BOOK OF ABSTRACTS

The 23rd IEEE/WIC International Conference on Web Intelligence and Intelligent Agent Technology

WWW.WI-IAT.COM/WI-IAT2024/

9th-12th December 2024, Bangkok, Thailand

WI-IAT 2024

Preface

The 2024 IEEE/WIC International Conference on Web Intelligence and Intelligent Agent Technology (WI-IAT'24) serves as a premier international forum for researchers and practitioners to present original research and exchange innovative ideas in web intelligence and intelligent agent technology. This year, WI-IAT'24 held at King Mongkut's University of Technology Thonburi (KMUTT), Bangkok, Thailand, as a hybrid event, continues a rich tradition of excellence since its inception in 2001.

The conference covers a broad spectrum of topics, including collective intelligence, data science, human-centric computing, knowledge management, network science, autonomous agents, and multi-agent systems. This year's program features five topical tracks: the Web of People, the Web of Data, the Web of Things, the Web of Trust, and the Web of Agents. Additionally, there are two special tracks focusing on "Fairness, Accountability, Transparency and Generative Content in AI" and "Web in Industry, Society, Education, Health and Smart Living, and the Web of Everything."

Overall, WI-IAT'24 received 334 submissions, comprising 152 regular papers and 182 workshop papers, with contributions from over 500 authors across more than 40 countries/regions worldwide. After a rigorous peer review process conducted by Program Committee members and additional reviewers, 38 high-quality regular papers were accepted, corresponding to an acceptance rate of 25%. Additionally, 31 short papers were accepted, further enriching the conference program. The conference also features twelve workshops showcasing 70 pioneering works, along with two panels and a Doctoral Consortium. We are honored to host four keynote speakers who will share insights on cutting-edge topics, ranging from interpretable neural networks to brain-inspired artificial intelligence.

We extend our deepest gratitude to the authors, reviewers, Program Committee members, workshop organizers, and sponsors for their invaluable contributions to the success of WI-IAT'24. We look forward to engaging discussions and inspiring exchanges that will shape the future of web intelligence and intelligent agent technology.

Kitsuchart Pasupa, King Mongkut's Institute of Technology Ladkrabang, Thailand
Haiqin Yang, International Digital Economy Academy, China
Mufti Mahmud, King Fahd University of Petroleum and Minerals, Saudi Arabia
Sung-Bae Cho, Yonsei University, South Korea

Program Co-Chairs

Contents

WI-IAT 2024

Schedule

December 9th,2024

The 23rd IEEE/WIC International Conference on Web Intelligence
and Intelligent Agent Technology
9th – 12th December 2024

Time		Activities
8:30 - 17:00		Registration
7.00-12.00	Parallel Workshop (Online)	
	WorkShop# 20 7:00-12:15 (UTC+7)	Workshop Topic The International Workshop on AI and Computer Science Online meeting access link: https://meeting.tencent.com/dm/3E4s57LHiPqz #Tencent Meeting Number (ID): 837-206-980
	WorkShop#10 8:30-9:50 (UTC+7)	Workshop Topic The International Workshop on Exploring High Dimensional Data: Methods, Challenges, and Applications Online meeting access link: https://meeting.tencent.com/dm/KDihay1gtXlT
	WorkShop#18 8:00-11:20 (UTC+7)	Workshop Topic The International Workshop on AI-Driven Information Processing: Advances in Speech, Language, and Signal Analysis Online meeting access link: https://meeting.tencent.com/dm/jS9zG8q5lUzJ #Tencent Meeting Number(ID)：151-406-637
8.00-12.00	Parallel Workshop (Onsite)	
	WorkShop#13 ROOM X01 7:40-10:30 (UTC/GTM+7)	Workshop Topic Large Language Models in Practice Online meeting access link: https://meeting.tencent.com/dm/dN14roytk6vQ
	WorkShop#17 ROOM X04 9:00-12:15 (UTC/GTM+7)	Workshop Topic The 2024 International Workshop on Web Intelligence meets Brain Informatics (WImeetsBI 2024) Online meeting access link: https://kmutt-ac-th.zoom.us/j/97606335481 #Tencent Meeting Number(ID)：976 0633 5481
	WorkShop#2 ROOM X02 9:30-11:30 (UTC/GTM+7)	Workshop Topic The 5th International Workshop on AI for Social Good in the Connected World Online meeting access link: https://kmutt-ac-th.zoom.us/j/97191573001 #Tencent Meeting Number(ID)：971 9157 3001
12:00 - 13:00	60 Mins	Lunch 9th Fl.
13:00 - 15:00	Parallel Workshop (Online)	
	WorkShop#4 13:00-15:30 (UTC/GTM+7)	Workshop Topic The 1st International Workshop on AI for Multimodal Learning and Applications Online meeting access link: https://meeting.tencent.com/dm/PeWiRGTnHMWC #Tencent Meeting Number(ID)：151-406-637
	WorkShop#3 13:30-14:50 (UTC/GTM+7)	Workshop Topic The 13th International Workshop on Intelligent Data Processing (IDP2024) Online meeting access link: https://meeting.tencent.com/dm/KDihay1gtXlT
17:00 - 00:00	WorkShop#12 17:00-18:00 (UTC/GTM+7)	Workshop Topic The International Workshop on Information Retrieval and Artificial Intelligence--The 3rd workshop on Personalized QA and its applications （PQAIA） Online meeting access link: https://meeting.tencent.com/dm/i3BAeJV9lQsq
	WorkShop#8 18:00-19:40 (UTC/GTM+7)	Workshop Topic The 16th International Workshop on Natural Language Processing and Ontology Engineering Online meeting access link: https://meeting.tencent.com/dm/g9RDRLHNKpOk
	WorkShop#6 18:00-19:30 (UTC/GTM+7)	Workshop Topic 9th International Workshop on Integrated Social CRM Online meeting access link: https://teams.microsoft.com/l/meetup-join/19%3ameeting_YjU3NjJmNjctODUwNS00NGZmLTk1N2EtYmRiYTQzMDFiMmMz%40thread.v2/0?context=%7b%22Tid%22%3a%22cc3998de-d1ee-4ab8-85c2-19fee5f70b64%22%2c%22Oid%22%3a%22555fc5ab-8665-4ab3-9639-e7e43bce7c3a%22%7d
	WorkShop#9 21:00-23:45 (UTC/GTM+7)	Workshop Topic The International Workshop on Multi-information Fusion (TIWMF 2024) Online meeting access link: https://yorku.zoom.us/j/96300872143

WI-IAT 2024

Schedule

December 9th,2024

Time	Activities		
8:30 - 17:00	Registration		
8:30 - 13:30	Parallel Workshop (Online)		
WS#20 Workshop Dates and Time （UTC+7） December 9, 2024 8:00-13:30 Workshop Topic : The International Workshop on AI and Computer Science			
Online meeting access link : https://meeting.tencent.com/dm/3E4s57LHiPqz #Tencent Meeting Number (ID): 837-206-980			
		Reporting Schedule	
Reporting time		Title	Contact Authors
11:15 - 11:45 (UTC/GMT+7)	Invited Talk	Exploring Knowledge Graph Completion in the Context of Multimodalit	Shuting Zhou Hubei Normal University, China
11:45 - 12:15 (UTC/GMT+7)	Invited Talk	Retrieval-Augmented Generation for Large Language Models	Yu Liu, Central China Normal University, China
7:00 - 7:15 (UTC/GMT+7)	WI269	Towards explaining emergent behavior in multi-agent systems micro-parameter space structuring with feature importance in Heatbug model Author Names : Sergey Kovalchuk, Li Chao, and Oleg Kubryak	Sergey Kovalchuk, sergey.v.kovalchuk@gmail.com
7:15 - 7:30 (UTC/GMT+7)	S20236	KeyColBERT-PRF: Optimized Text Retrieval via Keyword Augmentation Author Names : Seon Ho Kim, Jooyoung Yoo, Abdullah Alfarrarjeh, Krish Sukhani, and Cyrus Shahab	Seon Ho Kim, seonkim@usc.edu
7:30 - 7:45 (UTC/GMT+7)	S20250	Bot Detection in Social Media Using GraphSage and BERT Author Names : Abhishek Deshmukh, Melody Moh, and Teng-Sheng Moh	Teng-Sheng Moh, teng.moh@sjsu.edu
7:45 - 8:00 (UTC/GMT+7)	S20252	Comparative Analysis of Incremental and Traditional Training Methods under Hardware Limitations: The ViViT model case Author Names : Fernando Santos, Andr Sabino, and Jacinto Estima	Fernando Santos, fernandolamarsantos@gmail.com
8:00 - 8:15 (UTC/GMT+7)	S20239	STVD: Synchronized Truck Video Dataset with RGB and IR Cameras for Continuous Truck Traffic Monitoring Author Names : Seon Ho Kim, Jooyoung Yoo, Abdullah Alfarrarjeh, Krish Sukhani, and Cyrus Shahabi	Seon Ho Kim, seonkim@usc.edu
8:15 - 8:30 (UTC/GMT+7)	S20202	Research on Improved YOLOv5 Algorithm for Autonomous and Controllable Embedded Platforms Author Names : Bo Su, Jingmin Li, Jinguang Chen, and Han Liang	Jinguang Chen, 136966885@qq.com
8:30 - 8:45 (UTC/GMT+7)	S20221	Pseudo-Relevance-Driven Query Expansion Using BERT Author Names : Quanli Pei, Shunke Zhou, and Min Pan	Min Pan, panminiii@mails.ccnu.edu.cn
8:45 - 9:00 (UTC/GMT+7)	S20243	Protein sequence prediction based on feature combination and attention mechanism Author Names : Zeshan Hu and Quanli Pei	Quanli Pei, eric2000@yorku.ca
9:00 - 9:15 (UTC/GMT+7)	S20238	Reconstruction of a Hidden Page from Segmented Contours Using Deep Learning Author Names : Shunke Zhou and Quanli Pei	Quanli Pei, eric2000@yorku.ca
9:15 - 9:30 (UTC/GMT+7)	S20201	YOLO-GrapeNet: A Robust Model for Grape Disease Detection Author Names : Yuanhe Dong, Enze Li, Yan Jia, and Yong Zhuang	Enze Li, entory@stu.hbnu.edu.cn
9:30 - 9:45 (UTC/GMT+7)	S20225	Research on Fire Detection Algorithm based on Improved YOLOv5 Author Names : Junyi Ma, Yunmeng Li, Mingyuan Qin, and Qiang Tong	Qiang Tong, tongqiang@hbnu.edu.cn
9:45 - 10:00 (UTC/GMT+7)	S20242	Research on teaching design for AI-enabled higher-order thinking cultivation Author Names : Wenyan Ke, Xuan Du, and Dan He	Xuan Du, 1329542674@qq.com
10:00 - 10:15 (UTC/GMT+7)	S20244	Dynamic Cuckoo Hash by machine learning data density Author Names : Zelin Wang, Jinjun Liu, Zhengyi Fang, and Minqi Wu	Zelin Wang, wzl7777@stu.hbnu.edu.cn
10:15 - 10:30 (UTC/GMT+7)	S20245	The Mode and Strategy of Generative Artificial Intelligence Enabling Teaching from the Perspective of Human-Computer Collaboration Author Names : Peijie Zhou, Haixia Xu, and Yang Tan	Peijie Zhou, 1254267817@qq.com
10:30 - 10:45 (UTC/GMT+7)	S20246	Multi-Modal Fake News Detection Aided by Multi-Viewpoint Representation from a Multi-Modal Large Language Model Author Names : Yu Sun, Xian Fu, Zhuzhu Zhang, Ningning Zhang, Hui Zhang, and Yaqiang Cao	Xian Fu, teacher.fu@hbnu.edu.cn
10:45 - 11:00 (UTC/GMT+7)	S20251	Qwen-Fin: Chinese Financial Sentiment Analysis based on Fine-Tuned Large Language Model Author Names : Zongwu Ke, Zeyu Zhang, Long Zhou, Minqi Wu, and Tao Zhang	Zeyu Zhang, kiryusawau@stu.hbnu.edu.cn

Schedule

December 9th,2024

WS#10 Workshop Dates and Time （UTC+7） December 9, 2024 8:30-10:00 Workshop Topic: The International Workshop on Exploring High Dimensional Data: Methods, Challenges, and Applications			
Online meeting access link: https://meeting.tencent.com/dm/KDihay1gtXlT			
		Reporting Schedule	
Reporting time	Paper ID	Title	Presenter
8:30-8:50 (UTC/GMT+7)	S10201	Design of all-wheel drive control system for electric vehicles Author Name: Lifeng Wang	Lifeng Wang 153719286@qq.com
8:50-9:10 (UTC/GMT+7)	S10208	DE-GWO Optimized ADRC-Based Precision Feeding System for Horizontal Auger Author Names: Jianan Wang, Haohua Qin, and Lantian Guo	Lantian Guo, lantianguo@qust.edu.cn
9:10-9:30 (UTC/GMT+7)	S10209	A Piglet Feed Intake Prediction Method Based on ConvBiLSTM Model Author Names: Zhihao Li, Haohua Qin, Jianan Wang, Hongming Zhang, and Lantian Guo	Lantian Guo, lantianguo@qust.edu.cn
9:30-9:50 (UTC/GMT+7)	S10210	A Case Study of Cloud Query Performance Comparison Between SQL and NoSQL database Author Names: Sheng Chai and Zhengrui Qin	Sheng Chai, schai@nwmissouri.edu

WS#18 Workshop Dates and Time （UTC+7） December 9, 2024 9:00-11:30 (GMT+08:00 Beijing Time) Workshop Topic : The International Workshop on AI-Driven Information Processing: Advances in Speech, Language, and Signal Analysis			
Online meeting access link: https://meeting.tencent.com/dm/jS9zG8q5lUzJ #Tencent Meeting Number(ID)：151-406-637			
		Reporting Schedule	
Reporting time	Paper ID	Title	Presenter
8:00 - 8:20 (UTC/GMT+7)	WI273	Pervasive Teledildonics: How AI Aims to Impact Human sexuality Author Names: Mile Chabot, Emily Jaworski, and Patrice Renaud	Mile Chabot, chae86@uqo.ca
8:20 - 8:40 (UTC/GMT+7)	S01221	Advertisement Viewing Relevance Feedback Based on Users' Latent Expectations in Search Results Author Names: Xinni Yang, Da Li, Shigenaga Hamaguchi, Shinsuke Nakajima, and Yukiko Kawai	Xinni Yang, i2486228@cc.kyoto-su.ac.jp
8:40 - 9:00 (UTC/GMT+7)	WI329	CCC: A spreader selection approach to control spreading dynamics in complex networks Author Names: Suman Nandi, Dwiparna Mandal, and Animesh Dutta	Suman Nandi, suman1nandi1@gmail.com
9:00 - 9:20 (UTC/GMT+7)	Invited Talk	Impact of gen-AI on firm productivity, investment, and valuation Author Names: Yiming Xu, Jimmy Huang, George Georgopoulos	Yiming Xu, yiming.xu@utoronto.ca
9:20 - 9:40 (UTC/GMT+7)	Invited Talk	Price History and Volatility-Based Index Trading Author Names: Steven Campbell and Ming Dong	Ming Dong, mdong@schulich.yorku.ca
9:40 - 10:00 (UTC/GMT+7)	S23201	Stock Price Prediction Using Sentiment and Technical Analysis Author Names: Huaqi Gao and George Georgopoulos	Huaqi Gao, huaqi27@yorku.ca
10:00 - 10:20 (UTC/GMT+7)	WI302	Thai Venomous Snake Identification using Yolo Author Names: Areerut Wongmaha and Tuul Triyason	Areerut Wongmaha, areerut.wong@kmutt.ac.th
10:20 - 10:40 (UTC/GMT+7)	S18231	The Multicultural Characteristics and Functional Analysis of Language Landscape in Multilingual Community Author Names: Xinyue Zhang and Junmei Wang	Xinyue Zhang, 827193123@qq.com
10:40 - 11:00 (UTC/GMT+7)	S18202	Smart Mine: The Role of Artificial Intelligence in Modern Coal Extraction Author Names: Wenpeng Shi, Jian Li, Zhaosheng Chen, Chen Zhang, Xuewen Zhou, and Haiming Zhao	Zhaosheng Chen, chenzhaosheng@126.com
11:00 - 11:20 (UTC/GMT+7)	S18226	A Temporal Normalization-Enhanced EfficientPhys for Student Emotion Classification Author Names: Tao Hu, Yantao Wei, Qi Xu, and Kai Yang	Yantao Wei, yantaowei@mail.ccnu.edu.cn

WI-IAT 2024

Schedule

December 9th,2024

8:30 - 13:30	Parallel Workshop (Onsite)	X01-X04
WS#13 ROOM X01 Workshop DateA55:D65s and Time （UTC+7） December 9, 2024 8:30-10:30 Workshop Topic： Large Language Models in Practice		
Online meeting access link： https://meeting.tencent.com/dm/dN14roytk6vQ		
	Reporting Schedule	
Reporting time / Paper ID	Title	Contact Author
7:40-8:00 (UTC/GMT+7) / S13201	Expansion and Validation of Open-Domain Question and Answering: an Integrated Framework Based on Large Models Author Names : Kun Hou, Shiqi Sun, Haiyang Jiang, Haoliang Zhang, Jingyuan Li, Yingying Liu, and Haiyang Wang	Jingyuan Li, li.jingyuan.jerry@btbu.edu.cn
8:00-8:20 (UTC/GMT+7) / S13202	A course recommendation model rooted in heterogeneous information networks for meta-learning Author Names : Haoliang Zhang, Jingyuan Li, Kun Hou, Renrui Duan, and Haiyang Jiang	Jingyuan Li, li.jingyuan.jerry@btbu.edu.cn
8:20-8:40 (UTC/GMT+7) / WI203	XAG: Enhancing Transparency by Integrating Explainable Artificial Intelligence with Large Language Models Author Names : Takafumi Nakanishi	Takafumi Nakanishi, takafumi.nakanishi@ds.musashino-u.ac.jp
8:40-9:00 (UTC/GMT+7) / WI301	Synthetic Data for Scam Detection: Leveraging LLMs to Train Deep Learning Models Author Names : Pitipat Gumphusiri and Tuul Triyason	Pitipat Gumphusiri, pitipat.gum@student.mahidol.edu
9:00-9:20 (UTC/GMT+7) / WI243	Connecting Researchers and Grant Opportunities: A Deep Learning Approach to extract data from heterogenous unstructured sources Author Names : Naif Alotaibi, Morteza Saberi, Madhushi Bandara,Husam Al-Najjar,and Omar Hussain	Naif.N.Alotaibi@student.uts.edu.au, morteza.saberi@uts.edu.au, Madhushi.bandara@uts.edu.au, Husam.Al-Najjar@uts.edu.au,o.hussain@unsw.edu.au
9:20-9:40 (UTC/GMT+7) / S20249	Enabling Next-Generation Smart Homes through Bert Personalized Food Recommendations - RecipeBERT Author Names : Divya Mereddy and Jeevan Beedareddy	Divya Mereddy, divya.mereddy@vanderbilt.edu
9:40-10:00 (UTC/GMT+7) / Iinvited Talk	Unveiling the Source: Differentiating Human and Machine-Generated Texts in a Multilingual Setting Author Names : Gurunameh Singh Chhatwal and Jiashu Zhao	Gurunameh Singh Chhatwal, chha8740@mylaurier.ca

WS#17 ROOM X04 Workshop Dates and Time （UTC+7） December 9, 2024 9:00-12:00 Workshop Topic: The 2024 International Workshop on Web Intelligence meets Brain Informatics (WImeetsBI 2024)—WI-IAT Edition		
Online meeting access link: https://kmutt-ac-th.zoom.us/j/97606335481 #Tencent Meeting Number(ID)：976 0633 5481		
	Reporting Schedule	
Reporting time	Title	Presenter
9:00-9:30 (UTC/GMT+7) / Opening Address	Web Intelligence Meets Brain Informatics: Building the Foundations for Future Intelligent Societies	Ning Zhong, Maebashi Institute of Technology, Japan
9:30-10:00 (UTC/GMT+7) / Invited Talk	Transforming Mental Health Care with Web Intelligence: AI Solutions for Precision Psychiatry	Xiaohui Tao, University of Southern Queensland, Australia
10:00-10:30 (UTC/GMT+7) / Invited Talk	Towards Inclusive Society 5.0: WI and BI in Improving Quality of Life	Mufti Mahmud, Nottingham Trent University, UK
10:30-11:00 (UTC/GMT+7) / Invited Talk	Modeling Users' Curiosity in Recommender Systems	Xi Niu, University of North Carolina at Charlotte, USA
Reporting time / Paper ID	Title	Contact Author
11:00-11:15 (UTC/GMT+7) / S17204	Spatiotemporal Feature Extraction of Dynamic Brain Networks and Its Application in EEG-based Emotion Recognition Author Names: Jiangyu Han, Qiangjian Zhong, Ruiting Lin, Pengcheng Zhu, Nan Qiu, and Peiyang Li	Peiyang Li, pyli@cqupt.edu.cn
11:15-11:30 (UTC/GMT+7) / S17201	Water level prediction at cascade pump stations based on Multi-scale augmented temporal decomposition network Author Names: Xumeng Shen, Yongchuan Yu, JianZhuo Yan, Chunyi Hou, and Siyao Zhang	Yongchuan Yu, yuyongchuan@bjut.edu.cn
11:30-11:45 (UTC/GMT+7) / S17202	Automated Line Chart Information Extraction for Accelerated Data Analysis in Chemical Science Using Neural Networks and Hough Transform Author Names: Hairong Yan, Shaohan Yang, and Shaorui Sun	Hairong Yan, yanhairong@bjut.edu.cn
11:45-12:00 (UTC/GMT+7) / S17203	TSAC-DRM: A Drug Recommendation Model Based on Two-Stage Attention Mechanism and Constraint Learning Author Names: Shaofu Lin, Ziqian Qiao, and Jianhui Chen	Jianhui Chen, chenjianhui@bjut.edu.cn
Important Notice：This is Part 1 of WImeetsBI 2024, the WI-IAT edition. We also invite you to explore Part 2, the Brain Informatics edition, available at: https://wi-consortium.org/conferences/bi2024/.		

WI-IAT 2024

Schedule

December 9th,2024

WS#2 ROOM X02 Workshop Dates and Time （UTC+7） December 9, 2024 9:30-11:30 Workshop Topic: The 5th International Workshop on AI for Social Good in the Connected World			
Online meeting access link: https://kmutt-ac-th.zoom.us/j/97191573001 #Tencent Meeting Number(ID)：971 9157 3001			
Reporting Schedule			
Reporting time	Paper ID	Title	Contact Author
9:30-9:50 (UTC/GMT+7)	S02201	Bayesian Inference for the Evolving Epidemiological Characteristics: A Case Study of COVID-19 in Hong Kong Author Names: Chenyang Zhang, Yineng Gao, Qi Tan, Yue Peng, and Benyun Shi	benyunshi@outlook.com, zcy52112399@163.com, YINENG001@e.ntu.edu.sg, tanqi.g@gmail.com, ypeng@njtech.edu.cn
9:50-10:10 (UTC/GMT+7)	S02202	Physics-Informed Neural Networks for Infectious Disease Modeling with Limited Data Author Names: Jiwen Xia, Yineng Gao, Qi Tan, Yue Peng, and Benyun Shi	benyunshi@outlook.com, jiwenxia@njtech.edu.cn, YINENG001@e.ntu.edu.sg, tanqi.g@gmail.com, ypeng@njtech.edu.cn
10:10-10:30 (UTC/GMT+7)	S02204	Using LLMs to analyze Antecedent, Behavior and Consequence narrative recordings in Behavioral Health Science Author Names: Jeevan Sai Reddy Beedareddy, Sesha Shai Datta Kolli, and Haley Scheer	jeevan@curajoy.com, sesha@curajoy.com, haley@curajoy.com
10:30-10:50 (UTC/GMT+7)	S02206	Advancing Forensic Investigations: A Large Language Model Approach to Morphology Prediction Author Names: Hima Thota, Niraj Pandlkar, Teng-Sheng Moh, and Mark Barash	teng.moh@sjsu.edu
10:50-11:10 (UTC/GMT+7)	S02207	Strategic Disease Control via Complex Systems Modeling: Computational Methods and Empirical Validation of Population-Level Interventions and Individual Decision-Making Author Names: Liu Feng, Yang Liu, and Jiming Liu	csygliu@comp.hkbu.edu.hk, cslfeng@comp.hkbu.edu.hk, jiming@comp.hkbu.edu.hk
11:10-11:30 (UTC/GMT+7)	S02208	A Multidimensional Link Prediction Method Based on the Node itself and Common Neighbors Contributions Author Names: Yuan Ran, FeiFan Zhan, and Li Tao	tli@swu.edu.cn, ry20030208@email.swu.edu.cn, z990731@email.swu.edu.cn
12:00 - 13:00	60 Mins	Lunch	9th Fl.
8:30 - 13:30		Parallel Workshop (Online)	

WS#4 Workshop Dates and Time （UTC+7） December 9, 2024 14:00-17:00 (GMT+08:00 Beijing Time) Workshop Topic: The 1st International Workshop on AI for Multimodal Learning and Applications			
Online meeting access link: https://meeting.tencent.com/dm/PeWiRGTnHMWC #Tencent Meeting Number(ID)：151-406-637			
Reporting Schedule			
Reporting time		Title	Presenter
13:00-13:30 (UTC/GMT+7)	Keynote	Explorations of Large Language Models in Sentiment Analysis Author Name: Rui Fan	Rui Fan, Central China Normal University, China
13:30-14:00 (UTC/GMT+7)	Keynote	Cognitive Engagement Detection with Computer vision in Dense Classroom Scenarios Author Name: Qi Xu	Qi Xu, Central China Normal University, China
Reporting time	Paper ID	Title	Contact Author
14:00-14:15 (UTC/GMT+7)	S04201	A Retrieval-Augmented Dialogue Framework for Multimodal Medical Consultation Author Names: Xinsheng Zhang and Yi Zhang	Xinsheng Zhang, zhangxinsheng@hubu.edu.cn
14:15-14:30 (UTC/GMT+7)	S04208	multimodal information enhancing for reasoning question and answering.docx Author Names: Hailiang Wu, Hui Chen, and Peng He	Hui Chen, chenhui0137@hubu.edu.cn
14:30-14:45 (UTC/GMT+7)	S04214	Zero-shot Response-Aware Query Expansion Method for Conversational Retrieval Author Names: Junmei Wang, Xiadan Chen, Puyu He, Fengjing Zhang, Luyun Wang, and Jinhua Sheng	Junmei Wang, jmwang@hdu.edu.cn
14:45-15:00 (UTC/GMT+7)	S04228	Enhancing and Accelerating Image-Text Retrieval with Knowledge Graphs and FAISS Author Names: Junmei Wang, Jing Zeng, and Jinhua Sheng	Junmei Wang, jmwang@hdu.edu.cn
15:00-15:15 (UTC/GMT+7)	S22202	MCRecKit: An Open-Source Library for Multi-Criteria Recommendations Author Names: Yong Zheng and David Xuejun Wang	Yong Zheng, yzheng66@iit.edu
15:15-15:30 (UTC/GMT+7)	WI255	Applying mixup for Time Series in Transformer-Based Human Activity Recognition Author Names: Hiskias Dingeto and Juntae Kim	Juntae Kim, jkim@dongguk.edu

WI-IAT 2024

Schedule

December 9th,2024

WS#3 Workshop Dates and Time （UTC+7） December 9, 2024 14:30-16:30 Workshop Topic The 13th International Workshop on Intelligent Data Processing (IDP2024)			
Online meeting access link: https://meeting.tencent.com/dm/KDihay1gtXlT			
Reporting Schedule			
Reporting time	Paper ID	Title	Presenter
13:00-13:50 (UTC/GMT+7)	S03201	An Analysis of College Students Views on Translanguaging in Teaching?A Case Study of Students in NingboTech University Author Names: Shi Chen and Chen Ou	Chen Ou, ocean79ou@163.com
13:50-14:10 (UTC/GMT+7)	S03202	On the Contradictions in EFL Learners Oral English Learning from the Perspective of Activity Theory Author Names: Haoyun Wang and Chen Ou	Chen Ou, ocean79ou@163.com
14:10-14:30 (UTC/GMT+7)	S03203	Analyze Trolling Behavior Trends in Chinese Mobile Game Forums Using Sentiment Analysis Author Names: Yiming Ni, Paolo Mengoni, and LIANG LAN	LIANG LAN, lanliang@hkbu.edu.hk
14:30-14:50 (UTC/GMT+7)	WI234	Recent Trends in Web Intelligence and Agent Technology: Hybrid Topic Modeling Approaches Author Names: Secil Tezel, Veli Bahadir Can, and Sila Ovgu Korkut	Secil Tezel, tezel.secil@outlook.com

WS#12 Workshop Dates and Time （UTC+7） December 9, 2024 18:00-20:00 Workshop Topic: The International Workshop on Information Retrieval and Artificial Intelligence--The 3rd workshop on Personalized QA and its applications （PQAIA）			
Online meeting access link: https://meeting.tencent.com/dm/i3BAeJV9lQsq			
Reporting Schedule			
Reporting time	Paper ID	Title	Presenter
17:00-17:20 (UTC/GMT+7)	S12202	Leiden-Based Model for Detecting Anomalous Groups in Event Propagation Author Names: Lingkai Li, Bo Li, Renrui Duan, Jingyuan Li, and Haiyang Wang	Jingyuan Li, li.jingyuan.jerry@btbu.edu.cn
17:20-17:40 (UTC/GMT+7)	S12203	BERT-KAIM: A Knowledge-Augmented Model for Domain-Specific Tasks with Learnable Activation Functions and Mixed Precision Training Author Names: Haiyang Jiang, Yingying Liu, Haixiang Wang, Yao Zheng, Kun Hou, Jingyuan Li, and Haoliang Zhang	Jingyuan Li, li.jingyuan.jerry@btbu.edu.cn
17:40-18:00 (UTC/GMT+7)	S12204	Social Robot Detection Based on LLM and LSTM-LDA Model Author Names: Sheng Wang, Jingyuan Li, Shiqi Sun, Bo Li, Qiong Wu, and Haoliang Zhang	Jingyuan Li, li.jingyuan.jerry@btbu.edu.cn

WS#8 Workshop Dates and Time （UTC+7） December 9, 2024 19:00-22:00 (GMT+08:00)China Standard Time - Beijing Workshop Topic: The 16th International Workshop on Natural Language Processing and Ontology Engineering			
Online meeting access link: https://meeting.tencent.com/dm/g9RDRLHNKpOk			
Reporting Schedule			
Reporting time	Paper ID	Title	Presenter
18:00-18:20 (UTC/GMT+7)	S08202	Research on ontology construction based on the knowledge system of 'Compendium of Materia Medica' Author Names: Ying Zhou, Yang Zhou, and Yao Liu	Ying Zhou, zhouying961024@163.com
18:20-18:40 (UTC/GMT+7)	S08203	Construction of a Traditional Chinese Medicine Knowledge Graph Based on Structural Generation - Insights from Zheng Lei Ben Cao Author Names: Guisheng Zhang, Xuebo Li, Yang Zhou, and Yao Liu	Yao Liu, liuy@istic.ac.cn
18:40-19:00 (UTC/GMT+7)	S08205	A Study on the Compatibility Patterns of Prescriptions in Shengji Zonglu through the Integration of Structured and Text Mining Author Names: Yanli Zhang and Ruixiang Wang	Yanli Zhang, 19506029952@163.com
19:00-19:20 (UTC/GMT+7)	WI315	FAIR Metrics for motivating ethics in peer review Author Names: Adam Craig and Carl Taswell	Adam Craig, agcraig@hkbu.edu.hk
19:20-19:40 (UTC/GMT+7)	WI318	Analyzing User Segmentation in Clusters via Topic Modeling on X (Twitter) Using Comments and Interactions Author Names: Prinwat Udomwisanpat, Kulsawasd Jitkajornwanich, Panu Srestasathiern, Siam Lawawirojwong, and Pattama Charoenporn	Kulsawasd Jitkajornwanich, kulsawasd.jitkajornwanich@ttu.edu

Schedule

December 10th,2024

Time	Duration	Event Program		
8:30 - 17:00		Registration		
9:00 - 9:15	15 Mins	Opening Ceremony		
9:15 - 10:00	45 Mins	Keynote#1 - Guoyin Wang Title: Brain Cognition Inspired Artificial Intelligence (ROOM X04)		
10:00 - 10:15	15 Mins	Coffee Break		
10:15 – 12:00	1.45hrs.	Parallel Sessions		
		ROOM X02	ROOM X01	ROOM X04
		Web of People Session no.1 Recommender Systems and Cold-Start Challenge Join Zoom Meeting: https://kmutt-ac-th.zoom.us/j/91531261440 Meeting ID: 91531261440	Web of Data Session no.1 Large Language Models, NLP, and Text Processing Join Zoom Meeting: https://kmutt-ac-th.zoom.us/j/99366905017 Meeting ID: 993 6690 5017	SPECIAL TRACK: FAccT, LLM and AIGC and WEB OF TRUST Trustworthy AI: Explainability, Fairness, and Security in Digital and Social Contexts Join Zoom Meeting: https://kmutt-ac-th.zoom.us/j/98682042024 Meeting ID: 986 8204 2024
		WI298 A Comprehensive Approach Integrating Spot Atmosphere,User Situations, and Moods for Music Recommendation (20 Mins) **(Online)** Da Li, Fumina Maruoka, Tadahiko Kumamoto, Shintaro Ono, and Yukiko Kawai	**WI289** Reasoning Capabilities and Invariability of Large Language Models (20 Mins) Alessandro Raganato, Rafael Penaloza, Marco Viviani, and Gabriella Pasi	**WI325** Argument-structured Justification Generation for Explainable Fact-checking (20 Mins) Xiaoou Wang, Elena Cabrio, and Serena Villata
		WI215 Cold-Start Service Recommendation Based on a Multi-Strategy Pre-Training Model (20 Mins) **(Online)** Gang Xiao, Jiacheng Shi, JiaHuan Fei, Qibing Wang, Yuchen He, and Jiawei Lu	**WI228** LLM's got the funk: leveraging LLM, Prompt Engineering and Fine-Tuning for Topic Modelling on Brazilian Funk Lyrics (20 Mins) **(Online)** Jesus Yepez, Bruno Tavares, Fabiola Peres, and Karin Becker	**WI244** Towards a Smart Asset Model for Digital Assets on Blockchains (20 Mins) **(Online)** Vodelina Samatova, Nodirbek Korchiev, Sogolsadat Mansouri, and Kemafor Anyanwu
		WI331 Incorporating Classifier-Free Guidance in Diffusion Model-Based Recommendation (20 Mins) **(Online)** Noah Buchanan, Susan Gauch, and Quan Mai	**WI275** PROMET: Parameter-efficient Few-shot Fine-grained Entity Typing with Implicit Mask Filling (20 Mins) **(Online)** Riccardo Rubini, Manuel Vimercati, and Matteo Palmonari	**WI249** EHSD : Explainable Hate Speech Detection Based on Pre-trained Language Models with Rationale Learning and Multi-Task Learning (20 Mins) **(Online)** Yuta Honjo, Jianwei Zhang, and Wei Zhang
		WI225 Cosmetic Item Recommendation Method Based on Similar User Extraction Considering Skin Type and Concerns (15 Mins) Da Li, Amane Matsuoka, Fumiya Yamaguchi, Mayumi Ueda, and Shinsuke Nakajima	**WI296** Leveraging LLMs for Mental Health: Detection and Recommendations from Social Discussions (15 Mins) Vaishali Aggarwal, Sachin Thukral, Krushil Patel, and Arnab Chatterjee	**WI304** From Courts to Comprehension: Can LLMs Make Judgments More Accessible? (20 Mins) **(Online)** Giovanni Pinna, Davide Tugnoli, Mara Bartole, Luca Manzoni, and Andrea De Lorenzo
		WI339 Alleviating the Cold Start Problem in Recommender Systems Using Error-Based Learning (15 Mins) **(Online)** Ricardo Laanen and Flavius Frasincar	**WI354** A Framework for Synthetic Audio Conversations Generation using Large Language Models (15 Mins) Kaung Myat Kyaw and Jonathan Hoyin Chan	**WI264** Malicious Web Links Detection Based on Image Processing and Deep Learning Models (15 Mins) **(Online)** Claudia-Ioana Coste
			WI306 Synthetic Data Generation with Large Language Models for Personalized Community Question Answering (15 Mins) **(Online)** Marco Braga, Pranav Kasela, Alessandro Raganato, and Gabriella Pasi	**WI310** Optimization of Bias Mitigation in Word Embeddings: a Methodological Approach (15 Mins) **(Online)** María José Zambrano and Felipe Bravo-Marquez
12:00 - 13:00	60 Mins	Lunch		

Schedule

13:00 - 13:45	45 Mins	Keynote#2 - Ong Yew Soon Title: Foundations of Transfer and Multitask Optimization and Advances with Generative AI and Large Language Models (Room: X04)		
13:45 - 15:45	1hrs.	Forum Keynote: Irwin King Title: The Critical Role of AI in Learning Analytics and Assessment in the Future of Education (Room: X04)		
14:45 - 15:45	1hrs.	Forum on AI and Educaiton Chair: Irwin King (Room: X04)		
15:45 - 16:00	15 Mins	Coffee Break		
16:00 17:45	1.45hrs.	Parallel Session		
		ROOM X02	ROOM X01	ROOM X04
		Web of People Session no.2 AI for Health, Emotion, and Social Intelligence Join Zoom Meeting: https://kmutt-ac-th.zoom.us/j/96182656092 Meeting ID: 961 8265 6092	Web of Data Session no.2 Knowledge Graphs and Entity Linking Join Zoom Meeting: https://kmutt-ac-th.zoom.us/j/99366905017 Meeting ID: 993 6690 5017	SPECIAL TRACK: Web in Industry, Society, Health and Smart Living, and the Web of Everything and WEB OF AGENTS Interactive and Intelligent Platforms for Policy, Education, and Service Compliance Join Zoom Meeting: https://kmutt-ac-th.zoom.us/j/98682042024 Meeting ID: 986 8204 2024
		WI311 Food KBQA Recommender: A knowledge base question answering system powered meal plan recommender (20 Mins) **(Online)** Felix Bölz, Diana Nurbakova, Audrey Serna, Sylvie Calabretto, Lionel Brunie, and Harald Kosch	**WI260** TabLinkLLM: An LLM-based Approach forEntity Linking in Tabular Data (20 Mins) Iroshani Jayawardene, Roberto Avogadro, Ahmet Soylu, and Dumitru Roman	**WI262** Developing A Chatbot: A Hybrid Approach Using Deep Learning and RAG (20 Mins) Vrajkumar Patel, Parth Tejani, Jay Parekh, Xing Tan, and Huang Kai
		WI237 Mind2: Mind-to-Mind Emotional Support System with Bidirectional Cognitive Discourse Analysis (20 Mins) **(Online)** Shi Yin Hong, Uttamasha Oyshi, Quan Mai, Gibson Nkhata, and Susan Gauch	**WI284** Lifelong Neural Graph Summarization (20 Mins) Jonatan Frank, Marcel Hoffmann, Nicolas Lell, David Richerby, and Ansgar Scherp	**WI345** Development of a Participatory Policy Planning Tool based on Multi-Agent Social Simulation (20 Mins) Naoki Sugie, Mamoru Yoshizoe, and Hiromitsu Hattori
		WI247 Brain-inspired Diagnostic Model for Lung Nodules (20 Mins) **(Online)** Huanan Bao, Guoyin Wang, Qun Liu, and Pengcheng Xu	**WI285** Multi-View Structural Graph Summaries (20 Mins) Jonatan Frank, Andor Diera, David Richerby, and Ansgar Scherp	**WI356** Measuring Spoken English Proficiency Level Based on IELTS Speaking Test Using Machine Learning Models (15 Mins) Dylan Yves and Jonathan Chan
		WI251 Robustness of the compositional data approach in bipolar psychometric Likert scales big skewed data analysis (15 Mins) **(Online)** René Lehmann and Bodo Vogt	**WI238** Semantic and Structural Clustering for Enhancing SubGraph-based Knowledge Graph Completion (15 Mins) You-Syuan Chen, Cheng-Ru Wei, Tzi-Ping Gau, and Wei-Po Lee	**WI307** LLM-based Interoperable IoT Service Platform (15 Mins) Ryutaro Yokotsuji, Donghui Lin, and Fumito Uwano
		WI322 Anomalous Speech Detection: Unleashing the Adaptive Power of VarietyDetect for Enhanced Short-Text Anomaly Detection through Transfer Learning and Self-Training (15 Mins) **(Online)** Saugata Bose and Guoxin Su	**WI258** Fact-Centric Knowledge Web for Information Retrieval (15 Mins) Reuben Sinha and Shun Shiramatsu	**WI287** Developing Metaverse Initiatives: Insights from a University Case Study (15 Mins) Jiongbin Liu, William Yeoh, Shang Gao, Xiaoliang Meng, and Yuhan Zhu
			WI278 Modelling and Exploitation of Knowledge Graphs using Category Theory (15 Mins) Marek Reformat and Tim Put	**WI348** Intent-Based Qualification of Industry 4.0 Components (15 Mins) kaoutar sadouki, Elena Kornyshova, and Nourhene Ben Rabah
17:45-20:00	2.15hrs.	Reception		

WI-IAT 2024

Schedule

December 11th,2024

Time	Duration	Event Program		
8:30 - 17:00	Registration			
8:30 - 10.50	2.20hrs.	Best Paper Award Candidate Presentation & Parallel Sessions		
		ROOM X02	ROOM X01	ROOM X04
		Web of People Session no.3 Social Media, Opinion Analysis, and Citizen Participation Join Zoom Meeting: https://kmutt-ac-th.zoom.us/j/95340570479 Meeting ID: 953 4057 0479	Web of Data Session no.3 AI for Context-Aware QA, Social Insights, and Predictive Modeling Join Zoom Meeting: https://kmutt-ac-th.zoom.us/j/97282327978 Meeting ID: 972 8232 7978	Best Paper Award / Best Student Paper Award - Shortlist Join Zoom Meeting: https://kmutt-ac-th.zoom.us/j/92785661973 Meeting ID: 927 8566 1973
		WI233 Exploring Divergence in Collective Perception to Noto Earthquake Through News Comment Data (20 Mins) **(Online)** Kunhao Yang and Mengyuan Fu	**WI266** HouseOfTheDragonQA: Open-Domain Long-Form Context-Aware QA Pairs for TV Series (20 Mins) Aritra Kumar Lahiri and Qinmin Vivian Hu	**WI240** Estimation of POI Characteristics Based on Visitor Mobility Behavior (20 Mins) Landy Rajaonarivo and Tsunenori Mine
		WI282 A Comparative Analysis of Offensive Discourse in the 2021 Chilean Presidential Campaign on Twitter and WhatsApp (20 Mins) **(Online)** Hernan Sarmiento, Jorge Ortiz, Felipe Bravo-Marquez, Marcelo Santos, and Sebastián Valenzuela	**WI208** The 3SD few-shot method for detecting stances on Twitter:a case study of Brazilian Stances on COVID vaccination (20 Mins) Karin Becker, Jesus Yepes, and Andre Mediote de Souza	**WI337** Enhancing the conformal predictability of context-aware recommendation systems by using Deep Autoencoders (20 Mins) Saloua Zammali, Siddhant Dutta, and Sadok Ban Yahia
		WI338 Finding Conflicts of Opinion in Citizen Participation Platforms (20 Mins) **(Online)** William Aboucaya, Oana Balalau, Rafael Angarita, and Valérie Issarny	**WI309** Leveraging Large Language Models for Medical Information Extraction and Query Generation (15 Mins) Georgios Peikos, Pranav Kasela, and Gabriella Pasi	**WI235** A Concise Multi-Document Extractive Summarization Approach on Product Reviews (20 Mins) Nathaniel Benham, Siqi Gao, and Yiu-Kai Ng
		WI223 C^2DRNet: Context-Commonsense Discrepancy Resolution Learning on Commonsense Attentive Network for Humor Recognition (15 Mins) Yuta Sasaki, Jianwei Zhang, and Yuhki Shiraishi	**WI248** Cross-domain Hate Speech Detection for Content Moderation in Greek Social Networks (15 Mins) Nikolaos Stylianou, Theodora Tsikrika, Stefanos Vrochidis, and Ioannis Kompatsiaris	**WI277** Unveiling the Source: Differentiating Human and Machine-Generated Texts in a Multilingual Setting (20 Mins) Gurunameh Singh Chhatwal and Jiashu Zhao
		WI226 A System for Analyzing the Frequency of Product Feature Mentions in Review Videos (15 Mins) Fumiya Yamaguchi, Aiko Kobayashi, Mayumi Ueda, Da Li, and Shinsuke Nakajima	**WI232** Spatio-Temporal Multi-Factor Network Based on Attention Mechanism for Traffic Prediction (15 Mins) Yutong Li, Zhonghua Sun, Xinke Wang, Kebin Jia, and Jinchao Feng	**WI292** Deep Reinforcement Learning with Local Communications for Continuous Pathfinding Problems in Multi-Agent Systems (20 Mins) Yosuke Fujisawa, Daiki Shimada, Yuki Miyashita, and Toshiharu Sugawara
			WI317 A knowledge-based sequential sensor selection approach for fast object classification (15 Mins) Vincent Beugnet, Nathalie Pernelle, Manel Zarrouk, Cyrille Enderli, and Ludovic Grivault	**WI303** TIMBRE: Efficient Job Recommendation On Heterogeneous Graphs For Professional Recruiters (20 Mins) Éric Behar, Julien Romero, Amel Bouzeghoub, and Katarzyna Węgrzyn-Wolska
			WI241 A Multi-Population Surrogate-Assisted Algorithm Based on Granular-Ball K-Nearest Neighbors Classification for Expensive Optimization (15 Mins) **(Online)** Haihuan Jiang, Guoyin Wang, Qun Liu, and Jiajia Cao	**WI224** Synthetic Mobility Feature Generation for Mental Health Prediction using Diffusion Models (20 Mins) Masahiro Suzuki, Megumi Kodaka, and Yusuke Fukazawa
10:50 - 11:00	10 Mins	Coffee Break		

Schedule

11:00 - 12:00	1 hrs.	Doctoral Consortium Keynote: Giorgio Ascoli Title: "Brains v. machines - what can AI learn from neuroscience (Room: X04)
12:00 - 13:00	1 hrs.	Doctoral Consortium: (Room: X04) Chair: Jimmy Huang
13:00 - 14:00	1hr.	Lunch
14:00- 14:45	45 Mins	Keynote#3 - Danilo Mandic Title: Interpretable Convolutional NNs and Graph CNNs: Role of Domain Knowledge (Room: X04)
14:45 - 15:00	15 Mins	Coffee Break
15:00 - 16:30	1.30hrs.	Panel: Web Intelligence 3.0 and Beyond: Exploring the Intersection of LLMs, AI Agents, and Embodied Intelligence for a Future Intelligent Society Chairs: Jiming Liu and Ning Zhong (Room: X04)
16:30 - 17:00	30 Mins	Award Ceremony and WI-IAT 2025 Introduction (Room: X04) (1) The awards in the conference level, including the Best Paper Awards, the Best Service Awards etc. (2) The awards in the WIC level, including WIC Outstanding Research Contributions Award and WIC Outstanding Service Award. (3) The announcement of new Web Intelligence Academy (WIA) fellows. (4) The introduction of WI-IAT 2025.
17:15 - 18:00	45 Mins	Break
17:45 - 20:00	2.15 hrs.	Banquet / Best Paper Award

Schedule

December 12th,2024

Time	Duration	Event Program		
8:30 - 17:00		Registration		
9:00 - 9:45	45 Mins	Keynote#4 - Saori Tanaka Title: Status of Human Neuroimaging Databases Worldwide Focusing on Psychiatric and Neurological Disorders (Room: X04)		
9:45 - 10:00	15 Mins	Coffee Break		
10:00 - 11:45	1.45hrs.	Parallel Session		
		ROOM X02	ROOM X01	ROOM X04
		Web of People Session no.4 AI Innovations in Learning, Search, and Crowdsourcing Join Zoom Meeting: https://kmutt-ac-th.zoom.us/j/93071284103 Meeting ID: 930 7128 4103	Web of Data Session no.4 Perception Analysis and Monitoring Join Zoom Meeting: https://kmutt-ac-th.zoom.us/j/97302708539 Meeting ID: 973 0270 8539	Web of Agent Multi-Agent Systems, Coalition Formation, and Game Theory Join Zoom Meeting: https://kmutt-ac-th.zoom.us/j/94018630291 Meeting ID: 940 1863 0291
		WI305 Enhancing User's Knowledge Gain Estimation In Search-as-Learning Using Implied Knowledge (20 Mins) **(Online)** Arno Lesage, Hadi Nasser, Célia da Costa Pereira, Cathy Escazut, and Andrea Tettamanzi	**WI218** GAF-based multimodal time series data fusion for water depth monitoring in headwater streams (20 Mins) Xiaohu Zhao, Kebin Jia, Yue Zhang, Zhonghua Sun, Jinchao Feng, and Wei Liu	**WI221** Using Two Colour Necklaces to Fairly Allocate Coalition Value Calculations (20 Mins) Terry Payne, Luke Riley, Katie Atkinson, and Paul Dunne
		WI242 Automatic Rating for Each Evaluation Aspect Based on Hotel Review Analysis Using Word Embedding (20 Mins) Yujiro Hayashi, Jianwei Zhang, Yukiko Kawai, and Shinsuke Nakajima	**WI229** LAIP: Learned Adaptive Inspection Paths Using Offline Reinforcement Learning (20 Mins) **(Online)** Samuel Matloob, Ayan Dutta, O. Patrick Kreidl, Swapnonel Roy, and Ladislau Bölöni	**WI222** Incentives in Public Goods Games on Networks (20 Mins) Yair Vaknin and Amnon Meisels
		WI245 Self-Supervised Fine-tuning for Neural Expert Finding (20 Mins) Budhitama Subagdja, Sanchari Dan, and Ah-Hwee Tan	**WI286** Survey Table Generation from Academic Articles (20 Mins) **(Online)** Po-Chun Chen, Hen-Hsen Huang, and Hsin-Hsi Chen	**WI314** Utility-Profit based Large Scale Simultaneous Coalition Structure Generation and Assignment in Constrained Environment (15 Mins) Tuhin Kumar Biswas, Ankit Roy, and Animesh Dutta
		WI328 Task Assignment in Crowdsourcing Using Deep Knowledge Tracing (15 Mins) Ryotaro Yamamoto, Zhang Yuxuan, and Yohei Murakami	**WI253** Estimating Anime Sacred Sites Based on Geolocalization by Hybrid Model of Classification and Regression (15 Mins) **(Online)** Weixiang Ou, Kaito Honda, and Takayasu Fushimi	**WI343** Multi-Agent Traffic Simulations with Agent Control based on Logic Programming Languages (15 Mins) Mamoru Yoshizoe and Hiromitsu Hattori
		WI280 Estimating Knowledge Gain in Search As Learning: A Clustering-based Approach to Inferring Learning Goals (15 Mins) **(Online)** Hadi Nasser, Célia da Costa Pereira, Cathy Escazut, and Andrea Tettamanzi	**WI281** Moving Object Detection using Hybrid Yolo-v8 with Improved GAN (15 Mins) **(Online)** Mukaram Safaldin, Nizar Zaghden, and Mahmoud Mejdoub	**WI324** Evaluating and Enhancing LLMs Agent based on Theory of Mind in Guandan: A Multi-Player Cooperative Game under Imperfect Information (15 Mins) **(Online)** Yauwai Yim, Chunkit Chan, Tianyu Shi, Zheye Deng, Wei Fan, Tianshi Zheng, and Yangqiu Song
			WI294 What makes a place safe? uncovering urban perception through street view imagery (15 Mins) **(Online)** Felipe Moreno, Bruno Brandoli and Jorge Poco	
11:45 - 12:00	15 Mins	Closing Remark (Room X04)		

A Comprehensive Approach Integrating Spot Atmosphere, User Situations, and Moods for Music Recommendation

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ABSTRACT

Music recommendation plays a significant role in enhancing the daily experiences of individuals, especially during activities such as traveling. In this study, we propose an advanced music recommendation system that integrates user context, encompassing spot atmosphere, and mood. Our methodology entails employing deep learning techniques on geotagged tweets to assess spot atmosphere and conducting surveys to elucidate the correlation between user context (spot and activity) and mood. The music recommendations are generated based on both the spot atmosphere and user context. We validate our approach by analyzing user situations and moods through surveys, and we extract songs using Spotify's music features. The findings from our analysis demonstrate the superiority of the proposed method over previously employed techniques. This research contributes to the advancement of music recommendation systems by integrating context-aware features, ultimately leading to more personalized and enjoyable music suggestions for users.

Index Terms

Music Recommendation, Musical Characteristics, Geographic Information, Social Media

Cold-Start Service Recommendation Based on a Multi-Strategy Pre-Training Model

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ABSTRACT

Service recommendation aims to quickly select appropriate services from a large number of Web services to meet user needs. However, the cold-start problem due to new services or scarcity of historical interactions can affect recommendation performance. Thus, we propose a cold-start service recommendation method based on a multi-strategy pretraining model (MSPT), which improves recommendation performance through two pre-training tasks. First, a hypergraph convolutional network (HyperGCN) is trained for feature extraction of hypergraph based on labels, and a meta-aggregator and an adaptive sampling strategy are introduced into the hypergraph convolution to enhance the feature aggregation effect for cold-start data. Second, a text feature encoder is trained for extracting useful information from descriptive texts through contrastive learning (CL) between the text and collaborative modules. Finally, the model is fine-tuned by downstream recommendation tasks. The experimental results show that the proposed MSPT model is efficient. In terms of service embedding quality, its cosine similarity improves by 1.26% over the optimal baseline (including variants). In terms of NDCG@5 and HR@5, its values improve by 3.66% and 5.24% over the optimal baseline, respectively.

Index Terms

Service Recommendation, Cold-Start Recommendation, Hypergraph Convolutional Network, Contrastive Learning

Incorporating Classifier-Free Guidance in Diffusion Model-Based Recommendation

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ABSTRACT

This paper presents a diffusion-based recommender system that incorporates classifier-free guidance. Most current recommender systems provide recommendations using conventional methods such as collaborative or content-based filtering. Diffusion is a new approach to generative AI that improves on previous generative AI approaches such as Variational Autoencoders (VAEs) and Generative Adversarial Networks (GANs). We incorporate diffusion in a recommender system that mirrors the sequence users take when browsing and rating items. Although a few current recommender systems incorporate diffusion, they do not incorporate classifier-free guidance, a new innovation in diffusion models as a whole. In this paper, we present a diffusion recommender system that augments the underlying recommender system model for improved performance and also incorporates classifier-free guidance. Our findings show improvements over state-of-the-art recommender systems for most metrics for several recommendation tasks on a variety of datasets. In particular, our approach demonstrates the potential to provide better recommendations when data is sparse.

Index Terms

recommender system, generative AI, diffusion, classifier-free guidance

Cosmetic Item Recommendation Method Based on Similar User Extraction Considering Skin Type and Concerns

Da Li, Amane Matsuoka, Fumiya Yamaguchi, Mayumi Ueda, and Shinsuke Nakajima

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ABSTRACT

Accurate identification of similar users is crucial for implementing cosmetic item recommendations based on collaborative filtering. Users have diverse skin qualities and concerns, making simple classification by skin type inadequate. Therefore, this study involves users answering a questionnaire about their skin quality and concerns for different facial areas. Additionally, we analyze the reviews previously posted by these users to generate a feature vector representing their skin quality (type) and concerns. By using information obtained from both the questionnaire and the review analysis, we perform advanced similarity determination that considers skin quality and concerns for each facial area. Cosmetic items are then recommended based on the results of this similar user identification

Index Terms

cosmetic item recommendation, similar user extraction, collaborative filtering, skin concerns, review analysis

Alleviating the Cold Start Problem in Recommender Systems Using Error-Based Learning

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ABSTRACT

Information overload is increasingly common due to the overwhelming number of online products and services offered online. Web shops use recommender systems to provide personalized suggestions, which are effective for users with historical data but face challenges with new users due to the coldstart problem. It is useful to recommend items that offer a small but representative insight into new users' preferences, so that future recommendations can be improved. This research tests two error-based active learning strategies, which are especially useful because they are expected to both produce informative training points as well as reduce the predictive error of the model: the Ychange method and a modified version of the CV-based method called the error-change method. These methods rank items for predicting new user preferences, with proposed conservative, moderate, and risky versions. Results are compared with a random selection method and the PopGini method, which was the top-performing strategy in a research with a similar set-up. The moderate version of the error-change method significantly outperforms the other considered methods, while the Y-change method still outperforms PopGini.

Index Terms

cold-start problem, recommender systems, error-based learning, active learning

Reasoning Capabilities and Invariability of Large Language Models

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ABSTRACT

Large Language Models (LLMs) have shown remarkable capabilities in manipulating natural language across multiple applications, but their ability to handle simple reasoning tasks is often questioned. In this work, we aim to provide a comprehensive analysis of LLMs' reasoning competence, specifically focusing on their prompt dependency. In particular, we introduce a new benchmark dataset with a series of simple reasoning questions demanding shallow logical reasoning. Aligned with cognitive psychology standards, the questions are confined to a basic domain revolving around geometric figures, ensuring that responses are independent of any pre-existing intuition about the world and rely solely on deduction. An empirical analysis involving zero-shot and few-shot prompting across 24 LLMs of different sizes reveals that, while LLMs with over 70 billion parameters perform better in the zero-shot setting, there is still a large room for improvement. An additional test with chainof-thought prompting over 22 LLMs shows that this additional prompt can aid or damage the performance of models, depending on whether the rationale is required before or after the answer.

Index Terms

Natural Language Processing, Knowledge Representation and Reasoning, LLM benchmark, Generative AI

LLM's got the funk: leveraging LLM, Prompt Engineering and Fine-Tuning for Topic Modelling on Brazilian Funk Lyricssi

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ABSTRACT

Music can serve as a mirror of social conditions, and studying social phenomena requires proper computational tools to evaluate the discourses in song lyrics on a large scale. Brazilian Funk (BRFunk) is a popular genre that emerged from the *favelas* in Rio de Janeiro, regarded as controversial for merging stories of resilience and social criticism, with themes such as violence, drugs, and women objectification. These themes portray the social conditions of daily life in Brazilian slums (*favelas*). In this paper, we propose a novel topic modeling approach that explores the power of Large Language Models (LLM) and pre-trained models to extract insights from song lyrics, using BRFunk as a case study. The generative power of LLM is leveraged through prompt engineering to summarize lyrics excerpts into themes in an iterative process to create a reliable distribution of themes. Pre-trained models are then deployed to condensate the themes into a non-redundant and cohesive set of topics using BERTopic, and through BERT fine-tuned models that classify new lyrics excerpts according to these topics. Using the top 100 BRFunk songs of 2023, we illustrate how this large-scale computational strategy is an efficient ally for understanding social phenomena and cultural movements.

Index Terms
Topic modeling, Large Language Model, Prompting Engineer, BERT, —BRFunk

PROMET: Parameter-efficient Few-shot Fine-grained Entity Typing with Implicit Mask Filling

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ABSTRACT

Few-shot Fine-grained Entity Typing (FET) techniques are applied to classify entities recognized in texts into classes from taxonomies using a limited amount of training data. The task supports entity extraction and knowledge graph (KG) construction by classifying novel entities according to a taxonomy of interest. In this paper, we present PROMET (PROmpt-tuning using implicit Mask filling for Entity Typing), a novel parameterefficient prompt-based approach to few-shot FET that exploits implicit mask filling. The usage of the embedding of the masked tokens avoids the necessity of a manually defined verbalizer to initialize the matrix which maps the predicted token to entity classes. By directly fine-tuning Adapters and a linear layer instead of 1) the whole PLM and 2) the verbalizer matrix, PROMET uses a number of trainable parameters that is two orders of magnitude smaller than existing models, achieving better or comparable performance on benchmark datasets. Finally, we develop PROMET (and modify the state-of-the-art few-shot FET approach) to work in multi-label inference settings, coherently with earlier work in the field and with typing patterns in KGs.

Leveraging LLMs for Mental Health: Detection and Recommendations from Social Discussions

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ABSTRACT

Textual data from social platforms captures various aspects of mental health through discussions around and across issues, while users reach out for help and others sympathize and offer support. We propose a comprehensive framework that leverages Natural Language Processing (NLP) and Generative AI techniques to identify and assess mental health disorders, detect their severity, and create recommendations for behavior change and therapeutic interventions based on users' posts on Reddit. To classify the disorders, we use rule-based labeling methods as well as advanced pre-trained NLP models to extract nuanced semantic features from the data. We fine-tune domain-adapted and generic pre-trained NLP models based on predictions from specialized Large Language Models (LLMs) to improve classification accuracy. Our hybrid approach combines the generalization capabilities of pre-trained models with the domain-specific insights captured by LLMs, providing an improved understanding of mental health discourse. Our findings highlight the strengths and limitations of each model, offering valuable insights into their practical applicability.

This research potentially facilitates early detection and personalized care to aid practitioners and aims to facilitate timely interventions and improve overall well-being, thereby contributing to the broader field of mental health surveillance and digital health analytics.

Index Terms

Mental health, behavior, Reddit, GenAI

A Framework for Synthetic Audio Conversations Generation using Large Language Models

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ABSTRACT

In this paper, we introduce ConversaSynth, a framework designed to generate synthetic conversation audio using large language models (LLMs) with multiple persona settings. The framework first creates diverse and coherent text-based dialogues across various topics, which are then converted into audio using text-to-speech (TTS) systems. Our experiments demonstrate that ConversaSynth effectively generates high quality synthetic audio datasets, which can significantly enhance the training and evaluation of models for audio tagging, audio classification, and multi-speaker speech recognition. The results indicate that the synthetic datasets generated by ConversaSynth exhibit substantial diversity and realism, making them suitable for developing robust, adaptable audio-based AI systems.

Index Terms
Large Language Models (LLM), Synthetic Audio Generation, Conversational AI, Text-to-Speech (TTS)

Synthetic Data Generation with Large Language Models for Personalized Community Question Answering

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ABSTRACT

Personalization in Information Retrieval (IR) is a topic studied by the research community since a long time. However, there is still a lack of datasets to conduct large-scale evaluations of personalized IR; this is mainly due to the fact that collecting and curating high-quality user-related information requires significant costs and time investment. Furthermore, the creation of datasets for Personalized IR (PIR) tasks is affected by both privacy concerns and the need for accurate userrelated data, which are often not publicly available. Recently, researchers have started to explore the use of Large Language Models (LLMs) to generate synthetic datasets, which is a possible solution to generate data for low-resource tasks. In this paper, we investigate the potential of Large Language Models (LLMs) for generating synthetic documents to train an IR system for a Personalized Community Question Answering task. To study the effectiveness of IR models fine-tuned on LLM-generated data, we introduce a new dataset, named Sy-SE-PQA. We build SySE-PQA based on an existing dataset, SE-PQA [1], which consists of questions and answers posted on the popular StackExchange communities. Starting from questions in SE-PQA, we generate synthetic answers using different prompt techniques and LLMs. Our findings suggest that LLMs have high potential in generating data tailored to users' needs. The synthetic data can replace human-written training data, even if the generated data may contain incorrect information. The code is publicly available[2].

Index Terms

Natural Language Processing, Question Answering, Personalization, Large Language Models

Argument-structured Justification Generation for Explainable Fact-checking

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ABSTRACT

Justification production is a central task in automated fact-checking, and most studies cast this task as summarization. However, the majority of previous studies presume the availability of human-written fact-checking articles, which is unrealistic in practice. In this work, we address this issue by proposing a novel approach to generate argument-based justifications to improve fact-checking. Our contribution is threefold. First, our extensive experimental setting shows that, despite lower ROUGE scores, our argument-structured summarizer produces summaries leading to better claim verification performance than the state-of-the-art summarizer in fact-checking on three different benchmarks for this task. Second, our jointly-trained summarization and evidence retrieval system outperforms the state-of-the-art method on ExClaim, the only dataset where no human-written fact-checking articles are provided during verification of news claims. Third, we show that integrating attackability evaluation into the training process of the summarizer significantly reduces hallucinated argument relations, leading to more reliable and trustworthy justification generation

Towards a Smart Asset Model for Digital Assets on Blockchains

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ABSTRACT

Effective management of digital assets on blockchains is increasingly important for enhancing transparency and efficiency in areas like Supply Chain Management and ownership of user-generated content on the Web. Blockchains often have a very limited set of native transaction and asset types (usually a cryptocurrency) but allow user-defined transactions and assets implemented as part of programs called smart contracts. However, the semantics of these user-defined components are opaque to the blockchain engine, limiting reuse in transaction and asset modeling, blockchain interoperability and opportunities for automatic optimization of user-defined blockchain transactions.

This paper explores the explicit modeling of digital assets and their impact on blockchain performance and usability. In particular, we introduce an approach for enabling a *smart asset* model and propose an implementation approach using the Big Chain DB blockchain database as our context. We present an empirical evaluation that shows significant improvements in transaction latency, throughput, and correctness over traditional smart contract systems.

Index Terms

Blockchain, Digital Asset Modeling, Distributed Ledger Technology

EHSD: Explainable Hate Speech Detection Based on Pre-trained Language Models with Rationale Learning and Multi-Task Learning

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ABSTRACT

The rise of social media has led to the increasing prevalence of online hate speech. In recent years, there has been a surge of research on hate speech detection, resulting in significant improvements in detection performance. However, many high-performance models have complex architectures, making it difficult to understand the factors behind their detection results. To address this issue, models have been developed that use XAI (Explainable Artificial Intelligence) to provide explanations for detection decisions. Previous research has shown that a twostage approach, with rationale learning in the first stage and fine-tuning for hate speech detection in the second stage, can improve explainability. This study proposes a new model with three components to further improve detection performance and explainability. The first component is the replacement of Pretrained Language Models (PLM) with a domain-specific one. The second component is the extension of rationale learning by increasing the number of rationale representations learned. The third component is employment of multi-task learning. Experimental results show that the proposed model outperforms the previous model in terms of both performance and explainability. An ablation study reveals that all three components contribute to the improvement in both performance and explainability.

Index Terms

Hate Speech Detection, XAI, Pre-trained Language Models, Rationale Learning, Multi-Task Learning

From Courts to Comprehension: Can LLMs Make Judgments More Accessible?

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ABSTRACT

Legal regulations play a pivotal role in shaping citizens' daily lives, yet their complexity often renders them inaccessible to those without specialized legal expertise. Recent advances in natural language processing (NLP) have shown promise in creating summaries of legal texts to enhance their comprehensibility. However, the effectiveness of these summaries, particularly when generated by Large Language Models (LLMs), has not been extensively evaluated among the general public audience—i.e. non-experts.

This study evaluates the capability of LLMs, specifically small open-source models and GPT-4o, in summarizing Italian legal judgments to make them more understandable for individuals without legal training. To assess the quality and comprehensibility of these summaries, participants were presented with a questionnaire containing comprehension questions formulated by legal experts. While this response doesn't directly measure the summary's quality, it serves as a strong indicator of the summary's practical usefulness. The findings reveal that although these models are not yet fully capable of the task, they have demonstrated significant promise. However, the study also showed that while human-made summaries resulted in better comprehension and more accurate responses, they come at a higher cost compared to AI-generated summaries.

Index Terms

Legal Summarization, Natural Language Processing, Large Language Models, Human Evaluation, Legal Accessibility

Malicious Web Links Detection Based on Image Processing and Deep Learning Models

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ABSTRACT

The latest improvements regarding the online world have come with great benefits, but, as well as dangerous drawbacks (i.e., web-malware). This article proposes to investigate the reliability and accuracy of a novel web-malware detection method by using images and deep learning. The web links are transformed into colored and grayscale images and then a deep learning model is applied to extract relevant features and classify the links. We managed to calibrate and compare a 3-layer convolutional network and the well-known VGG16, ResNet50V2 and ResNet101 models. Moreover, we added a Long-Short Term Memory layer with the focus of improving performance. The approach was tested on two datasets and our best results reached 96.82% accuracy surpassing the performance of its counterparts on the largest dataset. Moreover, there are not significant differences between the classification done on the grayscale and on the RGB images. However, the Long-Short Term Memory layer may be influenced on how we have generated the input images, in a row-by-row or in a column-by-column manner

Index Terms
malicious web links, phishing links classification, image processing, deep-learning, web-security

Optimization of Bias Mitigation in Word Embeddings: a Methodological Approach

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ABSTRACT

Word embeddings (WEs) often reflect biases present in their training data, and various bias mitigation and evaluation techniques have been proposed to address this. Existing benchmarks for comparing different debiasing methods overlook two factors: the choice of training words and model hyperparameters. We propose a robust comparison methodology that incorporates them using nested cross-validation, hyper-parameter optimization, and the corrected paired Student's t-test. Our results show that when using our evaluation approach many recent debiasing methods do not offer statistically significant improvements over the original hard debiasing model.

Index Terms
Bias, Word Embeddings, Natural Language Processing

Food KBQA Recommender: A knowledge base question answering system powered meal plan recommender

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ABSTRACT

This study investigates the efficacy of a hybrid recommendation model for personalized meal plans, integrating *Knowledge Base Question Answering* (KBQA), *Information Retrieval* (IR), and *Recommendation* techniques. It utilizes the hybrid model to consider both different dietary preferences and nutritional requirements. In addition, it tries to bridge the gap between the recommender itself and its effectiveness in the real world by offering interfaces for integrating persuasion via explanation and gamification.

The findings contribute to extending knowledge about the development of food recommendation systems in constrained contexts. The system can address health awareness by considering user-defined constraints. However, in big use cases, it has issues with its scalability. Future work involves refining the data generation processes and exploring non-KBQA models for broader scalability and adaptability.

Index Terms

KBQA Recommendation, Information Retrieval, Health-aware Recommendation, Persuasive Systems, Food Recommendation

Mind2: Mind-to-Mind Emotional Support System with Bidirectional Cognitive Discourse Analysis

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ABSTRACT

Emotional support (ES) systems alleviate users' mental distress by generating strategic supportive dialogues based on diverse user situations. However, ES systems are limited in their ability to generate effective ES dialogues that include timely context and interpretability, hindering them from earning public trust. Driven by cognitive models, we propose Mind-toMind (Mind2), an ES framework that approaches interpretable ES context modeling for the ES dialogue generation task from a discourse analysis perspective. Specifically, we perform cognitive discourse analysis on ES dialogues according to our dynamic discourse context propagation window, which accommodates evolving context as the conversation between the ES system and user progresses. To enhance interpretability, Mind2 prioritizes details that reflect each speaker's belief about the other speaker with bidirectionality, integrating Theory-of-Mind, physiological expected utility, and cognitive rationality to extract cognitive knowledge from ES conversations. Experimental results support that Mind2 achieves competitive performance versus state-of-theart ES systems while trained with only 10% of the available training data.

Index Terms
emotional support system, dialogue generation, discourse analysis

Brain-inspired Diagnostic Model for Lung Nodules

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ABSTRACT

In recent years, artificial intelligence (AI) has attained or even surpassed the level of the human brain in fields such as machine translation and computer vision. However, AI systems still face limitations due to challenges in effectively managing uncertain information and a lack of interpretability. Recent developments in brain science and discoveries in cognitive mechanisms offer potential solutions to address these issues. Inspired by the brain's dual-pathway uncertainty-processing mechanism, we designed a lung nodule diagnosis model that integrates convolutional neural networks (CNNs) and transformers, simulating the regulatory effects of dopamine and kainate receptors on uncertainty. We introduce two regularization terms to reduce diagnostic uncertainty for lung nodules. Experimental results on the LIDC-IDRI and LNDb datasets indicate that this model not only performs well but also provides visual explanations that are more consistent with domain knowledge.

Index Terms
Brain Cognition, Uncertainty, MultiGranularity Cognitive Computing, Lung Nodule Diagnosis

Robustness of the compositional data approach in bipolar psychometric Likert scales big skewed data analysis

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ABSTRACT

Managerial decision making, the enhancement of recommender systems and the prediction of human behaviour depend on individual attitudes and preferences. To gather these, bipolar psychometric questionnaires are used among other methods. Recently, the compositional data structure known as the Simplex was identified in bipolar Likert scale data. This concept posits that any level of agreement with an item assertion implies a level of disagreement, resulting in bivariate compositional information. Through the use of an isometric log-ratio (ilr) transformation, bivariate data can be converted to a real-valued interval scale.It is well-established that the ilr approach enhances the statistical power of correlation tests and two-sample t-tests based on Student's t-distribution, provided that the Central Limit Theorem (CLT) holds true. However, in practical applications, adherence to the CLT depends on factors such as the number of items and the distribution shape of the data generating process (DGP). Psychometric data may consist of only a few item responses, and DGPs can exhibit skewness, leading to violations of the CLT. Through simulation studies, we demonstrate that the ilr approach performs effectively even when the CLT assumptions regarding skewness and small item numbers are violated, thereby increasing the statistical power of correlation tests. This research extends previous findings and underscores the versatility of the ilr approach as a dependable tool in psychometric big data analysis.

Index Terms
psychometric bipolar scales, correlation test, skewness, statistical power

Anomalous Speech Detection: Unleashing the Adaptive Power of VarietyDetect for Enhanced Short-Text Anomaly Detection through Transfer Learning and Self-Training

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ABSTRACT

VarietyDetect, a semi-supervised model combining transfer learning and self-training, enhances anomaly detection across domains. Leveraging both labeled and unlabeled data, *VarietyDetect* demonstrates a 24.6% F1 score improvement on hate speech detection and reduces false negatives by 15% on average. Its adaptability and iterative self-training position it as a robust solution for real-world short-text anomaly detection.

Index Terms

Self-training, Pre-trained language model (PLM), Transfer learning, Fine-tuning, One-class Classifier, Short-text, Hate speech.

Parallel Session SPECIAL TRACK: Web in Industry, Society, Health and Smart Living, and the Web of Everything and WEB OF AGENTS Interactive and Intelligent Platforms for Policy, Education, and Service Compliance

TabLinkLLM: An LLM-based Approach for Entity Linking in Tabular Data

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ABSTRACT

Entity linking (EL) involves identifying references to entities in source data, which can be structured or unstructured, and associating them with their respective records in a structured knowledge base. This technique is beneficial when applied to tabular data, facilitating tasks such as data integration, business intelligence, and the construction of knowledge graphs. Current EL algorithms for tabular data often face challenges such as ambiguity, heterogeneity, and limited context. In this paper, we propose TabLinkLLM – a generic approach for tabular data entity linking using Large Language Models (LLMs), specifically optimized through prompt engineering, retrieval-augmented generation, and fine-tuning. Our experimental comparisons with leading EL models reveal that while our approach does not outperform specialized EL models in terms of performance, the broad knowledge base of LLMs proves advantageous in addressing scenarios that these specialized models cannot handle.

Index Terms

Entity linking, Tabular data, Large language models, Knowledge graphs

Parallel Session SPECIAL TRACK: Web in Industry, Society, Health and Smart Living, and the Web of Everything and WEB OF AGENTS Interactive and Intelligent Platforms for Policy, Education, and Service Compliance

Lifelong Graph Learning for Graph Summarization

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ABSTRACT

Summarizing web graphs is challenging due to the heterogeneity of the modeled information and its changes over time. We investigate the use of neural networks for lifelong graph summarization. After observing the web graph at a point in time, we train a network to summarize graph vertices. We apply this trained network to summarize the vertices of the changed graph at the next point in time. Subsequently, we continue training and evaluating the network to perform lifelong graph summarization. We use the GNNs Graph-MLP and GCN, as well as an MLP baseline, to summarize the temporal graphs. We compare 1- hop and 2-hop summaries. We investigate the impact of reusing parameters from a previous snapshot by measuring backward and forward transfer as well as forgetting rate. Our extensive experiments are on two series of ten weekly snapshots, from 2012 and 2022, of a web graph with over 100M edges. They show that all networks predominantly use 1-hop information to determine the summary, even when performing 2-hop summarization. Due to the heterogeneity of web graphs, in some snapshots, the 2- hop summary produces up to ten times as many vertex classes as the 1-hop summary. When using the network trained on the last snapshot from 2012 and applying it to the first snapshot of 2022, we observe a strong drop in accuracy. We attribute this drop over the ten-year time warp to the strongly increased heterogeneity of the web graph in 2022. The source code and additional resources are available at https://github.com/jofranky/ Lifelong-Graph-Summarization-with-Neural-Networks.

Index Terms

temporal graphs, lifelong graph learning, neural networks, graph neural networks, graph summary, RDF graph

Multi-View Structural Graph Summaries

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ABSTRACT

A structural graph summary is a small graph representation that preserves structural information necessary for a given task. The summary is used instead of the original graph to complete the task faster. We introduce multi-view structural graph summaries and propose an algorithm for merging two summaries. We conduct a theoretical analysis of our algorithm. We run experiments on three datasets, contributing two new ones. The datasets are of different domains (web graph, source code, and news) and sizes. The interpretation of multi-view depends on the domain: pay-level domains on the web, control vs. data flow of the code, and the output of different news broadcasters. We experiment with three graph summary models: attribute collection, class collection, and their combination. We observe that merging two structural summaries has an upper bound of quadratic complexity; but under reasonable assumptions, it has linear-time worst-case complexity. The running time of merging has a strong linear correlation with the number of edges in the two summaries. Therefore, the experiments support the assumption that the upper bound of quadratic complexity is not tight and that linear complexity is possible. Furthermore, our experiments show that always merging the two smallest summaries by the number of edges is the most efficient strategy for merging multiple structural summaries. The source code and additional resources are available at https://github.com/jofranky/ Multi-View-Structural-Graph-Summaries.

Index Terms
RDF graphs, structural graph summaries, multi-view summaries, knowledge graphs

Parallel Session SPECIAL TRACK: Web in Industry, Society, Health and Smart Living, and the Web of Everything and WEB OF AGENTS Interactive and Intelligent Platforms for Policy, Education, and Service Compliance

Semantic and Structural Clustering for Enhancing SubGraph-based Knowledge Graph Completion

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ABSTRACT

Knowledge graphs play a key role in medical studies, aiding in disease diagnosis, understanding disease relationships, and enhancing knowledge integration. In this work, we employ structural and semantic-based methods for knowledge graph embedding and subgraph extraction using vector similarity. We also explore topic modeling for clustering. Our study compares different embedding techniques and clustering methods, confirming the effectiveness of our approach in link prediction tasks.

Keywords

Knowledge Graph Reasoning, Link Prediction, Subgraph Analysis, Knowledge Graph Embedding, Cluster Analysis

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Fact-Centric Knowledge Web for Information Retrieval

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ABSTRACT

The unreliability of Large Language Models (LLMs) owing to Machine Hallucination necessitates a shift towards Retrieval Augmented Generation (RAG), to ensure the veracity of LLM generated content. Inspired by Knowledge Graph based RAG techniques and their advantages of reduced token cost, improved computational performance and knowledge discovery, we present a “Knowledge Web” Structure and its associated techniques for Information Storage and Retrieval. We also explore the structure’s synergy with a Fact Finding LLM Agent, capable of generating answers for multihop questions from challenging datasets such as the MuSiQue dataset. While still in the experimental phase, our initial results are promising, indicating the potential efficacy of our approach compared to existing RAG techniques.

Keywords
Knowledge Graph, Large Language Models, LLM Agent, Information Storage, Information Retrieval

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Modelling and Exploitation of Knowledge Graphs using Category Theory

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ABSTRACT

The observed growth in Artificial Intelligence sparks an increased expectation of constructing intelligent systems. Equipping such systems with a semantically rich representation of data and information is essential.

This paper briefly introduces the use of knowledge graphs and category theory to create a framework for 'clever' data processing. It focuses on the key role of category theory mechanisms in data synthesis, particularly in concept validation and construction.

Index Terms

Knowledge Graphs, Complex Systems, Limits and CoLimits, Category Theory

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Development of a Participatory Policy Planning Tool based on Multi-Agent Social Simulation

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ABSTRACT

Cities are intricate systems where diverse social structures interact, leading to the continuous emergence of complex social phenomena. Analyzing and optimizing these interactions, as well as efficiently managing urban systems, present significant challenges. Multi-Agent Social Simulation (MASS) offers promising solutions for these challenges. However, MASS is not a user-friendly technology for stakeholders involved in urban issues, such as residents and local government officials. This paper presents the development of a participatory policy planning tool based on MASS. We developed a prototype system to explore potential traffic policies, integrating traffic simulation, data visualization, and a web-based interface. A social experiment conducted with residents in Japan demonstrated the potential of the MASS-based planning tool. Additionally, in the paper, we discuss an approach to simulate and evaluate urban traffic policies on the developed MASS-based system, focusing on optimizing the combination of traffic signal timing adjustments and policy implementations.

Index Terms
Multi-Agent Simulation, Urban Traffic Simulation, Genetic Algorithm

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Measuring Spoken English Proficiency Level Based on IELTS Speaking Test Using Machine Learning Models

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ABSTRACT

This study presents the development of a system for evaluating English-speaking proficiency based on the IELTS framework. We employed data collection, analysis, and machine learning techniques to build a predictive model. The system focuses on using the statistical features extracted from the transcription of the speaking test. The initial model (XGBoost) showed a mean squared error of 2.29. After feature reduction and hyperparameter tuning, performance improved, achieving an average cross-validation score of 1.57 with a variance of 0.3872 across five folds. Our analysis found that lexical diversity, measured by the total number of unique words, is the most influential factor in predicting IELTS scores, while other features had minimal impact. Despite the improvements, the model does not account for critical speech components like fluency and pronunciation. Future research should address these aspects to better align with IELTS criteria. This study contributes to natural language processing and linguistics by offering a new machine learning model for predicting IELTS scores from the test transcription.

Index Terms
Machine Learning, IELTS, Automated Speech Scoring

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LLM-based Interoperable IoT Service Platform

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ABSTRACT

With the rapid development of the Internet of Things (IoT) and the emergence of Large Language Models (LLMs), integrating these technologies offers significant potential for creating advanced IoT services. However, challenges remain in ensuring the interoperability of diverse IoT devices and web services, as well as in effectively utilizing LLMs to process real-world data. In this paper, we propose a novel IoT service platform designed to enhance interoperability across heterogeneous IoT devices and web services, seamlessly integrating LLMs to generate context-aware responses based on real-world situations. By standardizing IoT data through a unified interface, our platform enables developers to create sophisticated IoT applications without addressing the underlying heterogeneity of devices and services. Furthermore, sensor data is converted into prompts for LLMs, allowing the models to generate intelligent responses and control actuators in real-world scenarios. We implemented and evaluated the platform in a smart home environment, demonstrating its effectiveness in improving IoT service interoperability and the practicality of LLM-driven IoT applications. The results show that the proposed platform not only reduces development costs but also ensures responsive and contextually appropriate interactions, paving the way for more sophisticated IoT systems.

Index Terms
Internet of Things, Large Language Models, IoT Service Platform, Interoperability, Smart Home

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Developing Metaverse Initiatives: Insights from a University Case Study

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ABSTRACT

The metaverse concept has sparked significant interest in both academic and industrial spheres. As educational institutions increasingly adopt this technology, understanding its implementation becomes crucial. In response, we conducted a comprehensive case study at a large university, systematically analyzing the nine stages of metaverse development initiatives. Our study unveiled critical insights into the planning, assessment, and execution processes, offering invaluable guidance for stakeholders. The findings highlight both the opportunities for enhanced learning experiences and the challenges related to technological integration and social interaction in higher education.

Index Terms
Metaverse, metaverse development framework, higher education, case study.

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Intent-Based Qualification of Industry 4.0 Components

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ABSTRACT

In the context of Industry 4.0, the number and complexity of various components (such as cyber-physical systems, sensors, IoT devices, etc.) are growing continuously. Multiple factors related to the particular components and the context impact their usage and should be considered to configure them better. In our research, we focus on intents as a factor to take into account for the component configuration. By their nature, intents cannot be directly related to the components and the configuration actions on them. Thus, we translate intents and qualify the Industry 4.0 components by their capability to satisfy the intents using deep learning for a further configuration better aligned with users' needs. We formalize intents using the Extended Backus-Naur Form, allowing a more precise interpretation and execution of components, and use neural networks for our model. We demonstrate our proposal through a use case of a hydraulic system. Our findings highlight the potential of linking business intents with component data to enable more insightful and dynamic control of industrial operations. Future work will focus on automating component qualification and further refining intent-based optimizations, contributing to more intelligent, adaptive, and interconnected industrial ecosystems.

Index Terms

Industry 4.0, Intent, Intent Formalization, I4.0 Components, EBNF, Neural Network, Hydraulic System

Exploring Divergence in Collective Perception to Noto Earthquake Through News Comment Data

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ABSTRACT

Will natural disasters erode the cohesion of a society? Extensive research has demonstrated that natural disasters can exacerbate polarization and precipitate violent sociopolitical conflicts. This damaging impact of natural disasters on social cohesion originates from divergent perceptions from different social groups about natural disasters. Therefore, it is important for policymakers and researchers to understand and monitor the landscape of citizens' perceptions in the face of natural disasters. This study introduces a computational model employing an embedding model, UMAP, and HDBSCAN to tackle the discrepancies in citizen perceptions during natural disasters. Furthermore, by utilizing a large language model-based methodology to enhance the interpretability of the proposed model's outcomes, our model provides a detailed map illustrating the varied responses of citizens regarding a natural disaster. By applying this approach to around 100 thousand news comments on the 2024 Noto earthquake in Japan from Yahoo! News Japan, we found that more than half (62.7%) of the observed users agreed on a main narrative of the Noto earthquake. However, different and even opposing opinions about the Noto earthquake also existed. The remaining 37.6% of observed users are divided into 16 like-minded groups, and each group has divergent concerns about various issues relating to the Noto earthquake. These include the economic impact of the Noto earthquake, public health concerns in the affected area, the rescue and care of female citizens, international support, media coverage and public response to the Noto earthquake, and volunteer activities related to the Noto earthquake. In this way, the current study uncovered the complex landscape of collective perceptions of the 2024 Noto earthquake. The results of the current research can also contribute to building and improving the response and recovery strategy for the Noto earthquake and the forthcoming disasters.

Keywords
Public Opinion, Natural Disasters, Representation Learning, News Comments, Large Language Model.

A Comparative Analysis of Offensive Discourse in the 2021 Chilean Presidential Campaign on Twitter and WhatsApp

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ABSTRACT

Participatory society has often been regarded positively, frequently associated with the ideals of a more democratic and equitable civilization. Nevertheless, the idea of participation may act as a two-sided phenomenon in terms of empowerment, especially in the realm of social media platforms. This dichotomy is evident as increased participation often leads to a rise in offensive and divisive language, reflecting the challenging balance between open dialogue and the maintenance of respectful discourse on these platforms. In this work, we comprehensively examine the use of offensive language during a highly polarizing event on two online platforms, Twitter and Whatsapp. In our study, we focus in the 2021 Chilean Presidential Elections, a political event where candidates from two opposing parties faced each other. Using a state-of-the-art model and all available labeled data in literature, we determine the level of offensive language across platforms and parties. Our results show that Twitter messages contain, on average, up to 15% more of offensive language than Whatsapp.

Index Terms

social media, hate speech, polarization, Twitter, WhatsApp. Index Terms—social media, hate speech, polarization, Twitter, WhatsApp.

Finding Conflicts of Opinion in Citizen Participation Platforms

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ABSTRACT

Online citizen participation platforms are powerful democratic tools that allow large numbers of contributors to be involved in public decision-making.

However, for large groups of contributors to collaborate, we need to provide tools for users and decisionmakers to navigate and understand high volumes of content. Towards this goal, we introduce an approach based on natural language processing to detect pairs of contradictory and equivalent proposals in online citizen participation contexts. We apply this approach on two major national citizen consultations: the *République Numérique* and *Revenu Universel d'Activité* consultations. We highlight the potential of our method in two use cases. First, our method is a high-quality tool for finding idea communities in online content. Second, we demonstrate that the method improves on the state-ofthe-art for finding relevant complementary content for a user, by identifying new relevant views for 76 % of the proposals tested.

Index Terms

citizen participation, online collaboration, natural language processing, natural language inference, text clustering, text recommendation

C^{2}DRNet: Context-Commonsense Discrepancy Resolution Learning on Commonsense Attentive Network for Humor Recognition

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ABSTRACT

Humor brings laughter that promotes mental and physical health. Understanding humor, even for humans, is difficult and requires deep commonsense and world knowledge. According to the incongruity theory of humor in psychological research, recognizing the “discrepancy” between perceived context and expectation causes laughter. In this paper, we propose C2DRNet that extrapolates commonsense to pre-trained language models with Commonsense-aware Multi-Head Attention and imitates cognitive process based on the incongruity theory with supervised contrastive learning DRL (Discrepancy Resolution Learning) for sensitive humor recognition. Through experiments, we verify the effectiveness of commonsense infusion and DRL introduction for automatic humor recognition. The evaluation on the HaHackathon dataset shows that C2DRNet improves the overall humor recognition performance, especially recall by up to 2.8%, over simple PLM-only models that do not consider commonsense and incongruity theory. Through ablation studies, we also clarify the usefulness of DRL, investigate the influence of changing the amount of commonsense, and analyze the class labels suitable for DRL. Our code is available at https://github.com/zhanglab-iu/C2DRNet.

Index Terms

Humor recognition, Commonsense-aware attention, Discrepancy

A System for Analyzing the Frequency of Product Feature Mentions in Review Videos

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ABSTRACT

In online shopping, there exists a risk that purchased items may differ from expectations. Consequently, more users are turning to product review videos for guidance. However, due to the abundance of reviews on the internet, efficiently accessing desired information can be challenging for users. Therefore, we are developing an analytical system aimed at supporting online shopping. Specifically, we provide users with a quantification of the features mentioned in the videos, facilitating efficient video consumption. This paper reports on the development of a method using BERT to analyze product features from subtitles and comments in review videos, aiming to identify the mentioned aspects.

Index Terms

review video, product review, BERT, YouTube

HouseOfTheDragonQA: Open-Domain Long-Form Context-Aware QA Pairs for TV Series

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ABSTRACT

This paper proposes a novel approach to develop an open-domain and long-form Over-The-Top (OTT) QuestionAnswering (QA) dataset, HouseOfTheDragonQA, specifically oriented to the ”House of the Dragon” TV series. Most of the existing QA datasets have focused on short, fact-based answers sourced almost solely from Wikipedia articles—bereft of the depth and contextual richness required for sophisticated narrative understanding. Our dataset is curated using legally admissible and high-quality open-domain sources to combine full episode summaries from HBO and fandom wiki websites, user reviews from IMDb and Rotten Tomatoes, and structured data from repositories such as WikiData. The dataset provides a multidimensional context, capturing complex character dynamics and plot developments from these varied sources. On equal terms, rigorous data preprocessing and filtering methods ensure that only meaningful and non-spam, unbiased reviews will be present in this enhanced dataset.

The long-form answers generated from this enriched context provide comprehensive insights, making this dataset particularly valuable for improving conversational AI, narrative analysis, sentiment analysis, summarization techniques, and relation extraction. Comparative analysis with state-of-the-art QA datasets like SQuAD 2.0, TriviaQA, and Natural Questions (NQ) demonstrates the unique advantages of our dataset in terms of contextual complexity and answer length. The inclusion of detailed reviews offers added layers of audience sentiment and narrative interpretation, setting a new benchmark for quality in domainspecific QA tasks. Our effort enables advanced comprehension of entertainment-industry content and paves the way for more knowing and creative AI-driven interactions within digital media settings.

Index Terms

context-aware, question-answering, opendomain, long-form, LLMs, NLP, dataset

The 3SD few-shot method for detecting stances on Twitter: a case study of Brazilian Stances on COVID vaccination

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ABSTRACT

Stance detection (SD) is used in social networks to analyze public perception of specific topics or targets. 3SD (Semantic Search Stance Detection) is a Few-Shot SD method designed for Twitter. It leverages semantic search and pre-trained models on a small set of labeled tweets (query set) to create a more comprehensive dataset for training an SD model using supervised learning. Configured with the proper pre-trained model (e.g. trained in a specific language, multi-lingual), 3SD is language-independent. This paper develops a case study on the stances of Brazilians about the COVID vaccination topic. We tackled a strategy based on topic modeling to create a queryset for this new topic, and show that our results outperform baselines, including Large Language Models. The experiments evaluate the relationship between performance and query set size, as well as the ability of 3SD to filter relevant tweets while considering artificial engagement and mislabeled instances due to the crawling process.

Index Terms

stance, few-shot, pre-trained model, semantic search, Twitter

Leveraging Large Language Models for Medical Information Extraction and Query Generation

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ABSTRACT

This paper introduces a system which integrates large language models (LLMs) into clinical trials retrieval, improving patient-trial matching while preserving data privacy and expert oversight. We evaluate six LLMs for query generation, focusing on open-source and small models requiring minimal computational resources. Our findings show that these models achieve retrieval effectiveness comparable to or exceeding expertcreated queries and consistently outperform standard baselines and literature approaches. The best-performing LLMs exhibit fast response times (1.7-8 seconds) and generate a manageable number of query terms (15-63). Our results suggest that small, open-source LLMs can effectively balance performance, computational efficiency, and real-world applicability in clinical trial retrieval

Index Terms

clinical trial retrieval, information retrieval, natural language processing, large language models, text generation

Cross-domain Hate Speech Detection for Content Moderation in Greek Social Networks

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ABSTRACT

Hate speech has plagued the available content on all social networks, regardless of focus or primary language, with effective detection being the hardest obstacle towards moderation. In this work we focus on the wider issue of cross-domain hate speech detection. We introduce a state-of-the-art model for Greek hate speech detection, and compare it against LLMs in in-domain and out-of-domain hate speech detection, on data collected from three social networks. To facilitate this we introduce a new manually annotated dataset with messages from Twitch live stream chats. Our findings highlight the current state of hate speech detection, the needs for domain-agnostic alignment methods, the misconceptions in current hate speech detection methods and the Greek specific issues that require attention. We also open source our code and the newly created dataset

Index Terms
Natural Language Processing, Hate speech, Content Monitoring, Cross-domain evaluation

Spatio-Temporal Multi-Factor Network Based on Attention Mechanism for Traffic Prediction

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ABSTRACT

Traffic prediction is a complex spatio-temporal forecasting task, affected by high dimensional multi factors including fixed road structures and time variant external incidents. The prediction faces the challenges of spatial dependencies of road networks [1] affected by historic traffic data and complex external factors such as the uncertain weather variations and the Point of Interest (POI) attributes attached to the road networks. To address these challenges, we propose a spatio-temporal multifactor network (STMFN) which is a deep learning framework to model traffic prediction with Graph Convolutional Network (GCN) incorporating a traffic block and a weather block. Specifically, in the traffic block, external factors are regarded as traffic intrinsic attributes to extract spatio-temporal features for predicting future traffic conditions. And the weather block uses the cross-attention mechanism to extract the relationship between weather and traffic flow data. Comprehensive experiments on public benchmark datasets demonstrate the effectiveness of the proposed model.

Index Terms

traffic prediction, attention mechanism, external factors, multi-factor network

A Knowledge-based Sequential Sensor Selection Approach for Fast Object Classification

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ABSTRACT

Representing and classifying incomplete and evolving data in a knowledge graph is useful in many applications. In some contexts, it is possible to complete the descriptions of individuals by calling on external resources such as sensors.

In this paper, we propose an incremental classification method that exploits a domain ontology and a score evaluating the discriminating power of a property in order to select a sensor to be mobilized. We have evaluated our approach using data and knowledge describing a military theater of operations, where an object is detected by a sensor, and every sensor available on the platform can be mobilized to enrich this initial information and identify the object. We show that, while not flawless, our method outperforms a greedy sensor selection method in all aspects and we find parameters to fine-tune our classification.

Index Terms

Classification, Ontology, Knowledge Graph, Sensor Networks, evolving Data, Feature Selection

A Multi-Population Surrogate-Assisted Algorithm Based on Granular-Ball K-Nearest Neighbors Classification for Expensive Optimization

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ABSTRACT

Surrogate-assisted models replace the expensive fitness value evaluation by predicting the function value of optimization problems, thus reducing real fitness value evaluations, which becomes the mainstream of solving expensive optimizations. Surrogate-assisted models include classificationbased models and regression-based models. Current surrogateassisted expensive optimization algorithms rely on the surrogateassisted models. However, the performance of classification-based methods is limited, and the performance of regression-based methods is better, but the computational complexity is high. In this paper, a multi-population surrogate-assisted algorithm based on granular-ball K-nearest neighbors(GBKNN) classification(SAMPGB) is proposed for solving this problem. SAMPGB uses GBKNN algorithm as the surrogate-assisted model to reduce the computational complexity. A multi-population cooperative framework is employed to enhance the performance. SAMPGB divides the whole population into different coarse-grained subpopulations, and each coarse-grained subpopulation is further divided into different fine-grained subpopulations. Coarse-grained subpopulations adopt different evolutionary strategies, while finegrained subpopulations belonging to the same coarse-grained subpopulation adopt the same evolutionary strategy. Then the results of all the fine-grained subpopulations are integrated as the result of SAMPGB. The effectiveness of SAMPGB is proved through 30-1000 dimensional experiments of 6 widely benchmark functions

Index Terms
Multi-population surrogate-assisted model, Granular-ball KNN, Expensive optimizatio

Estimation of POI Characteristics Based on Visitor Mobility Behavior

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ABSTRACT

Research recommending the next POI to visitors has been very successful, but most of the recommended POIs were well-known. To address the problem of over-tourism, we need to know what types of people might visit lesser-known POIs, which can be alternatives to well-known POIs. However, no studies have investigated the relationship between visitors' mobility behavior and the recommended POIs. In this study, we propose a new approach to estimate the characteristics of POIs based on visitor behavior to suggest alternative POIs or events related to wellknown POIs to visitors. To implement this approach, we generate knowledge graphs automatically from visitor registration data and information about places, embed visitors according to their interests and information about their mobility extracted from the knowledge graphs, embed POIs according to the behavior of their visitors, and use a weighting system, contrastive learning, and data augmentation. The results allow us to confirm that it is possible to estimate the characteristics of POIs based on the behavior of the visitors.

Index Terms

spatial-temporal data analysis, people's behavior, POI label estimation, knowledge discovery

Parallel Session: Best Paper Award

Enhancing the Conformal Predictability of Context-aware Recommendation Systems by Using Deep Autoencoders

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ABSTRACT

In the field of Recommender Systems (RS), neural collaborative filtering represents a significant milestone by combining matrix factorization and deep neural networks to achieve promising results. Traditional methods like matrix factorization often rely on linear models, limiting their capability to capture complex interactions between users, items, and contexts. This limitation becomes particularly evident with high-dimensional datasets due to their inability to capture relationships among users, items, and contextual factors. Unsupervised learning and dimension reduction tasks utilize autoencoders, neural networkbased models renowned for their capacity to encode and decode data. Autoencoders learn latent representations of inputs, reducing dataset size while capturing complex patterns and features. In this paper, we introduce a framework that combines neural contextual matrix factorization with autoencoders to predict user ratings for items. We provide a comprehensive overview of the framework's design and implementation. To evaluate its performance, we conduct experiments on various real-world datasets and compare the results against state-of-the-art approaches. We also extend the concept of conformal prediction to prediction rating and introduce a Conformal Prediction Rating (CPR). For RS, we define the nonconformity score, a key concept of conformal prediction, and demonstrate that it satisfies the exchangeability property.

Index Terms

Context-aware recommender Systems, Deep Learning, Autoencoder, Conformal prediction

A Concise Multi-Document Extractive Summarization Approach on Product Reviews

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ABSTRACT

As the rate of web data creation and storage continues to rise, so does the need for effective multi-document summarization techniques. Computer-generated summaries that can effectively reflect the original data in a readable format saves the need for manual human labor. In the field of online product reviews specifically, a single product can have hundreds to thousands of reviews, and an average shopper is often to only read a handful of them. With effective summarization tools, these shoppers could be given a single generated summary that condenses the content of the review set into a single paragraph or two. Many efforts have been made to fulfill this need for multi-document summarization; however, most require complex data graphs, structures, or language models. Our research stresses simplicity in the extractive algorithm, making the process easier to understand and implement. In this paper, we propose four different versions of multi-document extractive summarizers based on KL-Divergence, TF-IDF, and Diversity scoring. These extractive summarizers are then measured against each other, along with several top-notch summarizers, in terms of effectiveness at expressing relevant content and linguistic quality. The results of these tests show a significant advantage for our summarizers, thus promoting our summarizers as a powerful-yetsimple process ready for use in product review summarization.

Index Terms

KL-Divergence, extractive summaries, reviews

Parallel Session: Best Paper Award

Unveiling the Source: Differentiating Human and Machine-Generated Texts in a Multilingual Setting

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ABSTRACT

Current advances in the text generative models and the increased use of these models in our daily lives have posed unique challenges to the text's authenticity. These machinegenerated texts can be used in fake news, academic integrity violations, mimicking real personalities online, etc. Most existing works in this area have shown detection ability in monolingual environments that are not generalized whereas the latest generational models are proficient in multiple languages thus making it difficult for existing tools to perform detection effectively. We aim to bridge this gap in research by proposing two innovative approaches in multilingual settings: a Pretrained Language Model (PLM) based method and a stylometric feature-based technique. The former achieved a significant improvement over state-ofthe-art techniques, demonstrating superior performance and generalizability. Concurrently, we also introduce a stylometric method that capitalizes on detailed textual features to outperform traditional statistical and feature-based models, providing a valuable forensic analysis and authenticity verification tool. This method is efficient for low-resource languages and has low computing requirements. We evaluate these on a diverse multilingual dataset which demonstrates the high reliability and accuracy of our proposed models. This study not only advances the field of authorship attribution but also contributes to the development of more secure digital communication environments.

Index Terms

Authorship Attribution, Machine-Generated text detection, multilingual MGT classification, Transformer based classifier, Stylometric-based classifier

Parallel Session: Best Paper Award

Deep Reinforcement Learning with Local Communications for Continuous Pathfinding Problems in Multi-Agent Systems

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ABSTRACT

We propose a *multi-agent deep reinforcement learning* (MADRL) method to efficiently solve continuous *multiagent path-finding* (MAPF) problems, in which multiple agents iteratively reach their goals via collision-free paths. Various algorithm-based methods exist for MAPF; however, many are centralized or intrinsically sequential, limiting their applicability and increasing computational costs as the number of agents increases. Conversely, some MADRL-based methods enable distributed pathfinding using only local information, making their costs independent of the number of agents after training. However, these methods sometimes lack efficiency, and the quality of the learned behavior may decrease when the range of local information is expanded owing to nonessential data. Our proposed method, *distributed pathfinding with centralized training* (DPCT), allows agents to train a central network using locally relevant information through communication with only nearby agents to generate efficient moves toward their goals. During execution, the agents use their own networks, which are copies of the central network, to concurrently determine their moves. Our experiments demonstrate that our method achieves more efficient goal-directed moves than conventional methods, and finds reasonable solutions for continuous MAPF, even in previously unexperienced environments.

Index Terms

Continuous multi-agent path-finding problem, multi-agent deep reinforcement learning, multi-agent planning, planning through locally connected agents, distributed planning with centralized training

Parallel Session: Best Paper Award

TIMBRE: Efficient Job Recommendation On Heterogeneous Graphs For Professional Recruiters

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ABSTRACT

Job recommendation gathers many challenges wellknown in recommender systems. First, it suffers from the cold start problem, with the user (the candidate) and the item (the job) having a very limited lifespan. It makes the learning of good user and item representations hard. Second, the temporal aspect is crucial: We cannot recommend an item in the future or too much in the past. Therefore, using solely collaborative filtering barely works. Finally, it is essential to integrate information about the users and the items, as we cannot rely only on previous interactions. This paper proposes a temporal graph-based method for job recommendation: TIMBRE (Temporal Integrated Model for Better REcommendations). TIMBRE integrates user and item information into a heterogeneous graph. This graph is adapted to allow efficient temporal recommendation and evaluation, which is later done using a graph neural network. Finally, we evaluate our approach with recommender system metrics, rarely computed on graph-based recommender systems.

Index Terms
recommender systems, knowledge graph, job recommendation, temporal

Parallel Session: Best Paper Award

Synthetic Mobility Feature Generation for Mental Health Prediction using Diffusion Models

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ABSTRACT

Human mobility patterns are closely linked to mental health status, and various models have been proposed to estimate mental health using mobility data. However, collecting extensive data over long periods remains challenging, often resulting in inadequate training datasets. This paper introduces a novel approach to enhance mobility data features from limited datasets using a diffusion model for synthetic augmentation. Our method involves three key steps: transforming mobility features into images using UMAP for dimensionality reduction, applying a diffusion model to generate new images, and converting these images back into mobility features. Evaluation using location data and QIDS scores from 8 nurses demonstrates significant improvements in model accuracy, precision, recall, and specificity for mental health state estimation. Compared to traditional methods, our approach boosts Accuracy by 4.21%, Precision by 2.32%, Recall by 6.80%, and Specificity by 1.94%. This method offers a practical solution for enhancing data quality in mental health research, particularly useful when mobility data is limited.

Keywords
Diffusion Model, Mobility Feature, Data Generation, Mental Health, Prediction

Enhancing User's Knowledge Gain Estimation in Search-as-Learning Using Implied Knowledge

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ABSTRACT

In the context of search as learning, users achieve their learning goals (target knowledge) through exploratory research. Consequently, it is essential to track the user's knowledge state in order to estimate how close the user is to achieving their learning goals. A recently proposed approach uses knowledge graphs to represent both the user's knowledge and the user's target knowledge. However, some basic pieces of information are not taken into account because they are not explicitly present in the resources during the user's search session. This omission results in incomplete relations between resources and reduces the accuracy of the user's knowledge gain estimation. Our approach, which is based on this foundation, introduces a method for enhancing the user's knowledge gain estimation by considering implied knowledge. In more precise terms, our approach extends the representation of both the user's and the target knowledge by utilising different predicate properties to complete these relations. We show that the newly proposed approach improves the knowledge gain estimation by taking into account an additional aspect of knowledge.

Index Terms
Knowledge Tracking, Search-As-Learning, Knowledge Graphs, Information Retrieval

Automatic Rating for Each Evaluation Aspect Based on Hotel Review Analysis Using Word Embedding

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ABSTRACT

Review texts in hotel search systems are useful for general users who search for hotels. However, the benefit of review submission to reviewers is limited, and the number of users who submit reviews is not large. Therefore, we thought that we could increase the number of reviewers by developing a system that can provide useful information to reviewers. We developed 19 new evaluation items to eliminate dissatisfaction with the six evaluation items used in conventional hotel reservation sites. For each evaluation items, we developed a model that can classify positive reviews, negative reviews, and reviews with no mention using word variance representation. This model allows us to analyze which evaluation items the posted reviews were dissatisfied with and which items they were satisfied with. The model then predicts the score at which the reviewer would not be dissatisfied with each evaluation items and recommends hotels that satisfy the condition. In this paper, we built a model for analyzing reviews using word variance representation. Automatic scoring was performed for each evaluation items, and the effectiveness of the proposed method was confirmed by comparing scores from existing sites, scores from the evaluation expression dictionary, and scores using the proposed method.

Index Terms
Hotel Recommendation, BERT.

Self-Supervised Fine-tuning for Neural Expert Finding

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ABSTRACT

Expert finding systems allow ones to find individuals who have expertise in specific fields or domains. Traditional expert finding are mostly based on topic modeling or keyword search methods that are limited in their capability to encode contextual knowledge from natural language. To address the limitation, this paper presents Neural Expert Finder (NEF), a novel method that takes a transfer learning approach based on transformer encoder networks to leverage the rich semantic and syntactic patterns of language encoded in pre-trained language models (PLMs). We propose a self-supervised learning approach utilizing contrastive training using both positive and automatically generated negative samples to fine-tune the PLMs to realize NEF. In addition, we also contribute a new benchmark data set for expert finding named SGComp, curated from experts' university and Google Scholar profiles. Our empirical evaluations demonstrate that the proposed method can effectively capture contextual representations and improve the retrieval of experts most relevant to their corresponding research areas. Both SGComp and three domain specific public data sets are utilized to compare NEF against ExpFinder nVSM, a state-of-the-art (SOTA) system in expert finding, and the results demonstrate consistent better performance of the proposed NEF

Task Assignment in Crowdsourcing Using Deep Knowledge Tracing

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ABSTRACT

Crowdsourcing is used to create language resources for low-resource languages. In such crowdsourcing endeavors, the variability in workers' abilities makes quality control a critical issue. Specifically, mismatches between workers and creation tasks can lead to the creation of incorrect language resources, resulting in frequent rework of creation and evaluation tasks and increased costs. Therefore, this study proposes a task assignment method that considers task difficulty, using a Deep Knowledge Tracing model trained on workers' work history to assign tasks that workers are likely to complete successfully. Specifically, Word2Vec is used to automatically assign knowledge tags to tasks based on word semantics, and a Deep Knowledge Tracing model is constructed. The constructed Deep Knowledge Tracing model calculates the success probabilities for tasks for each knowledge tag and worker. These probabilities are used as costs in an extended many-tomany Hungarian method for optimal assignment. To verify the effectiveness of the proposed method, an experiment was conducted in which 500 bilingual evaluation tasks between Indonesian and Minangkabau were assigned to 20 workers. The experimental results showed that the proposed method improved the accuracy rates by 2.4% - 5.6% compared to random assignment and assignment based on past accuracy rates.

Keywords
deep knowledge tracing, crowdsourcing, task assignment, low-resource language

Estimating Knowledge Gain in Search as Learning: A Clustering-based approach to inferring learning goals

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ABSTRACT

Understanding the user's queries, interpreting their information needs, and analyzing their interactions allow a Search as Learning system to gain awareness about the user's knowledge acquisition process. This awareness enables the system to adapt the search results accordingly—a feature indicative of an intelligent search system designed to support learning. Several researchers in this domain have addressed the subject of search result evaluation by estimating the knowledge acquired during the research session. This estimation was based on a predefined, fixed representation of the learning goals for each search topic. However, in real-life situations, users may have different information needs on these topic-related aspects, which they express using different queries. Therefore, the representation of learning goals should vary from one user to another based on their individual needs.

In this study, we address this limitation by inferring potential learning goals through a clustering of the list of search results returned for the submitted query, and by taking into account the document clicked by the user during the search. Consequently, even for the same topic, different users may have different representations of learning goals. We compare our approach to an alternative framework, where the representation of learning goals remains fixed across all users for a given topic. The correlation with the real knowledge gain of the users proves that our approach is superior across the majority of search topics.

Index Terms
Search As Learning, Learning Goals, Information Retrieval, Knowledge Acquisition

GAF-based multimodal time series data fusion for water depth monitoring in headwater streams

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ABSTRACT

Stream-monitoring cameras have recently been deployed in river systems to capture water depth dynamics. However, most existing camera-based monitoring methods require extra gauging equipment, sophisticated manual calibration or extensive labour annotation. In this paper, we propose a novel water depth monitoring method which utilizes a new Gramian Angular Field (GAF)-based multimodal time series data fusion technique and only requires a field camera. In particular, the GAF-based multimodal time series data fusion technique is designed to encode meteorological time series data into a twodimensional representation and then stack it with visual images at channel-wise to achieve input-level multimodal data fusion. In order to consider the information across time and space, we introduce a specific spatio-temporal feature fusion model that extracts spatial features and memorizes temporal dependencies from the fused multimodal information time series. We evaluate our method on a real-world headwater stream monitoring dataset from the West Brook study area in western Massachusetts, United States. Our extensive experiments demonstrate that the proposed method outperforms several state-of-the-art methods for water depth monitoring, and the mean absolute error of our proposed method achieves a remarkable level of 6.0*cm* at the study site with 0.89*m* average water depths and only 14.8*cm* at more drastically varied site with 3.95*m* average depths.

Index Terms

water depth monitoring, multimodal time series, multimodal data fusion, Gramian Angular Field (GAF).

LAIP: Learned Adaptive Inspection Paths Using Offline Reinforcement Learning

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ABSTRACT

In many scenarios for informative path planning done by ground robots or drones, certain types of information are significantly more valuable than others. For example, in the precision agriculture context, detecting plant disease outbreaks can prevent costly crop losses. Quite often, there is a limit on the exploration budget, which does not allow for a detailed investigation of every location. In this paper, we propose Learned Adaptive Inspection Paths (LAIP), a methodology to learn policies that handle such scenarios by combining uniform sampling with close inspection of areas where high-value information is likely to be found. LAIP combines Q-learning in an offline reinforcement learning setting, careful engineering of the state representation and reward system, and a training regime inspired by the teacher-student curriculum learning model. We found that a policy learned with LAIP outperforms traditional approaches in low-budget scenarios.

Index Terms
informative path planning, reinforcement learning

Survey Table Generation from Academic Articles

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ABSTRACT

With the exponential growth in the number of scientific research papers, researchers are often challenged to rapidly grasp new advancements and make meaningful comparisons between scholarly articles. The academic community has proposed several strategies to address this issue, such as MultiDocument Scientific Summarization (MDSS) and leaderboards. However, these solutions have their limitations in capturing flexible and detailed information. Among recent developments, the Open Research Knowledge Graph (ORKG) provides a platform for custom literature comparison tables, but it still depends on manual editing. As an initiative to overcome these challenges, we introduce the task of auto-generating Academic Article Survey Table (AAST). Using tables from arXiv survey papers, we have established a unique dataset enriched with supplementary information generated by large language models (LLMs). We proposed a three-tiered evaluation method to assess the system performance at the cell, row, and table levels. Our proposed LLM-based approach seeks to automate the creation of AASTs. Considering the context windows limitations of LLMs, we employed semantic compression techniques to increase the amount of information that can be input. Experiments show that applying semantic compression to introduction section of reference paper improves the model performance.

Index Terms
dataset, survey table, table generation, natural language generation, large language model

Estimating Anime Sacred Sites Based on Geolocalization by Hybrid Model of Classification and Regression

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ABSTRACT

In this study, we create a geolocalization model that estimates the sacred place where an anime is set from a single frame of the anime. In recent years, as anime has become more popular both domestically and internationally, “pilgrimages” to visit the places where the anime is set are also becoming popular. However, there is a large difference in information about sacred places between famous and lesser-known works, making it difficult for fans of lesser-known anime to enjoy pilgrimages to sacred places. In this study, we focus on the geolocalization problem of estimating the shooting location from a photo and address the problem of estimating the location from an anime image. Many existing methods for the geolocalization problem solve the problem as a multi-class classification task with regional meshes as classes, which can narrow down the rough area where a photo was taken, but cannot accurately identify where within that area the photo was taken. We, therefore, propose a hybrid method that combines classification and regression. Our method divides the target area into sub-areas where similar photos are posted, predicts the label of the sub-area (multi-class classification), and predicts a specific location (regression) in the classified area. In addition, because it is difficult to collect anime images with location information, in the learning process, we use actual photos posted on SNS and convert them into anime-style images using AnimeGAN, i.e., the style-transferred images, as training data. In experiments, we use actual anime images to compare the accuracy of the proposed model and regression model, and when using real photos and style-transferred images as training data. As a result of the experiments, we confirmed that the minimum error could be reduced when using the proposed model with style-transferred images as training data.

Moving Object Detection using Hybrid Yolo-v8 with Improved GAN

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ABSTRACT

In this paper, we propose a hybrid model combining YOLOv8 with improved Generative Adversarial Networks (GANs) to further improve performance detecting moving objects under challenging conditions. The improved GAN component generates realistic synthetic data, enriching the training dataset with varied and complex scenarios. This augmentation allows YOLOv8 to learn more effectively from the enhanced dataset, improving its accuracy and robustness in diverse environments. The GAN also aids in post-processing by refining the resolution and clarity of detected objects, reducing false positives and negatives. We evaluate the proposed hybrid model on the Visdrone, Tinyperson, and PASCAL VOC2007 datasets. The experimental results reveal that the hybrid YOLOv8 and GAN model significantly outperforms state-of-the-art models, achieving higher accuracy, precision, recall, and mean Average Precision (mAP) across various evaluation metrics. This demonstrates the effectiveness of integrating GANs with YOLOv8, providing a powerful and reliable solution for object detection in challenging conditions.

Index Terms
Computer vision, Moving objects, Object detection, YOLO-V8

What Makes a Place Feel Safe? Analyzing Street View Images to Identify Relevant Visual Elements

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ABSTRACT

Over the past four decades, urban perception has become a vital area of research that intersects multiple fields, such as criminology, psychology, and urban planning. This interdisciplinary approach seeks to understand and interpret how people perceive urban environments and how these perceptions shape their behavior. The surge in data collection methods, driven by modern web technologies and services, has enabled researchers to apply techniques from various domains to better quantify and analyze urban perception. In this study, we present the UrbanFormer, a vision transformer-based model, to address the task of urban perception analysis, leveraging the widely-used Place Pulse 2.0 dataset. Our focus is on the safety category, a key issue in urban perception, while employing vision transformer and explainability methods to provide insights into the decisionmaking process behind perception analysis.

Index Terms

urban perception, urban computing, computer vision, deep learning, street view images, human perception, built environment

Using Two Colour Necklaces to Fairly Allocate Coalition Value Calculations

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ABSTRACT

One of the challenges in forming coalitions within characteristic function games is in determining a suitable strategy for distributing coalition value calculations across a community of agents. The formation of coalitions of agents typically requires a quantitative assessment of the synergy resulting from the collaboration of different agents; however, the number of coalitions increases exponentially with the number of agents available. Although some approaches have been proposed that reduce this search space through approximation, several approaches adopt an exhaustive search by allocating subsets of calculations across different agents. The properties of these approaches can differ, and may result in uneven or redundant allocations. In this paper we show how *Combinatorial Necklaces* of beads in two colours can be used to generate canonical sequences for determining coalition value calculation distributions. By using these sequences, coalitions can be allocated to those agents that appear in them, as well as balancing the computational load approximately evenly (with respect to the number of coalition allocation calculations and number of operations) across the agents. Furthermore, such necklaces can be generated simply and efficiently with algorithms that have been proven to generate all necklaces, for a given size (N) and set of colours (k) in *constant amortized time* or CAT, i.e. where the total time is $O(Nk(n))$

Index Terms
Multiagent systems, Combinatorics

Incentives in Public Goods Games on Networks

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ABSTRACT

Public goods games (PGGs) on networks are multiagent games where individuals can invest in a public good, and agents benefit from investments in their neighborhoods. Solutions of PGGs are stable states (e.g., pure strategy Nash equilibria) and it is established that they do not always exist. The present study proposes an iterative multi-agent search algorithm that is guaranteed to converge on general binary PGGs on networks. The algorithm uses payments among neighboring agents during search and enforces a stable state on strategic agents via a VCG mechanism. The algorithm is guaranteed to converge to outcomes that are at least as efficient as the initial state. Outcomes are stabilized by the VCG mechanism upon termination of the algorithm and this stabilization by the mechanism incurs a cost on society. The experimental evaluation shows that this cost is only a small fraction of the increase in social welfare. The experimental evaluation compares the performance of the proposed algorithm to former solving methods on instances of binary PGGs where former methods converge (i.e., potential games). The proposed algorithm finds solutions of higher efficiency and fairness than the solutions obtained by former methods.

Index Terms

multi-agent systems, public goods games on networks, distributed / multi-agent search

Utility-Profit based Large Scale Simultaneous Coalition Structure Generation and Assignment in Constrained Environment

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ABSTRACT

In multi-agent systems (MAS) Simultaneous Coalition Structure Generation and Assignment (SCSGA) problem aims to form m disjoint coalitions among n agents so as to accomplish m tasks. The state-of-the-art (SOTA) of SCSGA explore $m \times 2n$ values and incur significant computational complexity considering the search space equal to $(m! \times mn)$ possible coalition structures. Hence, the large scale problem handling within a reasonable time frame has limited exploration in SOTA of SCSGA. To address the large scale problem handling, a more human interpretable formulation over SCSGA, in this paper we study and address the SCSGA with Constrained Environment (SCSGA-CE) problem. Instead of assigning arbitrary valuation of each coalition corresponding to a task, in SCSGACE such valuations are measured by the constraints of utility and profit value of the agents in a coalition and the corresponding task respectively. In this work we propose different heuristic algorithms to solve SCSGA-CE problem for large scale inputs, that yield solution in $O(nm)$ time despite of incurring similar search space of $(m! \times mn)$ as like SCSGA. Experimentally, the proposed algorithms achieve acceptable performance over large scale problem instances within a reasonable time frame beyond the consideration limit of the SOTA of SCSGA.

Index Terms

Coalition Formation, Task Assignment, UtilityProfit value, Heuristic Search

Multi-Agent Traffic Simulations with Agent Control based on Logic Programming Languages

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ABSTRACT

Environmental concerns, particularly those related to exhaust emissions from congested traffic and the growing popularity of electric and autonomous vehicles, are at the forefront of societal discussions. In response, various traffic management strategies have been proposed. However, evaluating the impact of these policies and regulations on real-world traffic flows is challenging. To address this, we developed MACiMA, a multi-agent traffic simulator designed to replicate intricate traffic patterns and assess the effectiveness of different traffic management approaches through simulation. While MACiMA effectively models traffic flows through agent interactions, defining the behavior of individual agents within the constraints of specific traffic policies presents a significant programming challenge. To overcome this, we explored an innovative approach by integrating MACiMA with PROLEG, a legal reasoning system based on the logic programming language Prolog. This integration enables us to model the decision-making processes of agents influenced by applicable traffic laws and policies. Our experiments, which involved autonomous vehicles and various policies across multiple areas, revealed that agents could dynamically adapt their behavior according to the implemented traffic policies. Furthermore, these experiments highlighted the impact of varying proportions of autonomous vehicles on traffic conditions and uncovered region-specific differences in response to different conditions.

Index Terms

simulation, multi-agent, autonomous driving, reasoning algorism, logic programming

Evaluating and Enhancing LLMs Agent based on Theory of Mind in Guandan: A Multi-Player Cooperative Game under Imperfect Information

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ABSTRACT

Large language models (LLMs) have shown success in handling simple games with imperfect information and enabling multi-agent coordination, but their ability to facilitate practical collaboration against other agents in complex, imperfect information environments, especially in a non-English environment, still needs to be explored. This study investigates the applicability of knowledge acquired by open-source and API-based LLMs to sophisticated text-based games requiring agent collaboration under imperfect information, comparing their performance to established baselines using other types of agents. We propose a Theory of Mind (ToM) planning technique that allows LLM agents to adapt their strategy against various adversaries using only game rules, current state, and historical context as input. An external tool was incorporated to mitigate the challenge of dynamic and extensive action spaces in this card game. Our results show that although a performance gap exists between current LLMs and state-of-the-art reinforcement learning (RL) models, LLMs demonstrate ToM capabilities in this game setting. It consistently improves their performance against opposing agents, suggesting their ability to understand the actions of allies and adversaries and establish collaboration with allies. To encourage further research and understanding, we have made our codebase openly accessible.

Index Terms

LLM Agent, Multi-agent Collaboration, Theory

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