# 2024 IEEE 9th International Conference on Data Science in Cyberspace (DSC 2024)

**Jinan, China**
**23-26 August 2024**

**IEEE Catalog Number:** CFP24E91-POD
**ISBN:** 979-8-3503-9137-4

**Copyright © 2024 by the Institute of Electrical and Electronics Engineers, Inc.**
**All Rights Reserved**

*Copyright and Reprint Permissions*: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

| | |
|---|---|
| IEEE Catalog Number: | CFP24E91-POD |
| ISBN (Print-On-Demand): | 979-8-3503-9137-4 |
| ISBN (Online): | 979-8-3503-9136-7 |

**Additional Copies of This Publication Are Available From:**

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

# 2024 IEEE 9th International Conference on Data Science in Cyberspace (DSC)

# DSC 2024

## Table of Contents

**Message from the General Chairs** ..... **xxv**
**Message from the Program Chairs** ..... **xxvi**
**Organizing Committee** ..... **xxvii**

## SESSION 1: Blockchain and Cryptographic Methods

An Automated Construction Method for Symmetric Encryption Round Function Models Based on Dynamic Analysis ..... 1
*Gaolei Du (Qilu University of Technology (Shandong Academy of Sciences), China), Yunge Sun (Qilu University of Technology (Shandong Academy of Sciences), China), Junpeng Qu (Qilu University of Technology (Shandong Academy of Sciences), China), and Yong Fu (Quan Cheng Laboratory, China; Shandong Fundamental Research Center for Computer Science, China)*

An Encryption Algorithm Cycle Identification Method Based on Bit Execution ..... 7
*Yunge Sun (Qilu University of Technology(Shandong Academy of Sciences), China), Gaolei Du (Qilu University of Technology(Shandong Academy of Sciences), China), Junpeng Qu (Qilu University of Technology(Shandong Academy of Sciences), China), and Yong Fu (Quan Cheng Laboratory, China; Shandong Provincial Key Laboratory of Industrial Network and Information System Security, Fundamental Research Center for Computer Science, China)*

Towards Blockchain Services Marketplace for More Efficient Blockchain Development ..... 13
*Huynh Thanh Thien Pham (Deakin University, Australia), Frank Jiang (Deakin University, Australia), Alessio Bonti (IBM Australia, Australia), Lei Pan (Deakin University, Australia), Junyu Lu (Guilin Yunjing Technology Co., Ltd, Australia), and Mohamed Abdelrazek (Deakin University, Australia)*

An Empirical Case Study of Meta-IP Chain DAO: The Pioneer Tokenless DAO ..... 24
*Caiyan Tang (The University of Sydney, Australia), Qi Cai (Hangzhou Haiyun Network Technology Pty Ltd, China), Chengzu Dong (Deakin University, Australia), Qin Wang (CSIRO, Australia), Shiping Chen (CSIRO, Australia), and Mingyue Jiang (Deakin University, Australia)*

Dynamic Detection Technology of Encryption Algorithm Based on Pin ..... 32
*Junpeng Qu (Qilu University of Technology (Shandong Academy of Sciences), China), Gaolei Du (Qilu University of Technology (Shandong Academy of Sciences), China), Yunge Sun (Qilu University of Technology (Shandong Academy of Sciences), China), and Yong Fu (Quan Cheng Laboratory, China; Shandong Fundamental Research Center for Computer Science, China)*

## SESSION 2: Privacy-Preserving Data Management

An Efficient and Privacy-Preserving Load Monitoring and Billing Scheme in Smart Grid ..... 38
*Yong Ding (Guilin University of Electronic Technology, China; Guangxi Zhuang Autonomous Region Information Center, China), Enchang Yuan (Guilin University of Electronic Technology, China), Changsong Yang (Guilin University of Electronic Technology, China; Guangxi Zhuang Autonomous Region Information Center, China), Hai Liang (Guilin University of Electronic Technology, China), Huiyong Wang (Guilin University of Electronic Technology, China), and Xinyong Peng (Guangxi Zhuang Autonomous Region Information Center, China)*

A Perturbation-Based Privacy Leakage Defense Method for Federal Learning ..... 46
*Changsong Yang (Guilin University of Electronic Technology, China; Guangxi Zhuang Autonomous Region Information Center, China; Guangdong Provincial Key Laboratory of Novel Security Intelligence Technologies, China), Sirui Huang (Guilin University of Electronic Technology, China), Yong Ding (Guilin University of Electronic Technology, China; Guangxi Zhuang Autonomous Region Information Center, China; HKCT Institute for Higher Education, China), Hai Liang (Guilin University of Electronic Technology, China), Siyuan Jia (Guilin University of Electronic Technology, China), and Xinyong Peng (Guangxi Zhuang Autonomous Region Information Center, China)*

Unleashing the Potential of Decentralized Federated Learning in Healthcare: A Comprehensive Survey on Insights and Challenges ..... 53
*Haibo Cheng (City University of Macau, China; Qilu University of Technology (Shandong Academy of Sciences), China), Wenjian Liu (City University of Macau, China), Youyang Qu (Qilu University of Technology (Shandong Academy of Sciences), China), Kexue Fu (Qilu University of Technology (Shandong Academy of Sciences), China), and Qinyuan Wang (City University of Macau, China)*

Identifying Data Breaches in Dark Web through Prompt Active Learning ..... 61
*Hui Xiang (Beijing University of Posts and Telecommunications, China; Zhejiang University, China), Yifan Wu (Beijing University of Posts and Telecommunications, China; Ministry of Education, China), Xuebin Wang (University of Chinese Academy of Sciences, China; Chinese Academy of Sciences, China), Jinqiao Shi (Beijing University of Posts and Telecommunications, China; Ministry of Education, China), Can Zhao (University of Chinese Academy of Sciences, China; Chinese Academy of Sciences, China), and Jiapeng Zhao (Beijing University of Posts and Telecommunications, China; Ministry of Education, China)*

Learning to Distinguish Entities Overlapping for Open Relation Extraction ..... 69
*ChangJian Li (National University of Defense Technology, China), Kai Chen (National University of Defense Technology, China), Han Yu (National University of Defense Technology, China), YinXuan Huang (National University of Defense Technology, China), XueChen Zhao (National University of Defense Technology, China), JianFeng Zhang (National University of Defense Technology, China), and AiPing Li (National University of Defense Technology, China)*

## SESSION 3: Distributed Computer and Graph Theory

Research on Key Technologies of Intelligent Management Platform for Medical Care Objects Based on Internet of Things and Digital Twins ..... 77
*Wenbo Zhang (Shandong First Medical University, China), Lei He (Shandong First Medical University, China), Tao Shi (Shandong First Medical University, China), Shuang Gao (Shandong First Medical University, China), Yichen Zhao (University of Bristol, United Kingdom), Xing Wang (Shandong First Medical University, China), Lumin Xing (Shandong First Medical University, China), and Yongmeng Li (Shandong First Medical University, China)*

Smart Grid Attack Region Partitioning Strategy Based on Node Importance ..... 85
*Zilong Chen (Guangzhou University, China), Li Xu (Guangzhou University, China), Mohan Li (Guangzhou University, China), and Yanbin Sun (Guangzhou University, China)*

NEF-GGCN: Node-Edge Fusion Gated Graph Convolutional Networks for Skeleton-Based Medical Action Recognition ..... 93
*Jie Yao (Beijing Information Science & Technology University, China), Funing Xiang (Alibaba International Digital Commerce Group, China), Xuemei Wei (Beijing Information Science & Technology University, China), and Kun Yuan (Hefei University of Technology, China)*

Causal Attention Group Recommendation Integrating Social Information ..... 101
*Liancheng Xu (Shandong Normal University, China), Xiaoqi Wu (Shandong Normal University, China), Xiaoxiang Wang (Shandong Normal University, China), and Xinhua Wang (Shandong Normal University, China)*

Community Partition Based Source Localization in Early Time ..... 109
*Jinchen Shi (National University of Defense Technology, China), Yang Fang (National University of Defense Technology, China), Zhen Tan (National University of Defense Technology, China), Hui Yang (The 30th Research Institute of China Electronics Technology Group Corporation, China), and Xiang Zhao (National University of Defense Technology, China)*

## SESSION 4: Anomaly and Intrusion Detection

SLX:A Multi-class Network Intrusion Detection Method on Stacking Boosting Algorithm ..... 116
*Zhitong Liu (Guangzhou University, China), Zhiqiang Zhang (Harbin Institute of Technology (Shenzhen), China; Peng Cheng Laboratory, China), Mengqing Cheng (Guangzhou University, China), Haonan Tan (Guangzhou University, China), Xinyao Tan (Lancaster University, United Kingdom), and Le Wang (Guangzhou University, China; Peng Cheng Laboratory, China)*

Vehicle Network Intrusion Detection Based on K-Nearest Neighbor Variational Autoencoder using Contrastive Learning ..... 122
*Chenyun Duan (Harbin Institute of Technology (Shenzhen), China), Lei Du (Harbin Institute of Technology (Shenzhen), China; Pengcheng Laboratory, China), Liyi Zeng (Pengcheng Laboratory, China), and Zhaoquan Gu (Harbin Institute of Technology (Shenzhen), China; Pengcheng Laboratory, China)*

Modification Method for Internal Network Flow Anomaly Detection Based on Multi-Timescale Analysis ..... 130
*Xinyu Zhang (Beijing University of Posts and Telecommunications, China), Junmei Ding (Beijing University of Posts and Telecommunications, China), and Yueming Lu (Beijing University of Posts and Telecommunications, China)*

SEAD: Self-Aware Adversarial Detection for Black-Box Reinforcement Learning ..... 138
*Chengyi Wang (Zhejiang University of Technology, China), Jinyin Chen (Zhejiang University of Technology, China), Haibin Zheng (Zhejiang University of Technology, China), and Xuhua Pan (Binjiang Institute of Zhejiang University, China)*

An Abnormal Behavior Detection Method Based on User Behavior Correlation Feature Sequence Modeling ..... 146
*Yuting Zhou (Ministry of Education; Beijing University of Posts and Telecommunications, China), Lijuan Sun (Ministry of Education; Beihang University, China), Jingchen Wu (Ministry of Education), Yutong Gao (Ministry of Education; Minzu University of China, China), and Xu Wu (Ministry of Education; Beijing University of Posts and Telecommunications, China)*

## SESSION 5: Vulnerabilities and Risks in Cyberspace

Optimization Design of Network Attack and Defense Scenarios in Intelligent Clusters ..... 154
*Chengyue Wang (Beijing University of Posts and Telecommunications, China), Yang Liu (Beijing Institute of Technology; Beijing Institute of Astronautical Systems Engineering, China), Yaojun Qiao (Beijing University of Posts and Telecommunications, China), Daoqi Han (School of Cyberspace Security Beijing University of Posts and Telecommunications, China), and Yueming Lu (School of Cyberspace Security Beijing University of Posts and Telecommunications, China)*

Research on Automobile Data Security Risk Analysis Based on TARA Method ..... 162
*Dong Liu (Cyber Emergency Response Team, China), Zhicheng Liu (Cyber Emergency Response Team, China), Yang Liu (Cyber Emergency Response Team, China), Biqing Qiu (Cyber Emergency Response Team, China), and Shirui Wang (Cyber Emergency Response Team, China)*

An Intelligent Retrieval System for Similar Information System Vulnerabilities Based on Knowledge Graph ..... 171
*Junzhe Dong (Beijing Jiaotong University, China), Shuo Geng (Beijing Jiaotong University, China), and Xiong Zhang (Beijing Jiaotong University, China)*

Defense Against Graph Injection Attack in Graph Neural Networks ..... 177
*Hanjin Tong (China University of Geosciences, China), Tianqing Zhu (City Univeristy of Macau), Faqian Guan (China University of Geosciences, China), and Wanlei Zhou (City Univeristy of Macau)*

Cyber-Range: the Scientific Infrastructure for Cyberspace Security Research ..... 188
*Xing Zou (Peng Cheng Laboratory, China) and Ning Hu (Peng Cheng Laboratory, China)*

## SESSION 6: Advances in Large Language Models I

Leveraging LLM Based Retrieval-Augmented Generation for Legal Knowledge Graph Completion ..... 196
*Jiang Lai (Shanghai Jiao Tong University, China), Zheng Conghui (Shanghai Jiao Tong University, China), Zhang Xiaohan (Shanghai Jiao Tong University, China), Sun Fuhui (Information Technology Service Center of People's Court, China), Wang Xiaoyan (Information Technology Service Center of People's Court, China), and Pan Li (Shanghai Jiao Tong University, China)*

LLM & Bagging for 1-Shot Joint IE ..... 204
*Yibin Fu (National University of Defense Technology, China), Zhaoyun Ding (National University of Defense Technology, China), and Xiaojie Xu (China University of Petroleum (East China), China)*

A Relation Semantic Enhancement Method for Large Language Model Based Knowledge Graph Completion ..... 209
*Jiaqi Si (People.Cn Co., Ltd., China), Xiaoye Ouyang (China Academy of Electronics and Information Technology, China), Xiaoling Zhu (CETC Academy of Electronics and Information Technology Group Co., Ltd., China), and Yi Zhang (CETC Academy of Electronics and Information Technology Group Co., Ltd., China)*

CyGPT: Knowledge Graph-Based Enhancement Techniques for Large Language Models in Cybersecurity ..... 216
*Lu Ou (Guangzhou University, China), Xiaoya Ni (Guangzhou University, China), Wei Wu (Guangzhou University, China), and Zhihong Tian (Guangzhou University, China)*

## SESSION 7: Advances in Large Language Models II

Decode the Dark Side of the Language: Applications of LLMs in the Dark Web ..... 224
*Hongfan Chen (Beijing University of Posts and Telecommunications, China; Zhejiang University, China; Ministry of Education, China), Yigang Diao (Cyberspace Administration of China, China), Hui Xiang (Beijing University of Posts and Telecommunications, China; Ministry of Education, China), Yixuan Huo (Beijing University of Posts and Telecommunications, China; Ministry of Education, China), Xiaqing Xie (Beijing University of Posts and Telecommunications, China; Ministry of Education, China), Jiapeng Zhao (Beijing University of Posts and Telecommunications, China; Ministry of Education, China), Xuebin Wang (Chinese Academy of Sciences, China), Yanwei Sun (Beijing University of Posts and Telecommunications, China; Ministry of Education, China), and Jinqiao Shi (Beijing University of Posts and Telecommunications, China; Ministry of Education, China)*

LocatingGPT: A Multi-Modal Document Retrieval Method Based on Retrieval-Augmented Generation ..... 232
*Zilong Chen (Guangzhou University, China), Peng Zhang (Guangzhou University, China), Mingyang Xu (South China Normal University, China), Xingjian Gao (Santa Clara University, USA), Dan Liu (OpenBMB, China), Xuebing Luo (Guangzhou University, China), Rencheng Huang (Guangzhou University, China), and Tao Zhang (Guangzhou University, China)*

A Method for Generating Medical Text Data by Integrating Spatiotemporal Attributes and Implicit State Transitions ..... 240
*Xu Yang (Ministry of Education; Beijing University of Posts and Telecommunications, China), Lijuan Sun (Ministry of Education; Beihang University, China), Yutong Gao (Ministry of Education; Minzu University of China), Sanchuan Guo (Ministry of Education; Beijing University of Posts and Telecommunications, China), and Xu Wu (Ministry of Education; Beijing University of Posts and Telecommunications, China)*

Hate Speech Detection in Network Perception Constrained Scenarios ..... 247
*Zeng Haoyuan (National University of Defense Technology, China), Bo Qiao (National University of Defense Technology, China), Ye Wang (National University of Defense Technology, China), and Bin Zhou (National University of Defense Technology, China)*

StanceDigger: Achieving Efficient Text Stance Detection with Collaborative Attention and Consistent Learning ..... 255
*YuLiang Wei (Harbin Institute of Technology, China), Qi Li (Harbin Institute of Technology, China), Yang Liu (Harbin Institute of Technology, China), Chang Sun (Harbin Institute of Technology, China), and Yongzheng Zhang (China Assets Cybersecurity Technology co., ltd., China)*

## SESSION 8: Knowledge Graph and Management Techniques

An Aggregation Procedure Optimization Method by Leveraging Neighboring Prompt for GCN-Based Knowledge Graph Completion Model ..... 263
*Yashen Wang (China Academy of Electronics and Information Technology, China; Artificial Intelligence Institute of CETC, China), Xiaoling Zhu (CETC Academy of Electronics and Information Technology Group Co., Ltd., China), Tianzhu Chen (Artificial Intelligence Institute of CETC, China), and Yi Zhang (CETC Academy of Electronics and Information Technology Group Co., Ltd., China)*

Spherical Hierarchical Knowledge Graph Embeddings for Cybersecurity Knowledge Graph Completion ..... 271
*Yao Lin (Guangzhou University, China), Dong Zhu (Guangzhou University, China), Chenhui Zhang (Guangzhou University, China), Zhiqiang Zhang (Harbin Institute of Technology (Shenzhen), China), and Le Wang (Guangzhou University, China)*

A Novel Method of Cybersecurity Knowledge Graph Construction and Storage Optimization Based on Cyber Range ..... 279
*Cui Luo (Peng Cheng Laboratory, China), Haiyan Wang (Peng Cheng Laboratory, China), Huaping Yuan (Peng Cheng Laboratory, China), Zhaoqian Gu (Harbin Institute of Technology (Shenzhen), China), and Ning Hu (Peng Cheng Laboratory, China)*

Knowledge Graph Construction in the Context of Traditional Chinese Medicine: A Review ..... 287
*Lei He (Shandong First Medical University, China), Wenbo Zhang (Shandong First Medical University, China), Tao Shi (Shandong First Medical University, China), Yichen Zhao (University of Bristol, United Kingdom), Xing Wang (Shandong First Medical University, China), Lumin Xing (Shandong First Medical University, China), and Yongmeng Li (Shandong First Medical University, China)*

Research on Entity Extraction Method for Rehabilitation Medicine Knowledge Management ..... 294
*Weijie Deng (National University of Defense, China), Zhaoyun Ding (National University of Defense, China), Junqi Chen (National University of Defense, China), and Yi Wang (National University of Defense, China)*

## SESSION 9: Machine Learning and Neural Networks

CIL4EMTD: A Novel Class Incremental Learning Method for Encrypted Malware Traffic Detection ..... 300
*Jiarui Li (Harbin Institute of Technology (Shenzhen), China), Lei Du (Harbin Institute of Technology (Shenzhen), China; Pengcheng Laboratory, China), Yilu Chen (Harbin Institute of Technology (Shenzhen), China), Liyi Zeng (Pengcheng Laboratory, China), Hao Li (National Key Laboratory of Advanced Communication Networks, China), and Zhaoquan Gu (Harbin Institute of Technology (Shenzhen), China; National Key Laboratory of Advanced Communication Networks, China)*

Weapon Target Assignment Based on Deep Q-Learning ..... 308
*Jianbo Qin (National University of Defense Technology, China), Yi Wang (National University of Defense Technology, China), and Zhaoyun Ding (National University of Defense Technology, China)*

Multi-Behavior Hypergraph Contrastive-Enhanced Transformer for Recommender Systems ..... 314
*Weixuan Sun (National University of Defense Technology, China), Jiuyang Tang (National University of Defense Technology, China), Yang Fang (National University of Defense Technology, China), Jinqiu Hong (National University of Defense Technology, China), Hao Xu (National University of Defense Technology, China), and Mao Wang (National University of Defense Technology, China)*

Node Fragility Reward Shaping Based on Reinforcement Learning in Intranet Penetration Scenario ..... 322
*Yinghui Xu (Guangzhou University, China), Haonan Tan (Guangzhou University), Jianyu Deng (Guangzhou University), and Le Wang (Guangzhou University, China; PengCheng Laboratory, China)*

Enhancing Adversarial Robustness: A Novel Bayesian Uncertainty-Based Ensemble Learning Method ..... 329
*Yidong Chai (Hefei University of Technology, China), Yi Liu (Hefei University of Technology, China), Mohammadreza Ebrahimi (University of South Florida, USA), Weifeng Li (University of Georgia, USA), Balaji Padmanabhan (University of South Florida, USA), Yuanchun Jiang (Hefei University of Technology, China), and Yezheng Liu (Hefei University of Technology, China)*

## SESSION 10: Applications and Practice

An Early Detection Model of Prostate Cancer Based on MRI ..... 337
*Yuankun Liu (City University of Macau, China), Lumin Xing (The First Affiliated Hospital of Shandong First Medical University, China), Di Wang (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Fundamental Research Center for Computer Science, China; City University of Macau, China), Xin Nie (City University of Macau, China; Chongqing Jianzhu College, China), Xueyan Zhang (City University of Macau, China; Shandong Youth University of Political Science, China), Di Wu (University of Southern Queensland, Australia), and Wenjian Liu (City University of Macau, China)*

Enhancing CLAHE with Interval-Valued Fermatean Fuzziness for Robust Low-Light Image Enhancement ..... 345
*Hongpeng Wang (Shandong Jianzhu University, China), Duanfa Wang (Shandong Pharmaceutical Glass Co., Ltd, China), Zhiqin Wang (Shandong Jianzhu University, China), and Chenglong Li (Shandong Jianzhu University, China)*

Reliability Measurement of Vehicle Sensor Data Based on Historical Perception ..... 354
*Chenqing Guo (Beijing University of Posts and Telecommunications, China), Jinxin Zuo (Beijing University of Posts and Telecommunications, China), Yueming Lu (Beijing University of Posts and Telecommunications, China), and Weixuan Xie (Beijing University of Posts and Telecommunications, China)*

ST-LadderNet: Spatial-Temporal Correlation Stepply Enhanced Deep Learning Model for Urban Traffic Predicting ..... 362
*Shu Feixiang (Shanghai Jiao Tong University, China), Jiang Lai (Shanghai Jiao Tong University, China), Zheng Conghui (Shanghai Jiao Tong University, China), Sun Fuhui (Information Technology Service Center of People's Court, China), Wang Xiaoyan (Information Technology Service Center of People's Court, China), and Pan Li (Shanghai Jiao Tong University, China)*

## SESSION 11: Emerging Techniques

Continuous Verification of Catastrophic Recalling in Machine Unlearning via Adversarial Testing ..... 370
*Y. Neil Qu (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Fundamental Research Center for Computer Science, China), Zonghao Ji (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Fundamental Research Center for Computer Science, China), Lei Cui (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Fundamental Research Center for Computer Science, China), Chong Zhang (Deakin University, Australia), Lei Liu (Xidian University, China), and Zhiyi Tian (University of Technology Sydney, Australia)*

HGNNDroid: Android Malware Detection Based on Heterogeneous Graph Neural Network ..... 378
*Xingyu Liu (University of Electronic Science and Technology of China, China), Xiaozhen Liu (Chengdu wonder-explorer Technology Co., Ltd., China), Kegang Hao (Southwest China Research Institute of Electronic Equipment, China), Ke Wang (University of Electronic Science and Technology of China, China), Xinglong Chen (Southwest China Research Institute of Electronic Equipment, China), and Weina Niu (University of Electronic Science and Technology of China, China)*

The Ecological and Financial Impact Study of Electric Bus Transition ..... 385
*Sijun Li (Renmin University of China), Jianqi Wang (Renmin University of China), Eric Li (Renmin University of China), Daren Liu (Renmin University of China), and Yi Li (Renmin University of China)*

## WORKSHOP 1: Data Security for Artificial Intelligence (DASAI2024)

Risk Analysis and Protection Suggestions for Artificial Intelligence Data Security ..... 392
*Biqing Qiu (Cyber Emergency Response Team, China), Dong Liu (Cyber Emergency Response Team, China), Shunchao Cao (China Software Tesing Center, China), Chunxu Mu (China Software Tesing Center, China), Shen Yan (China Software Tesing Center, China), and Yang Liu (Cyber Emergency Response Team, China)*

Multi-Agent Assignment via Growth Assignment Algorithm ..... 399
*Dongzhi Ge (Nanjing University of Science and Technology, China), Lidong He (Nanjing University of Science and Technology, China), and Zhengguo Bian (Ningbo Apex Robotics Co., Ltd., China)*

INN-Based Robust JPEG Steganography Through Cover Coefficient Selection ..... 406
*Fei Shang (Sun Yat-Sen University, China), Weixiang Zhao (Sun Yat-Sen University, China), Jingyang Wen (Sun Yat-Sen University, China), Xiangui Kang (Sun Yat-Sen University, China), and Z. Jane Wang (University of British Columbia, Canada)*

A Universal Semantic-Based Method for Backdoor Attack ..... 414
*Sizheng Wu (Beijing Information Science and Technology University, China), Jun Li (Beijing Information Science and Technology University, China), Chao Li (Guangzhou University), Yawei Ren (Beijing Information Science and Technology University, China), and Liyan Shen (Beijing Information Science and Technology University, China)*

Lightweight Malicious Encrypted Traffic Detection Method Based on KL Image Compression ..... 421
*Yuecheng Wen (Qilu University of Technology (Shandong Academy of Sciences), China), Xiaotong Li (Qilu University of Technology (Shandong Academy of Sciences), China), Haiqing Lv (Qilu University of Technology (Shandong Academy of Sciences), China), Menglu Wang (Qilu University of Technology (Shandong Academy of Sciences), China), and Wenbo Zuo (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Fundamental Research Center for Computer Science, China)*

## WORKSHOP 2: Big Data and Business Analytics (BDBA2024)

Bibliometric Analysis of Large Language Model Artificial Intelligence Based on Knowledge Graph ..... 428
*Xinxu Weng (Tongji University, China), Yuqing Wang (Shanghai Normal University, China), Shijing Weng (Jipiti Data Technology (Zhejiang) Co., Ltd, China; Oulu Technology Services (Zhejiang) Co., Ltd, China), Juan Xiong (Hangzhou Qianjiang Data Technology Co., Ltd, China; Oulu Technology Services (Zhejiang) Co., Ltd, China), and Lei Weng (Hangzhou Qianjiang Data Technology Co., Ltd, China; Oulu Technology Services (Zhejiang) Co., Ltd, China; University of Buenos Aires, Argentina)*

Online Health Information Adoption Behavior of Chronic Disease Patients ..... 435
*Du Yanan (Anhui Medical University, China), Zha Xiaoli (Anhui Medical University, China), Li Min (Anhui Medical University, China), and Song Yueli (Anhui Medical University, China)*

An Encrypted Malicious Traffic Detection Method Based on Deeper Protocol Features ..... 441
*Lei Chen (National University of Defense Technology, China), Yilu Chen (Harbin Institute of Technology, China), Chenwei Liu (Guangzhou University, China), and Wenying Feng (Pengcheng Laboratory, China)*

A Data Dimensionality Reduction Method Based on Stacked Auto-Encoders with Self-Attention ... 446
*Songming Han (Electric Power Research Institute of Guangxi Power Grid Co., Ltd., China), Ying Ling (Electric Power Research Institute of Guangxi Power Grid Co., Ltd., China), Ming Xie (Guangxi Power Grid Co., Ltd., China), Shaofeng Ming (Electric Power Research Institute of Guangxi Power Grid Co., Ltd., China), and Fuchuan Tang (Electric Power Research Institute of Guangxi Power Grid Co., Ltd., China)*

## WORKSHOP 3: Graph Representation Learning and its Applications (GRLA2024)

A Time-Tightly Coupled UAV Control Scheduling Scheme ..... 452
*Yuanyuan Guo (National University of Defense Technology, China), Xianqiang Zhu (National University of Defense Technology, China), Qianzhen Zhang (National University of Defense Technology, China), and Bin Liu (National University of Defense Technology, China)*

Building an Autonomous Driving Platform Based on ROS and its Safety Analysis ..... 457
*Zelin Wei (National University of Defense Technology, China), Qiwei Chen (Nanjing University of Aeronautics and Astronautics, China), and Rui Weng (Nanjing University of Aeronautics and Astronautics, China)*

Analysis of Big Data Research Hotspots Based on Keyword Co-Occurrence ..... 464
*Niuniu Zhang (National University of Defense Technology, China) and Guohe Feng (South China Normal University, China)*

Intelligent Recognition Model for IoT Terminal Devices Based on Message Business Logic Features ..... 472
*Fangliao Yang (Information and Communication Branch of State Grid Hunan Electric Power Company Limited, China), Shi Zhu (Information and Communication Branch of State Grid Hunan Electric Power Company Limited, China), Mingguang Li (Hunan University, China), Lailong Luo (National University of Defense Technology, China), Bangbang Ren (National University of Defense Technology, China), and Yuhui Cai (Hunan University, China)*

## WORKSHOP 4: Industrial Control System Security (ICS 2024)

Trapping Resource Orchestration Scheme Based on Electric Power Environment ..... 479
*Tianfu Xu (State grid Jiangxi Electric Power Co., LTD., China), Tianzhe Li (Guangzhou University, China), Qun He (State grid Jiangxi Electric Power Co., LTD., China), Zhiyuan Luo (State grid Jiangxi Electric Power Co., LTD., China), Naqin Zhou (Guangzhou University, China), Haoqin Chen (Guangzhou University, China), and Rixuan Qiu (State grid Jiangxi Electric Power Co., LTD., China)*

Automatic Classification Based on the LSTM-SiTGRU Model for Plaintext and Ciphertext ..... 487
*Songming Han (Electric Power Research Institute of Guangxi Power Grid Co., Ltd., China), Ying Ling (Electric Power Research Institute of Guangxi Power Grid Co., Ltd., China), Ming Xie (Information Department of Guangxi Power Grid Co., Ltd., China), and Shaofeng Ming (Electric Power Research Institute of Guangxi Power Grid Co., Ltd., China)*

Anonymous Smart Grid System Based on Revocable Ring Signatures ..... 495
*Xuhua Ai (Southern Power Grid Guangxi Power Grid Co., Ltd., China), Yiting Huang (Southern Power Grid Guangxi Power Grid Co., Ltd., China), Yuan Yin (Southern Power Grid Guangxi Power Grid Co., Ltd., China), Yun Dong (Southern Power Grid Guangxi Power Grid Co., Ltd., China), Qi Meng (Southern Power Grid Guangxi Power Grid Co., Ltd., China), Denghao Tu (Topsec Network Security Technology Co., Ltd., China), and Liyuan Zhang (Southern Power Grid Guangxi Power Grid Co., Ltd., China)*

Research on Fault Early Warning of Industrial Control System Based on TCN-MKELM ..... 501
*Jiahan Dong (State Grid Beijing Electric Power Research Institute, China), Tong Jin (State Grid Beijing Electric Power Research Institute, China), Xiaohu Wang (State Grid Beijing Electric Power Research Institute, China), Guangxin Guo (State Grid Beijing Electric Power Research Institute, China), and Qihang Zhou (State Grid Beijing Electric Power Research Institute, China)*

Visual Malware Classification and Detection Method Based on Convolutional Neural Network .... 507
*Hua Huang (Information and Telecommunications Company; State Grid Shandong Electric Power Company, China), Hua Sheng (Information and Telecommunications Company; State Grid Shandong Electric Power Company, China), Xingwang Han (Information and Telecommunications Company; State Grid Shandong Electric Power Company, China), Wenbin Zhang (Information and Telecommunications Company; State Grid Shandong Electric Power Company, China), and Zilin Zhao (Qilu University of Technology (Shandong Academy of Sciences), China)*

Time Series Anomaly Detection Based on Normalized Flow and Bayesian Networks ..... 515
*Honglei Yao (State Grid Shandong Electric Power Research Institute, China), Donglan Liu (State Grid Shandong Electric Power Research Institute, China), Yingxian Chang (State Grid Shandong Electric Power Company, China), Xin Liu (State Grid Shandong Electric Power Research Institute, China), and Chaofan Tang (Qilu University of Technology (Shandong Academy of Sciences), China)*

Research on Intrusion Detection of Industrial Control System Based on Adversarial Machine Learning ..... 523
*Zheyu Zhang (Cyber Emergency Response Team, China), Xiaorui Ren (Cyber Emergency Response Team, China), Chengyun Xie (Cyber Emergency Response Team, China), and Jianyu Guo (Cyber Emergency Response Team, China)*

Research on the Construction of Industrial Internet Security Model Based on PetriNet ..... 528
*Lili Yang (State Grid Qinghai Information & Telecommunication Company, China), Kaiwen Gao (State Grid Qinghai Information & Telecommunication Company, China), LiPing Han (State Grid Qinghai Information & Telecommunication Company, China), Yuantao Wang (Fengtai Tecology (Beijing) Co., LTD, China), Yueyi Zhang (Fengtai Tecology (Beijing) Co., LTD, China), and Yong Xie (Fengtai Tecology (Beijing) Co., LTD, China)*

Research on Classification and Grading of Cross-Border Data in Free Trade Port Construction ..... 533
*Yukun Zhang (Hainan University, China), Xiaoli Qin (Hainan University, China), Yanzhao Tian (Hainan University, China), and Shenjian Xiao (Hainan University, China)*

Knowledge Base-Guided Modeling of ICS Device Behavior for Status Prediction ..... 541
*Lei Li (State Grid Shandong Electric Power Company, China), Shichao Zhang (State Grid Shandong Electric Power Company, China), Xin Liu (State Grid Shandong Electric Power Research Institute, China; Shandong Smart Grid Technology Innovation Center, China), Donglan Liu (State Grid Shandong Electric Power Research Institute, China; Shandong Smart Grid Technology Innovation Center, China), Rui Wang (State Grid Shandong Electric Power Research Institute, China; Shandong Smart Grid Technology Innovation Center, China), Fangzhe Zhang (State Grid Shandong Electric Power Research Institute, China; Shandong Smart Grid Technology Innovation Center, China), Fuhui Zhao (State Grid Shandong Electric Power Research Institute, China; Shandong Smart Grid Technology Innovation Center, China), and Shanjie Xu (State Grid Shandong Electric Power Research Institute, China; Shandong Smart Grid Technology Innovation Center, China)*

## WORKSHOP 5: Data Security and Privacy (DSP2024)

Research on Stochastic Feature Selection Optimization Algorithm Fusing Symmetric Uncertainty ..... 549
*Ting Wang (Linyi University, Shandong), Qian Zhao (Linyi University, Shandong), Sen Wang (Linyi University, Shandong), and Changqiang Jing (Linyi University, Shandong)*

SDCRT: An Anonymous Communication Network Routing Algorithm Based on SDN Architecture .... 555
*Mingqian Yang (Guangzhou University, China), Wei Peng (Guangzhou University, China), Xiaowei Song (Guangzhou University, China), Xiting Ma (Guangzhou University, China), Ling Liu (Guangzhou University, China), and Ning Hu (Peng Cheng Laboratory, China)*

Secure Two-Party Newton Interpolation ..... 563
*Shuang Zhou (Shandong University, China), Zhigang Liu (Shandong University, China), Jian Liu (Shandong University, China), and Han Jiang (Shandong University, China)*

Encrypted Malicious Traffic Detection Based on Sample Selection Optimization and Data Augmentation ..... 567
*Rui Liang (Guangzhou University, China), Hanchong Zhang (Guangzhou University, China), Fuqiang Liu (Guangzhou University, China), Jinyun Zhang (Guangzhou University, China), Zhe Sun (Guangzhou University, China), Yanfei Song (Cyber Emergency Response Team, China), Chao Li (Guangzhou University, China), and Liang Zhang (PipeChina North Pipeline Company, China)*

CloudNet: Building a Data-Plane for Anonymous Communication Network Based on Cloud Service... 575
*Xiaowei Song (Guangzhou University, China), Mingqian Yang (Guangzhou University, China), Wei Peng (Guangzhou University, China), Mengen Liang (Guangzhou University, China), Ling Liu (Guangzhou University, China), and Ning Hu (Peng Cheng Laboratory, China)*

Conduit:An IPFS-Based Hidden Access Channel for Mix-Net ..... 583
*Wei Peng (Guangzhou University, China), Xiaowei Song (Guangzhou University, China), Mingqian Yang (Guangzhou University, China), Mengen Liang (Guangzhou University, China), Rui Wu (Guangzhou University, China), and Ning Hu (Peng Cheng Laboratory, China)*

Reputation Based Adaptive Federated Learning in Medical Scenarios ..... 591
*Lianhai Wang (Qilu University of Technology (Shandong Academy of Sciences); Shandong Fundamental Research Center for Computer Science, China), Tianrui Liu (Qilu University of Technology (Shandong Academy of Sciences); Shandong Fundamental Research Center for Computer Science, China), Yingxiaochun Wang (Qilu University of Technology (Shandong Academy of Sciences); Shandong Fundamental Research Center for Computer Science, China), Xinlei Wang (Qilu University of Technology (Shandong Academy of Sciences); Shandong Fundamental Research Center for Computer Science, China), and Qi Li (Qilu University of Technology (Shandong Academy of Sciences); Shandong Fundamental Research Center for Computer Science, China)*

A Novel Method for Honeypot Anti-Identification Against Modbus Fuzz Testing in Industrial Control Systems ..... 599
*Yunhao Xu (Guangzhou University, China), Chao Li (Guangzhou University, China), Daiqi Gu (Guangzhou University, China), Zhewei Zhang (Guangzhou University, China), Zhe Sun (Guangzhou University, China), and Yanfei Song (Cyber Emergency Response Team, China)*

Infringement Detection and Traceability Scheme Based on Ciphertext Feature Extraction ..... 607
*Lianhai Wang (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Fundamental Research Center for Computer Science, China), Xinlei Wang (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Fundamental Research Center for Computer Science, China), Tianrui Liu (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Fundamental Research Center for Computer Science, China), Yingxiaochun Wang (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Fundamental Research Center for Computer Science, China), and Qi Li (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Fundamental Research Center for Computer Science, China)*

## WORKSHOP 6: Data Governance and its Applications in Cyberspace (DGAC 2024)

A Short-Term Electric Load Forecasting Method Based on the Fusion of Global and Local Features ..... 615
*Haozhan Gu (Shandong University of Arts Academy of Fine Arts, China), Hangwei Tian (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Fundamental Research Center for Computer Science, China), Jingchun Wang (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Provincial Key Laboratory of Computer Networks, Shandong; Shandong Fundamental Research Center for Computer Science, China), and Yumei Li (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Provincial Key Laboratory of Computer Networks, Shandong; Fundamental Research Center for Computer Science, China)*

Text Information Mining in Cyberspace: An Information Extraction Method Based on T5 and KeyBERT ..... 621
*Kuan Liu (Qilu University of Technology (Shandong Academy of Sciences), China), Yumei Li (Qilu University of Technology (Shandong Academy of Sciences); Shandong Institute of Economy and Informatization Development, China), Yuanhua Qi (Qilu University of Technology (Shandong Academy of Sciences); Shandong Fundamental Research Center for Computer Science, China), Ning Qi (SHANDONG SCICOM Information and Economy Research Institute Co., Ltd., China), and Mengran Zhai (Shandong Institute of Economy and Informatization Development, China)*

Networked Vehicle Practices Based on Networked Firing Ranges ..... 629
*Wenqi Zheng (Institute of Computer Application China Academy of Engineering Physics, China), Hao Ren (Institute of Computer Application China Academy of Engineering Physics, China), Siqi Yang (Institute of Computer Application China Academy of Engineering Physics, China), Zhi Chen (Institute of Computer Application China Academy of Engineering Physics, China), Jiajun Xie (Institute of Computer Application China Academy of Engineering Physics, China), and Wenqiang Pan (Institute of Computer Application China Academy of Engineering Physics, China)*

Research on Liquid Crystal Display Technology Based on Regional Dynamic Dimming Algorithm ..... 635
*Zhitao Yu (Hisense Video Technology Co., Ltd, China), Peng Sun (Hisense Visual Technology Co., Ltd, China), Mingle Zhou (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Provincial Key Laboratory of Computer Networks, Shandong; Fundamental Research Center for Computer Science, China), Qianlong Liu (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Fundamental Research Center for Computer Science, China), and Shilong Zhao (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Fundamental Research Center for Computer Science, China)*

Ultra-High Definition Video Quality Assessment Method Based on Deep Learning ..... 641
*Wei Li (Hisense Video Technology Co., Ltd Qing Dao, China), Can He (Hisense Video Technology Co., Ltd Qing Dao, China), MingLe Zhou (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Fundamental Research Center for Computer Science, China), HengYu Zhang (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Fundamental Research Center for Computer Science, China), and WenLong Liu (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Fundamental Research Center for Computer Science, China)*

Incorporate Data Elements into the Digital Evaluation System of the NewEra ..... 647
*Wang Li (Information and Economy Research Institute Co., Ltd., China), Hengyu Zhang (Information and Economy Research Institute Co., Ltd., China), Hongze Xie (Information and Economy Research Institute Co., Ltd., China), Xikai Ding (Information and Economy Research Institute Co., Ltd., China), and Qianlong Liu (Information and Economy Research Institute Co., Ltd., China)*

Research on the Distribution Characteristics of Standardized Big Data Resources Based on Data Visualization——Taking Standardization Practice in Shandong Province as an Example ..... 652
*Jinyang Sun (SHANDONG SCICOM Information and Economy Research Institute Co., Ltd., China), Dongdong Peng (Jinan Municipal Bureau of Big Data, China), Zhe Lu (SHANDONG SCICOM Information and Economy Research Institute Co., Ltd., China), Mengran Zhai (Shandong Institute of Economy and Informatization Development, China), Ning Qi (SHANDONG SCICOM Information and Economy Research Institute Co., Ltd., China), and Yuanhua Qi (Qilu University of Technology (Shandong Academy of Sciences, China)*

Security and Privacy of Artificial Intelligence with Ethical Concerns ..... 660
*Yihong Li (University of Toronto)*

Research on Government Data Governance in the Era of Large Language Model ..... 668
*Mingxi Ji (Shandong Shanke Digital Economy Research Institute Co., Ltd., China), Xueping Gu (Yantai Big Data Center, China), Qinghong Guo (Shandong Shanke Digital Economy Research Institute Co., Ltd., China), and Xikai Ding (Shandong Shanke Digital Economy Research Institute Co., Ltd., China)*

Research on the Design of Government Data Governance Evaluation System under the Perspective of Digital Government ..... 672
*Zirui Xu (Qilu University of Technology(Shandong Academy of Sciences), China), Jinyang Sun (SHANDONG SCICOM Information and Economy Research Institute Co., Ltd., China), Zhe Lu (SHANDONG SCICOM Information and Economy Research Institute Co., Ltd., China), and Delong Han (Qilu University of Technology (Shandong Academy of Sciences), China)*

Feature Aggregation Network for Memory-Based Industrial Anomaly Detection ..... 677
*Min Li (City University of Macau, China; Qilu University of Technology (Shandong Academy of Sciences), China), Delong Han (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Fundamental Research Center for Computer Science, China), Rui Shao (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Fundamental Research Center for Computer Science, China), and Jinghui He (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Fundamental Research Center for Computer Science, China)*

## WORKSHOP 7: Reliable Artificial Intelligence and Swarm Intelligence: Privacy, Security, Trustworthy, and Fairness (PSTF-AI & SI2024)

Visible Light Positioning Method for Indoor Line-of-Sight Scene Based on Time Series Coding ..... 684
*Yonghao Yu (City University of Macau, China; Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Provincial Key Laboratory of Computer Networks, China), Yongde Guo (City University of Macau, China), Dawei Zhao (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Provincial Key Laboratory of Computer Networks, China), Kexue Fu (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Provincial Key Laboratory of Computer Networks, China), Yongwei Tang (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Provincial Key Laboratory of Computer Networks, China; Shandong University, China), and Qinyuan Wang (City University of Macau, China)*

Aligning Users Across Social Networks Based on Hypergraph Embedding ..... 691
*Xia Wu (University of Electronic Science and Technology of China, China), Zehan Li (University of Electronic Science and Technology of China, China), Zijun Hu (University of Electronic Science and Technology of China, China), Qing Zhao (University of Electronic Science and Technology of China, China), and Hangyu Hu (University of Electronic Science and Technology of China, China)*

Risk Modeling and Traceability of Boundary Attacks on Internet of Power Systems Based on Complex Networks ..... 699
*Xin Li (Northeast Electric Power University, China), Zhaoyang Qu (Northeast Electric Power University, China), Tong Yu (People's Bank of China Qinghai Provincial Branch, China), Ming Xie (China Southern Power Grid Guangxi Power Grid Co., Ltd. Research Institute, China), Fu Yu (China Guizhou Power Grid Co., Ltd., China), and Wei Ding (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Fundamental Research Center for Computer Science, China)*

Fairness of Large Music Models: From a Culturally Diverse Perspective ..... 706
*Qinyuan Wang (University of Sydney, Australia), Bruce Gu (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Fundamental Research Center for Computer Science, China), He Zhang (CNPIEC KEXIN LTD, China), and Yunfeng Li (CNPIEC KEXIN LTD, China)*

Contrastive Learning for Chest X-ray Classification: A Fusion of Topological Data Analysis and ResNet ..... 713
*Hao Ren (City University of Macau, China), Zeyu Luo (City University of Macau, China), Fengshi Jing (City University of Macau, China), Xinyue Zhang (Minzu University of China, China), Han He (City University of Macau, China), Yonghao Yu (City University of Macau, China), and Dawei Zhao (Qilu University of Technology (Shandong Academy of Sciences), China; Shandong Fundamental Research Center for Computer Science, China)*

Scalable and Feasible Honeypot Solution for SMEs in Cloud Environments ..... 720
*Xiaodong Wang (Melbourene Polytechnic, Australia), Sazia Parvin (Melbourene Polytechnic, Australia), Sitalakshmi Venkatraman (Melbourene Polytechnic, Australia), Kiran Fahd (Melbourene Polytechnic, Australia), and Amjad Gawanmeh (University of Dubai, UAE)*

## 16th International Conference on Frontiers of Information Technology Applications and Tools (FITAT 2024)

A Framework for Vietnamese Question-Answering in Law Domain ..... 726
*Thang V. Q. Le (Ton Duc Thang University, Vietnam), Dinh-Hong Vu (Ton Duc Thang University, Vietnam), Van-Huy Pham (Ton Duc Thang University, Vietnam), Anh-Cuong Le (Ton Duc Thang University, Vietnam), and Nguyen P. Nguyen (Ton Duc Thang University, Vietnam)*

Multiple Knowledge Graphs Semantic Interaction Based on Graph Embedding and Matching Processing ..... 732
*Ling Wang (Northeast Electric Power University, China), Haoyu Hao (Northeast Electric Power University, China), Xue Yan (Northeast Electric Power University, China), Xiwei Wang (Northeast Electric Power University, China), Tie Hua Zhou (Northeast Electric Power University, China), and Keun Ho Ryu (Ton Duc Thang University, Vietnam; Chungbuk National University, Republic of Korea)*

Knowledge Points Semantic Classification Method Based on Graph Embedding over Co-word Networks ..... 738
*Tie Hua Zhou (Northeast Electric Power University, China), Xiuting Jia (Northeast Electric Power University, China), Xirao Xun (Northeast Electric Power University, China), Tianshuo Bi (Northeast Electric Power University, China), and Ling Wang (Northeast Electric Power University, China)*

Deep Learning-Based Mortality Prediction of COVID-19 Patients with Cardiovascular Disease ..... 744
*Huilin Zheng (Guilin University of Technology, China), Yingyi Liang (Guilin University of Technology, China), Daming Zhang (Guilin University of Technology, China), Kai Shi (Guilin University of Technology, China), Luxi Dong (Guilin University of Technology, China), and Xiaolan Xie (Guilin University of Technology, China)*

Solution for Prediction of Customer Behavior in Call Center Systems ..... 750
*Battogtokh Azzaya (School of Information Technology and Electronics, Mongolia), Sambuu Uyanga (School of Information Technology and Electronics, Mongolia), and Namsrai Oyunerdene (School of Information Technology and Electronics, Mongolia)*

A Model for Evaluating a Digital Transformation of Rural Areas of Mongolia ..... 754
*Delgermaa Gankhuyag (National University of Mongolia, Mongolia), Uyanga Sambuu (National University of Mongolia, Mongolia), Enkhtuul Bukhsuren (National University of Mongolia, Mongolia), and Buyankhishig Bold (National University of Mongolia, Mongolia)*

A Prognostic Model Based on Five Characteristic Genes to Predict the Prognosis of Patients with Hepatocellular Carcinoma. ..... 762
*Lidi Wu (NanKai University, China), Yang Liu (NanKai University, China), Jiale Yang (NanKai University, China), and Yongjun Piao (NanKai University, China)*

Single-Cell RNA Sequencing Analysis Reveals Transcriptional Dynamics of Immune Cells During Ovarian Cancer Metastasis ..... 770
*Yan Yan (Nankai University, China), Yukun Wang (Nankai University, China), Yiru Da (Nankai University, China), and Yongjun Piao (Nankai University, China; Tianjin Central Hospital of Gynecology Obstetrics, China)*

Generation of Synthetic Data for Sharing and Utilization in Healthcare Data ..... 778
*Ha Ye Jin Kang (Hanyang University, Republic of Korea), Min Sam Ko (Hanyang University, Republic of Korea), and Kwang Sun Ryu (National Cancer Center, Republic of Korea)*

Deciphering Myopia: Insights From Single-Cell Data and Machine Learning Approaches ..... 782
*Junwei Hu (Nankai University, China), Yule Zhang (Nankai University, China), and Yongjun Piao (Nankai University, China)*

Digital Contracts: A Sustainable and Secure Solution for Modern Businesses - A Case Study of E-Geree.mn in Mongolia ..... 789
*Javkhlan Rentsendorj (National University of Mongolia, Mongolia), Lkhamrolom Tsoodol (National University of Mongolia, Mongolia), Munkhtsetseg Namsraidorj (National University of Mongolia, Mongolia), and Oyun-Erdene Namsrai (National University of Mongolia, Mongolia)*

Data Augmentation Based on Word Importance and Deep Back-Translation for Low-Resource Biomedical Named Entity Recognition ..... 793
*Yu Wang (Shanghai Maritime University, China), Meijing Li (Shanghai Maritime University, China), and Runqing Huang (Shanghai Maritime University, China)*

A New Approach for Non-Contact, Automated Measurement of Respiration Rate using Structured Light ..... 798
*Sumiyakhand Dagdanpurev (National University of Mongolia, Mongolia), Darkhijav Davaasuren (National University of Mongolia, Mongolia), Adiyabat Enkhjargal (National University of Mongolia, Mongolia), and Amartuvshin Renchin-Ochir (National University of Mongolia, Mongolia)*

Demand Response Scheme: Achieving Sustainability in Distributed Data Processing ..... 802
*Xueying Zhai (University of Science and Technology Beijing, China), Yunfeng Peng (University of Science and Technology Beijing, China), Xiuping Guo (Beijing University of Posts and Telecommunications, China), Liang Zhang (Guizhou Institute of Technology, China), and Wei Zhang (Qilu University of Technology (Shandong Academy of Sciences), China)*

Improving Skin Lesion Classification Based on Fusion Multi-Learning Models ..... 810
*Trung-Phien Nguyen (HCMC University of Technology and Education, Vietnam), Van-Dung Hoang (HCMC University of Technology and Education, Vietnam), Minh-Luan Su (HCMC University of Technology and Education, Vietnam), Thi-Nhat-Vy Nguyen (HCMC University of Technology and Education, Vietnam), Trong-Tri Bui (HCMC University of Technology and Education, Vietnam), and Ba-Duy Nguyen (Binh Duong Economics and Technology University, Vietnam)*

Managing Concurrent Course Selection Requests in a Web-Based University Management System ..... 818
*Baatarbileg Altangerel (National University of Mongolia, Mongolia), Tulgaa Purevsuren (National University of Mongolia, Mongolia), and Oyun-erdene Namsrai (National University of Mongolia, Mongolia)*

Implementing Unified Identity and Access Management System: Case Study for the National University of Mongolia ..... 821
*Lkhamrolom Tsoodol (National University of Mongolia, Mongolia), Munkhnasan Tuvdendorj (National University of Mongolia, Mongolia), Javkhlan Rentsendorj (National University of Mongolia, Mongolia), and Oyun-Erdene Namsrai (National University of Mongolia, Mongolia)*

Cultural Heritage Education in the Metaverse ..... 825
*Oyundolgor Khorloo (National University of Mongolia, Mongolia) and Enkhbayar Altantsetseg (National University of Mongolia, Mongolia)*

**Author Index** ..... **833**