Learning

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ABSTRACT

Child dehydration is a significant health concern, especially among children under 5 years of age, as they are more susceptible to conditions such as diarrhea and vomiting. In Afghanistan, the impact of severe diarrhea on child mortality is exacerbated by dehydration. However, there is a notable gap in the research landscape, particularly a lack of exploration into the potential of deep learning techniques for diagnosing dehydration in Afghan children under five. To address this gap, our study leveraged three powerful classifiers: Deep Learning (DL), eXtreme Gradient Boosting Classifier (XGBoost), and k-nearest neighbors (KNN). We developed a predictive model using a comprehensive dataset of sick children obtained from the Afghanistan Demographic and Health Survey (ADHS). The primary objective of our research was to accurately determine the dehydration status of children under 5 years of age, providing crucial insights for healthcare professionals. Among all the classifiers we evaluated, the DL approach emerged as the most effective, achieving a remarkable accuracy of 99% on both the test and validation sets, along with an impressive Area under the Curve (AUC) score of 0.99. The KNN classifier also performed solidly, with a consistent 90% accuracy across all evaluation metrics. The XGBoost classifier demonstrated a remarkable precision rate of 98%, highlighting its robustness. Our DL model has the potential to significantly assist healthcare professionals in promptly and accurately identifying dehydration in children under five, leading to timely interventions that can substantially reduce the risk of severe health complications. This study showcases the promising application of deep learning approach in improving the early diagnosis of dehydration specifically in the context of Afghan children, contributing to enhanced healthcare outcomes and saving children life.

CCS CONCEPTS

Computing methodologies → Machine learning; Machine learning approaches; Neural networks; •Applied computing → Medical sciences; Health care information systems.

KEYWORDS

Dehydration, under five children, deep learning, diarrhea, predictive model

Segment-based and Patient-based Segmentation of CTPA Image in Pulmonary Embolism using CBAM ResU-Net

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ABSTRACT

An accurate pulmonary embolism segmentation from computed tomography pulmonary angiography (CTPA) images is very important in pulmonary embolism diagnosis. However, the segmentation process nowadays is done manually by physicians, making the process time-consuming and the accuracy dependent on the physician's ability. Hence, we focused on improving the accuracy of an automatic segmentation method by employing image preprocessing techniques and modifying U-Net architecture in many ways. This paper introduced ResU-Net (residual U-Net) and CBAM ResU-Net (ResU-Net with the addition of CBAM attention modules in the skip connections) models to this framework. Furthermore, we explored two training approaches: segment-based and patient-based. Our experimental results showed that segment-based models performed substantially better than patient-based models. Regardless of training approaches, the most accurate model was CBAM ResU-Net which achieved up to 0.8719 in Dice score for the segment-based approach and 0.6751 for the patient-based approach.

CCS CONCEPTS

Computing methodologies → Artificial intelligence; Computer vision; Computer vision problems; Image segmentation

KEYWORDS

CTPA, pulmonary embolism, segmentation, CBAM, ResU-Net

Predicting Blood Drop Height and Volume using Physics Equations, VGG-19, and XGBoost

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ABSTRACT

Blood Pattern Analysis is a technique in forensic science which focuses on leftover bloodstains from the crime to recreate the event. However, the fluctuation in air resistance and drop deformity causes the calculations to deviate from the exact values. Therefore, machine learning models were constructed to overcome this limitation of calculations. A series of experiments was conducted by dropping porcine blood on paper across nine distinct heights: 20, 40, 60, 80, 100, 120, 140, 160 and 180 cm with four different drop volume: 13, 16, 25 and 30 μL resulting in 36 classes. A simple simulation of free-fall spherical object was also created to convert any drop height into impact velocity. Regarding both the empirical data and simulation, the correlation between spreading factor and modified Reynold number along with the number of spines and modified Weber number were expressed as equations which can be used to determine drop height and drop volume. Concurrently, the same dataset as used in physics calculations was used to train machine learning models that implement VGG-19 and XGBoost. For VGG-19, the inputs are images of bloodstains while for XGBoost, the inputs are stain area, stain perimeter, and the number of spines. As a result, the accuracy for physics equations, VGG-19, and XGBoost resulted in 0.26, 0.56 and 0.49, respectively.

CCS CONCEPTS

Computing methodologies \rightarrow Machine learning; Learning paradigms; Supervised learning; Supervised learning by classification; • Applied computing \rightarrow Computer forensics; Evidence collection, storage and analysis.

KEYWORDS

Blood pattern analysis, Reynold number, Weber number, XGBoost, VGG-19

ClusteredSHAP: Faster GradientExplainer based on K-means Clustering and Selections of Gradients in Explaining 12-Lead ECG Classification Model

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ABSTRACT

The vast majority of healthcare systems are operating at or near their full capacity. Providing an inaccurate diagnosis is a further prevalent issue. Although it is common knowledge that physicians get significant training, it is nevertheless possible for them to misdiagnose patients, overlook warning signs, or commit any number of other human blunders. Deep Learning (DL) has emerged as a helpful tool in medical diagnostics, particularly in ECG (electrocardiogram) signal classification, enabling efficient and precise detection of cardiac abnormalities. However, the inherent black-box nature of DL poses challenges for its direct implementation in real-world medical settings. To address this, Explainable AI (XAI) techniques such as SHAP, LIME, and CAM have been introduced, aiming to render the complex decisions of neural networks interpretable. Among these, SHAP is recognized for its robustness and comprehensive explanation capabilities. Nonetheless, the high computational demands of traditional SHAP methods hinder their real-time application, especially in urgent medical scenarios. In this paper, we propose an optimized SHAP approach leveraging K-Means clustering to group gradients by importance, namely ClusteredSHAP. Our methodology focuses on a select cluster of high-magnitude gradients, enhancing the efficiency of the GradientExplainer. Our evaluation encompasses both the computational efficiency and the usability of the resulting explanations, through a custom questionnaire and explanation usability scores inspired by established user experience metrics and medical tool usability standards. The results show that our proposed ClusteredSHAP not only provides significantly faster explanations, but also achieves a similar level of average explanation usability scores with the GradientExplainer. Through this work, we strive to bridge XAI with clinical practice, ensuring timely, transparent, and effective patient care.

CCS CONCEPTS • Applied computing; • Life and medical sciences; • Health care information systems.

KEYWORDS Heart Disease Diagnosis, Explainable AI, Shapley Additive exPlanations, K-means Clustering, 12-Lead ECG Classification

Scenario Fidelity and Perceived Driver Mental Workload: Can Workload Assessment be Crowdsourced?

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ABSTRACT

Driver workload assessment is difficult. In spite of decades of effort, there is still no generally accepted method of assessing driver mental workload. Prominent methods include physiological, subjective, and dual-task assessments. While driving workload may also be influenced by the driving experience and mood, or other driver-specific factors, we were interested in the question of how much mental workload was likely to be induced in different types of driving situations. Since construction of driving situations in simulators is time consuming and may be limited by the technical features available, we have explored the use of videos of driving situations as stimuli for estimating driver mental workload. In the study reported here we asked two questions. 1) How well do people agree with each other when rating the mental workload that would be elicited by different driving situations presented as videos or storyboards. 2) How well do mental workload judgments based on storyboards of driving situations agree with corresponding judgments made after viewing videos of the same scenarios. We discuss the implications of this work for crowdsourcing driver workload assessment and building large data repositories suitable for training machine learning models. Our ultimate goal is to develop safe driver notification systems that schedule notifications when the driver is experiencing low (but not high) levels of mental workload.

CCS CONCEPTS

Human-centered computing → Ubiquitous and mobile computing design and evaluation methods;
Empirical studies in HCI; • Applied computing → Transportation.

KEYWORDS

Tasks/Interruptions/Notification, Crowdsourced, Transportation, Visual Design

Power and Delay Efficient Hardware Implementation with ATPG for Vedic Multiplier Using Urdhva Tiryagbhyam Sutra

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ABSTRACT

In most implementations of digital circuitry, multiplication requires the highest latency and computational complexity. Vedic calculations are an ancient system of mathematics that involves mathematical computations to ascertain the multiplication in faster implementation. In this paper, Urdhva Tiryagbhyam Sutra inspired Vedic Multiplier algorithm is used for multiplication rather than conventional multiplication, enabling simple and quick computation with limited hardware resources. 99.329% fault coverage was achieved using the ATALANTA tool, and the results after incorporating Automatic Test Pattern Generation (ATPG) are encouraging. The synthesis and functional verification of the proposed arithmetic circuit are carried out in Quartus Prime and the ModelSim 20.1 Intel simulator, respectively. Additionally, the latency and power consumption obtained are 7.89 ns and 0.164 nW, respectively, which is significantly less than the current designs. By using a fault collapsing technique with no aborted faults, 298 collapsed faults, 2 backtrackings, 33 test patterns before compactions, and a minimum of 20 test patterns after compactions, the design testing time is reduced.

CCS CONCEPTS

Hardware → Very large scale integration design; • Computing methodologies → Symbolic and algebraic manipulation.

KEYWORDS

Vedic multiplier, Urdhva Tiryagbhyam, Fault coverage, Automatic Test Pattern Generation (ATPG), Test patterns, ISCAS 89

Alaryngeal Speech Generation Using MaskCycleGAN-VC and Timbre-Enhanced Loss

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ABSTRACT

This paper introduces a data augmentation technique for alaryngeal speech using voice conversion within the MaskCycleGAN-VC framework [6]. Our method leverages two masking techniques: Articulatory Dimension Masking (ADM) and the combination of ADM with Consecutive Time Masking (CTM), called SpecAugment [11]. The initial technique used for masking within the MaskCycleGANVC framework is CTM, and our proposed additional masking techniques enhance the quality and performance of voice conversion for alaryngeal speech. We can also expand the variability of voice characteristics within the converted alaryngeal speech dataset. One notable enhancement in our approach is incorporating a timbre similarity score into the generator loss, known as the Timbre Enhanced Loss. This score dynamically guides the conversion process to prioritize preserving timbral characteristics during voice transformation. From our experiments using different objective metrics, the proposed method can provide synthesized alaryngeal speeches having characteristics close to the actual ones.

CCS CONCEPTS

• Computing methodologies → Voice Conversion.

KEYWORDS

Data Augmentation, Voice Conversion, Consecutive Time Masking, Articulatory Dimension Masking, Spec Augment, Timbre Enhanced Loss

Impact of Different Discrete Sampling Strategies on Fitness Landscape Analysis Based on Histograms

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ABSTRACT

Complex problems are frequently tackled using techniques from the realm of computational intelligence and metaheuristic algorithms. Selection of a metaheuristic from the wide range of algorithms possessing various properties to address specific problem types efficiently is a difficult and crucial task to avoid unnecessary blind alleys and computational expenses. Approximation of continuous problem landscapes by a limited number of scattered discrete samples is a widespread problem characterization applied in exploratory landscape analysis (ELA). ELA is a set of methods analyzing the objective and solution spaces of a problem to construct features estimated from the random samples. This paper describes a simple method for fitness landscape analysis based on the normalized histograms of sample fitness. Generation of a small number of representative discrete samples is crucial for efficient problem characterization, and therefore, amount of sampling strategies including random generators and low-discrepancy sequences was developed to evenly cover the problem landscapes. The main contribution of this paper is a study examining the impact of different sampling strategies on the distribution of fitness values based on the normalized histogram analysis. The results reveal a strong effect.

CCS CONCEPTS

• Computing methodologies → Optimization algorithms; Bio-inspired approaches; • Mathematics of computing → Distribution functions; • Theory of computation → Randomness, geometry and discrete structures.

KEYWORDS

sampling strategies, low-discrepancy sequences, metaheuristics, exploratory landscape analysis, fitness distribution

Randomization of Low-discrepancy Sampling Designs by Cranley-Patterson Rotation

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ABSTRACT

Complex problems are often addressed by methods from the domain of computational intelligence, including metaheuristic algorithms. Different metaheuristics have different abilities to solve specific types of problems and the selection of suitable methods has a large impact on the ability to find good problem solutions. Problem characterization became an important step in the application of intelligent methods to practical problems. A popular approach to problem characterization is the exploratory landscape analysis. It consists of a sequence of operations that approximate and describe the hypersurfaces formed by characteristic problem properties from a limited sample of solutions. Exploratory landscape analysis uses a particular strategy to select just a small subset of problem solutions for which are the characteristic properties evaluated and high-level features computed. Low-discrepancy sequences have been recently used to design a family of sampling strategies. They have useful space-filling properties but their effective and efficient randomization might represent an issue. In this work, we study the Cranley-Patterson rotation, a lightweight randomization strategy for low-discrepancy sequences, compare it with other randomization methods, and observe the effect its use has on the randomization of sets of sampling points in the context of exploratory landscape analysis.

CCS CONCEPTS

Computing methodologies → Optimization algorithms; Bio-inspired approaches; •Theory of computation
→ Random-ness, geometry and discrete structures.

KEYWORDS

metaheuristics, exploratory landscape analysis, sampling strategies, low-discrepancy sequences, randomization

Spam Article Detection on Social Media Platform Using Deep Learning: Enhancing Content Integrity and User Experience

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ABSTRACT

In the digital age, the widespread use of online social media corresponds with a rise in spam. These messages often appear as forceful ads, sales offer, gambling promotions, or repetitive chain messages, and they compromise users' experiences and the overall communication quality on these platforms. Various strategies have been developed to tackle this problem. Some strategies involve human reviewers, which is a straightforward yet time-consuming method. Others utilize advanced techniques like machine and deep learning. Even though a substantial amount of research has applied these methods to English-based spam, studies focusing on Thai language spam are limited. Given this context, our study seeks to develop tools based on machine and deep learning techniques to identify and classify Thai spam content effectively. The central goal of our research is to compare these techniques and determine the most effective model for classifying Thai spam content.

KEYWORDS

Machine Learning, Deep Learning, Natural Language Processing, Text Classification, Social Media

Impact of External Factors on Air Passenger Demand Prediction Using Machine Learning

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ABSTRACT

The aviation industry has seen considerable changes in recent years, with multiple underlying factors influencing passenger demand. This research delves into these external factors impacting air travel demand in Thailand. By merging historical arrival data with diverse datasets, the study aims to reveal how these factors affect demand and enhance predictive models. Machine learning regression models are utilized, focusing on Thailand's historical inbound passenger volume across three main regions. The research highlights the importance of optimal time lags for search queries, given passengers' tendencies to search before traveling. Using a recursive feature elimination process, the model was refined to include only the most influential variables. Correlation analyses reinforced these conclusions, and by incorporating location-specific Google Trend queries, prediction precision was notably improved. The methodology not only affirms the significant role of external factors in shaping air travel demand but also demonstrates its broader application in the tourism sector. This study provides key insights for improved demand forecasting in Thailand's tourism and aviation sectors.

KEYWORDS

machine learning, air passenger, Google Trend, demand prediction

Dual-Stage OOD Detection Learning with an Unsupervised Start

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ABSTRACT

When deep neural networks (DNNs) are deployed in real-world applications, their effectiveness is threatened by unexpected input data that does not reflect the training data distribution, i.e., out-of-distribution (OOD) data. Ideally, there should be relatively large training sets, including a diverse set of priori-unknown OOD data that are sufficiently different from the set of training distributions. However, this is often not the case in real-world scenarios and training data sampled from unknown distribution(s) may not be representative, leading to poor model generalizability. In this paper, we present a new two-stage training procedure for improving OOD input detection. The method uses unsupervised contrastive representation learning to leverage unlabeled data, thereby learning a class-invariant feature representation in the first stage. Then, in the second stage, we train the same model with a label smoothing technique, by minimizing cross-entropy. We evaluate this approach by considering the case of an OOD detection task in image classification (using the CIFAR-10, SVHN, Tiny ImageNet, and LSUN benchmark data sets), where there is relatively little labeled training data. Our experiments show that label smoothing improves both model calibration and the reliability of our OOD detection method. Our method is shown to improve (relative to earlier work) the generalizability and OOD detection of two frequently used architectures of convolutional neural networks.

CCS CONCEPTS

Computing methodologies → Neural networks; Unsupervised learning.

KEYWORDS

Neural Networks, Machine Learning, Deep Neural Networks, Unsupervised Representation Learning, Contrastive Learning, Out-of-distribution Detection

Automated Stock Trading System using Technical Analysis and Deep Learning Models

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ABSTRACT

Investing in stocks has historically leaned on methods like technical and fundamental analysis. This research offers a novel approach by integrating advanced machine learning techniques to predict stock prices. Deep learning models, namely LSTM-CNN and CNN-LSTM, as well as the Attention Layer, were explored for their capacity to capture and emphasize significant temporal features in stock data. The LSTM-CNN hybrid proved adept at grasping long-term temporal dependencies in stock patterns. In contrast, the CNN-LSTM with Attention Layer emphasized localized patterns by leveraging CNN's spatial feature extraction in tandem with LSTM's sequence modeling. The innovative use of the Attention layer enables selective emphasis on pertinent temporal patterns during model training. Preliminary experimental results highlight the potential superiority of these techniques over conventional methods. While the Attention layer exhibited promising results in certain tests, the hybrid models showcased efficacy in other conditions. However, it is salient to note that no model showcased consistent dominance across various stocks and conditions. This study underscores the potency and potential pitfalls of deploying deep learning in stock prediction, paving a foundation for future research in refining and optimizing these models for broader financial market applications.

KEYWORDS

Machine Learning, Deep Learning Model, Technical Analysis, Stock Exchange, Stock Trading

Attention-driven Text-guided Image Manipulation

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ABSTRACT

The main content of Text-guided Image Manipulation (TGIM) research is the use of textual information to modify the corresponding content in the input image. Based on generative adversarial networks (GAN), this research has achieved impressive manipulation performance. Nevertheless, the quality of image manipulation still needs to be further improved. In this paper, an attention-driven TGIM method is proposed to further improve the quality of image manipulation. Specifically, the proposed method uses an attention mechanism to fine-tune the whole process of image manipulation at the word level. Through attentional fine-tuning, the quality of image manipulation can be continuously improved to realize high-quality image manipulation effects. The proposed method is experimentally validated on a public Caltech-UCSD birds-200-2011 (CUB) dataset, and the qualitative and quantitative comparison results demonstrate the superior performance of the proposed method on TGIM. Compared to the existing TGIM methods, the proposed method improves the Inception Score (IS) by 22.6% and reduces Fréchet Inception Distance (FID) by 13.4%.

CCS CONCEPTS

Computing methodologies → Computer vision; Computer graphics.

KEYWORDS

Text-guided image manipulation, Attention driven, Generative adversarial networks, Computer vision

Khmer Calligraphy Style Transfer Using SkelGAN

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ABSTRACT

Font style transfer is a challenging task in computer vision, aimed at extracting the visual characteristics such as stroke contrast and apply them to the content image. In this article, we focus on utilizing SkelGAN, a modified version of the U-Net architecture, to transfer font styles from English to Khmer characters. For our experiment, we collected a dataset of 15 calligraphy fonts containing both Khmer and English characters. To assess the performance of the generated images, we used the Structural Similarity Index Measure (SSIM). We compare the generated images with the ground truth images, providing a quantitative assessment of their similarity. Our experimental results indicate that SkelGAN successfully performs style transfer from English calligraphy to Khmer calligraphy, achieving an average SSIM score of 0.93. This score signifies a significant resemblance between the generated and target styles.

CCS CONCEPTS

• Computing methodologies → Artificial intelligence; Computer vision;

KEYWORDS

font design, style transfer, Khmer font

An Implementation of Phrase Fill-in-blank Problem for Test Code

Reading Study in Java Programming Learning Assistant System

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ABSTRACT

Java is a multi-purpose programming language revolving around the concepts of objects and classes. JUnit is a unit testing framework for Java developers to write test codes and execute testing for highly reliable and bug-free codes. Previously, to assist self-studies by novice students, we have developed the Java programming learning assistant system (JPLAS), and implemented the personal answer platform on Node.js. JPLAS offers several types of exercise problems at different learning levels. In JPLAS, Phrase Fill-in-blank Problem (PFP) requests to fill in the blanks in a given source code with one or multiple elements, and Code Writing Problem (CWP) requests to answer a source code that will pass a given test code. Any answer is automatically marked on the platform by string matching with the correct one for PFP and by unit testing for CWP. In this paper, we present an implementation of PFP for test code reading studies in JPLAS. It is expected that students can easily start solving CWP after PFP. As preliminary evaluations, we generated five PFP instances from five source codes with corresponding test codes and assigned them to 15 undergraduate students in State Polytechnic of Malang, Indonesia. The results confirmed that the proposal is proper for novice students to study test code reading by JPLAS.

CCS CONCEPTS

- Software and its engineering Object oriented languages.

KEYWORDS

programming learning assistant system, Java, JUnit, test code reading, phrase fill-in-blank problem

Session 8: Data and Software Engineering, and Cyber Security, Privacy and AI

Exploring User Experience with Voice Assistants: Impact of Prior Experience on Voice Assistants.

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ABSTRACT

Voice assistants (VA) like Siri, Alexa, Cortana, and Google Assistant are on the rise, and are currently integrated into smartphones, and dedicated home speakers. They handle various tasks through voice commands, from home automation, emails to calendars. In general, we can say the VA changes how we interact with technology, hence benefiting diverse users. To reap more benefit of the VA, it is crucial to emphasize user-centric research as a focus, in addition to the technical advancements especially given the abundance of commercial VA. Each VA is unique and different, and the option of which one to acquire still remains a topic for discussion. However, prior experience affects the use of technology but if that also affects VA is still yet uncovered. This study aims to uncover how prior experience affects the user experience while using multiple VA, which ultimately affect their overall preference. Understanding VA user experiences is crucial as they integrate further into our lives. Researchers and Manufacturers must consider user preferences for broader adoption; hence this study reveals more insights into how VA cater to both experienced and non-experienced users (First-timers).

CCS CONCEPTS

Human-centered computing → Human computer interaction (HCI); HCI design and evaluation methods; Usability testing.

KEYWORDS

Voice Assistant, User Experience, Alexa, Google Assistant, Prior Experience, Novice

Designing a vulnerability threat detection scanner with the use of machine learning models

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ABSTRACT

Vulnerabilities are a serious threat to operational systems, networks, and applications. Identifying them in web services is crucial for organizations aiming to safeguard their intellectual property and data. This process involves automated scans to detect underlying software issues that could lead to data corruption, loss, or system compromise. Advanced technologies, including vulnerability scanners based on automated testing tools, are employed to detect attacks on web resources. This research focuses on developing an effective vulnerability scanner and analyzing its functionality to ensure information system security. Vulnerability scanners employ various threat detection approaches, including signature detection, behavioral analysis, heuristics, data flow analysis, and machine learning models. Experiments in this work are devoted to the detection of SQL injection threats. The steps, such as data preprocessing, cleaning, normalization, feature extraction, and classification with machine learning algorithms (Naïve Bayes, Logistic Regression, Decision Tree, Random Forest, and XGBoost), were implemented to train machine learning models. The trained models showed impressive classification scores of 0.95 and above for Accuracy, Precision, Recall, and F1-score metrics. These results prove the effectiveness of utilizing a machine-learning approach for SQL injection identification scanners.

CCS CONCEPTS • CCS Security and privacy Intrusion/anomaly detection and malware mitigation Intrusion detection systems • CCS Security and privacy Software and application security Web application security • CCS Security and privacy Systems security Vulnerability management Vulnerability scanners

KEYWORDS Threat detection, Vulnerability scanner, SQL injection, machine learning, Naïve Bayes, Logistic Regression, Decision Tree, Random Forest, XGBoost

Enhancing Cybersecurity Resilience: A Comprehensive Analysis of Human Factors and Security Practices Aligned with the NIST Cybersecurity Framework

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ABSTRACT

Although effective technical countermeasures play a pivotal role in safeguarding organizations' digital assets, the persistent challenge of human factors in cybersecurity cannot be underestimated. This study aims to identify the human factors employed within the cybersecurity research community and the relevant human-centric security practices. These human factors and security practices are subsequently mapped to the functions, categories, and sub-categories of the NIST Cybersecurity Framework (NIST-CSF). The methodology for this research comprises a literature review and qualitative mapping techniques. The findings show the identification of 20 distinct human factors and 12 security practices. Additionally, the mapping reveals that 3 of the NIST-CSF functions, 8 categories, and 17 sub-categories are directly related to human aspects of cybersecurity. By aligning human factors and security practices with established NIST-CSF guidelines, organizations can strengthen their overall security posture. Moreover, it helps identify gaps in cybersecurity related to human factors to address vulnerabilities and mitigate risks associated with human errors, reducing the likelihood of security incidents and data breaches. Ultimately, this study provides valuable insights, presents conclusions, and suggests directions for future work.

CCS CONCEPTS

• Cybersecurity • Human Factors • Human-Computer Interaction

KEYWORDS

Information Security Awareness, NIST-CSF, Security Practices

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