PROCEEDINGS OF SPIE

5th International Conference on Computer Information Science and Application Technology (CISAT 2022)

Fuming Zhao Editor

29-31 July 2022 Chongqing, China

Organized by Chongging University of Technology

Sponsored by Guangzhou Computer Society

Published by SPIE

Volume 12451
Part One of Two Parts

The papers in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIEDigitalLibrary org.

The papers reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from these proceedings:

Author(s), "Title of Paper," in 5th International Conference on Computer Information Science and Application Technology (CISAT 2022), edited by Fuming Zhao, Proc. of SPIE 12451, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510660076

ISBN: 9781510660083 (electronic)

Published by

SPIF

P.O. Box 10, Bellingham, Washington 98227-0010 USA Telephone +1 360 676 3290 (Pacific Time) SPIE.org

Copyright © 2022 Society of Photo-Optical Instrumentation Engineers (SPIE).

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of fees. To obtain permission to use and share articles in this volume, visit Copyright Clearance Center at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher.

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

Publication of record for individual papers is online in the SPIE Digital Library.



Paper Numbering: A unique citation identifier (CID) number is assigned to each article in the Proceedings of SPIE at the time of publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

- The first five digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc. The CID Number appears on each page of the manuscript.

Contents

xv Conference Committee

TECHNOLOGY OF ELECTRONIC ENGINEERING MODELING AND INDUSTRIAL AND COMMERCIAL **APPLICATION** 12451 02 Analysis of research situation and development process in the field of global marine internet of things [12451-28] 12451 03 Research on factors of marine ranch leisure fisheries development based on multiple orderly logit model [12451-228] 12451 04 Optimizing the loaded and empty car flows of railway network with dual objectives [12451-25] Digital prediction modeling of fabric softness based on thickness classification [12451-70] 12451 05 12451 06 Application of recycling packaging in low carbon supply chain [12451-94] 12451 07 Total nitrogen prediction based on quantum weighted minimal gated unit neural networks in wastewater treatment process [12451-44] 12451 08 Numerical simulation study on the disturbance effect of cable tunnel induced by subway tunnel construction [12451-33] 12451 09 Design and application of integrated circuit virtual simulation experimental system under VR technology [12451-219] 12451 0A Research on non-contact detection method for conductivity of supercapacitor [12451-119] Optimization of differential load dynamic characteristics of radar antenna folding system 12451 OB based on co-simulation [12451-211] 12451 0C Carbon trading behavior of power generation enterprises based on causal inference [12451-210] 12451 0D Study of DQN-based shield tunnel fiber grating sensing monitoring section layout optimization [12451-40] 12451 OE Public opinion early warning technology of power supply service based on topic web crawler [12451-118] 12451 OF Design for security configuration of remote management multi-VLAN switch based on VLAN trunking protocol [12451-53] Simulation analysis and optimization of production process [12451-121] 12451 0G

12451 OH	Variation laws of heat storage performances and heat storage stability of ZrO2 electrolyte materials with temperature and time [12451-96]
12451 OI	A trajectory prediction model for commercial flight based on representative trajectory [12451-163]
12451 OJ	High-resolution remote sensing building extraction based on attention mechanism and DeepLabv3+ [12451-168]
12451 OK	Construction and visualization application of 3D digital model of garden plants [12451-177]
12451 OL	Design of high frequency transformer inner glue defect detection system based on vision [12451-68]
12451 OM	Prediction of fertilizer price based on bidirectional LSTM [12451-65]
12451 ON	Application practice of the Internet of Things technology in oilfield development [12451-3]
12451 0O	Research on the "last mile" distribution model of fresh E-commerce based on analytic hierarchy process [12451-9]
12451 OP	Study on coupling development of Liaoning tourism and agriculture based on grey correlation analysis [12451-18]
12451 OQ	Research on automobile virtual evaluation system based on user experience [12451-6]
12451 OR	Simulation of total amount of pollutants into river based on MATLAB software [12451-21]
12451 OS	User-oriented energy management system of combined heat and power [12451-27]
12451 OT	Design and implementation of medical convenient assistant based on Android [12451-23]
12451 OU	Research on prediction model of carbon trading price based on BAS-BP neural network: take Shenzhen, Guangdong Province, China as an example [12451-26]
12451 OV	Study on microcontact mechanism of chemical mechanical planarization removing [12451-8]
12451 OW	Study on endogenous development trend of dry bulk shipping market [12451-10]
12451 OX	Analysis of water surface line in free-surface-pressurized flow section of tailwater tunnel of large hydropower station [12451-15]
12451 OY	Present situation, problems, and prospect of weighing control system in concrete mixing plant [12451-24]
12451 OZ	Research on efficient statistical method of surface coverage data along the pipeline [12451-100]

12451 10	Nondestructive testing system for steel wire rope based on magnetic leakage method [12451-164]
12451 11	The design of paper counting device based on STM32 [12451-161]
12451 12	Analysis based on HIDS and NIDS [12451-41]
12451 13	Study on path planning of high-speed aircraft based on scene-ring matching in land-sea interface area [12451-69]
12451 14	A study of MLP-mixer with FFT for short term wind speed forecasting [12451-34]
12451 15	Urban road environment perception for automated driving based on an improved YOLOP [12451-102]
12451 16	Research on electromagnetic radiation of LoRa wireless module based on near field scanning [12451-101]
12451 17	Fuzzy evaluation model of urban resilience for COVID-19 prevention and control based on TOPSIS [12451-170]
12451 18	Application of dynamic monitoring system in electricity market environment [12451-17]
	TECHNOLOGY OF IMAGE INFORMATION RECOGNITION AND SPECTRAL MODEL MEASUREMENT AND CONTROL
12451 19	
12451 19 12451 1A	AND CONTROL Investigation of rotating cubic receiver for mobile users in visible light communication systems
	Investigation of rotating cubic receiver for mobile users in visible light communication systems [12451-166] Fruit detection research based on near-infrared spectroscopy and lightweight neural network
12451 1A	Investigation of rotating cubic receiver for mobile users in visible light communication systems [12451-166] Fruit detection research based on near-infrared spectroscopy and lightweight neural network [12451-84]
12451 1A 12451 1B	Investigation of rotating cubic receiver for mobile users in visible light communication systems [12451-166] Fruit detection research based on near-infrared spectroscopy and lightweight neural network [12451-84] Data augmentation method in image retrieval of digital equipment [12451-159] Research on detection method of foxing on paper cultural relics based on CNN and
12451 1A 12451 1B 12451 1C	Investigation of rotating cubic receiver for mobile users in visible light communication systems [12451-166] Fruit detection research based on near-infrared spectroscopy and lightweight neural network [12451-84] Data augmentation method in image retrieval of digital equipment [12451-159] Research on detection method of foxing on paper cultural relics based on CNN and hyperspectral [12451-122] Study on Tibetan speech recognition based on ultrasonic tongue imaging, lip video, and audio
12451 1A 12451 1B 12451 1C 12451 1D	Investigation of rotating cubic receiver for mobile users in visible light communication systems [12451-166] Fruit detection research based on near-infrared spectroscopy and lightweight neural network [12451-84] Data augmentation method in image retrieval of digital equipment [12451-159] Research on detection method of foxing on paper cultural relics based on CNN and hyperspectral [12451-122] Study on Tibetan speech recognition based on ultrasonic tongue imaging, lip video, and audio [12451-115] Research on the classification method of industrial wastewater by UV-vis spectroscopy based

12451 1H	Prediction model of deflection based on wavelet and LSTM+GAN [12451-201]
12451 11	Photorealistic image style transfer based on attention mechanism and histogram loss [12451-205]
12451 1J	Identification of climb/descent mode based on DE-RFE-RF [12451-54]
12451 1K	Detection of welding cavity defects in x-ray images based on digital image processing technology [12451-104]
12451 1L	Depth-detectable optical co-registration of optically pumped magnetometer-magnetoencephalography and magnetic resonance imaging [12451-62]
12451 1M	2-D direction finding for coexisted independent and coherent signals [12451-81]
12451 1N	A new prediction model for lung cancer based on ANN-SVM [12451-56]
12451 10	Research on the knowledge graph based life cycle carbon footprint labeling representation model for electromechanical products [12451-39]
12451 1P	A review of traditional image segmentation methods [12451-127]
12451 1Q	Control strategies of model consistency for large-scale parallel and distributed simulation applications [12451-206]
12451 1R	Disturbance observer based model predictive control for a VTVL reusable launch vehicle [12451-126]
12451 1S	Improved TransUNet retinal vessel segmentation method [12451-109]
12451 1T	Quantitative analysis of water quality parameters COD measurement based on spectral data fusion [12451-153]
12451 1U	A feature attention based multi-stage network for image deblurring [12451-188]
12451 1V	Algorithm design and software implementation of laser Doppler vibration signal based on overlapping frames [12451-232]
12451 1W	Representation research based on sketch images [12451-58]
12451 1X	A review expert recommendation model based on knowledge graph embedding [12451-60]
12451 1Y	Super-resolution single-molecule microscopic reconstruction based on improved deep-STORM [12451-57]
12451 1Z	Video deblurring network based on dark light enhancement [12451-174]
12451 20	Research on relationship extraction for constructing knowledge graphs [12451-125]

12451 21	A knowledge graph visualization and retrieval system based on joint extraction model [12451-90]
12451 22	Improve embedded knowledge graph multi-hop question answering based on relational path [12451-80]
12451 23	High speed moving object location based on UWB ranging calibration [12451-155]
12451 24	Mongolian pattern image processing based on improved Canny algorithm [12451-179]
12451 25	Numerical calculation of the magnetic field in a spherical magnetohydrodynamic attitude controller [12451-171]
12451 26	3D point cloud reconstruction and segmentation for large scene based on UAV aerial images [12451-190]
12451 27	Human face cartoon image generation based on CycleGAN [12451-73]
12451 28	News recommendation system with category awareness based on pre-trained Electra [12451-220]
12451 29	3D point cloud classification model based on local location information [12451-194]
12451 2A	The study of computer graphic based on appearance modeling and subsurface scattering [12451-2]
12451 2B	Simulation study of pseudo inverse method for thrust distribution in ship dynamic positioning [12451-243]
12451 2C	A comprehensive evaluation system for pixel level image fusion [12451-234]
12451 2D	Infrared ship detection based on latent low-rank decomposition and salient feature fusion [12451-233]
12451 2E	Snoring detection method in sleep based on MBAM-ResNet [12451-120]
12451 2F	Swin transformer based benign and malignant pulmonary nodule classification [12451-185]
	SOFTWARE ENGINEERING KNOWLEDGE AND DATA INFORMATION PROCESSING AND ANALYSIS
12451 2G	Research on the characteristics of regular bus trips in Guangzhou under the influence of the new crown epidemic based on multivariate data fusion [12451-5]
12451 2H	Analysis of electric vehicle technology development based on patent big data: a topic analysis of structured topic model (SIM) [12451-88]

12451 21	Python based IT industry recruitment data automatic collection, warehousing, and analysis system [12451-142]
12451 2J	Research on Chinese summary generation based on pointer key information [12451-61]
12451 2K	Itemization framework of requirements using machine reading comprehension [12451-113]
12451 2L	A novel quantitative index for Poincaré plot: included angle cosine measure [12451-49]
12451 2M	Improvement and extension of secure vector dominance protocol [12451-131]
12451 2N	Human pose estimation based on intra-level feature fusion [12451-98]
12451 20	Software aging prediction framework based on optimized TCN model with grey correlation analysis [12451-66]
12451 2P	A dynamic cache placement policy for NDN based on programmable data plane [12451-99]
12451 2Q	A design of LVDS high-speed data transmission system based on FPGA [12451-59]
12451 2R	Design and development of color perception treatment video game for autistic children [12451-4]
12451 2S	Design and research of information systems for construction worker management services [12451-22]
12451 2T	Application of state machine-based closed-loop control mode in computer-based interlocking test software [12451-11]
12451 2U	Numerical simulation analysis of V-shaped column joints under different size cross sections [12451-218]
12451 2V	Chinese short text classification based on topic BERT and BiGRU [12451-106]
12451 2W	A dialogue replacement data augmentation method based on comparing belief state and dialogue acts [12451-50]
12451 2X	Pareto pairwise ranking for fairness enhancement of recommender systems [12451-132]
Part Two	
12451 2Y	Research on the characteristics of Weibo user information receiving behavior of private undergraduate universities based on big data analysis [12451-148]
12451 2Z	Research on the model of network public opinion pre-warning system for emergencies under the background of big data [12451-192]
12451 30	Noisy label learning based on self-supervised pre-training and data augmentation strategies [12451-123]

12451 31	Research on the implementation of microservice application development platform based on MDA [12451-191]
12451 32	Application principle and practice of scene moving shot in virtual live broadcast based on UE4 [12451-114]
12451 33	Design of digital simulation software for flight control software based on multi-source data fusion [12451-146]
12451 34	A method to solve unbalanced multi-label text classification in practical projects by introducing association information between classes [12451-247]
12451 35	Built on SpringBoot's travel platform [12451-144]
12451 36	An application-oriented multi-granularity vehicle trajectory data indexing structure based on concept lattice [12451-172]
12451 37	Evaluation method of substation equipment health status based on data unified semantic representation [12451-187]
12451 38	Value of unit step signal u(t) at t=0 [12451-47]
12451 39	Tibetan place name recognition method based on multi-feature fusion [12451-199]
12451 3A	Session recommendation based on target attention and directed graph [12451-71]
12451 3B	Analysis of factors affecting runway occupancy time based on airport operation data [12451-239]
12451 3C	Design and implementation of ecological data collection management software based on DOI mechanism [12451-79]
12451 3D	Key technologies for exchange and sharing of multiple data information resources [12451-167]
12451 3E	Research on quantitative big data analysis of ideological and political education literature based on CiteSpace [12451-204]
12451 3F	Information visualization of scientific publications for obtaining overall pattern and trend [12451-14]
12451 3G	A modified SIRV model for COVID-19 [12451-13]
12451 3H	Comparison of finite element analysis of v-shaped column joints with different parameters [12451-19]
12451 3I	Improving English to Chinese machine translation performance via adversarial training [12451-87]
12451 3J	Improvement of the protocol for millionaires' problem [12451-129]

12451 3K	A matching method of oral text to instruction based on word vector [12451-124]
12451 31	Research on Tibetan-Chinese cross-linguistic summarization [12451-156]

APPLICATION OF SCIENTIFIC ALGORITHMS AND DEVELOPMENT OF COMPUTER TECHNOLOGY

	The second of th
12451 3M	A novel interactive 3D method for IETM [12451-160]
12451 3N	Semantic segmentation of urban street scene based on DeepLabv3+ [12451-193]
12451 3O	A reconfigurable design of satellite in-orbit encryption algorithms based on FPGA [12451-52]
12451 3P	Multi-behavior recommendation algorithm based on multi-view item semantic learning [12451-136]
12451 3Q	JPEG compression coding optimization based on NEON instruction [12451-85]
12451 3R	TbNet: three-branch network to guide deep completion [12451-214]
12451 3S	Online signature verification based on attention mechanism depth-wise separable convolution residual network [12451-152]
12451 3T	Fixed-frequency monitoring and early warning technology of machine-card separation based on improved least square method [12451-180]
12451 3U	Insulator defect detection algorithm based on improved YOLOv5s [12451-128]
12451 3V	A configuration diagram layout algorithm for marine transmission system based on depth-first search [12451-75]
12451 3W	Dynamic target threat assessment method based on sequential three-way decisions [12451-64]
12451 3X	Design of highly concurrent course selection system based on microservice [12451-103]
12451 3Y	Improved BP neural network RSSI ranging algorithm [12451-143]
12451 3Z	Design of parking integral management system based on blockchain technology [12451-138]
12451 40	OAuth 2.0 protocol optimization based on CPK technology [12451-133]
12451 41	Design and implementation of cloud computing network security level protection evaluation system based on Python [12451-213]

12451 42	Detection method of island blind spot of grid-connected photovoltaic system based on improved artificial fish swarm algorithm [12451-45]
12451 43	DVB-T localization parameter estimation and algorithm simulation [12451-111]
12451 44	A 3D reconstruction algorithm based on adaptive cost aggregation and depth map optimization [12451-149]
12451 45	NL2SQL enhancement through semantic representation aggregation [12451-78]
12451 46	Coexistence of LTE-U and Wi-Fi sharing unlicensed spectrum in ultra-dense networks [12451-86]
12451 47	A new stroke prediction model combined algorithm based on artificial neural networks and logistic regression [12451-183]
12451 48	Multi-objective optimal configuration of micro-networks based on improved snake optimization algorithm [12451-38]
12451 49	A load balancing algorithm with minimum links scheduling [12451-63]
12451 4A	ESSM: an extractive summarization model with enhanced spatial-temporal information and span mask encoding [12451-181]
12451 4B	A deep-learning-based algorithm for detecting soil moisture [12451-230]
12451 4C	Software test task assignment in agile development based on deep learning algorithms [12451-42]
12451 4D	Face age estimation network based on improved residual blocks [12451-226]
12451 4E	Periodic signal recognition algorithm and quantization based on BP neural network [12451-93]
12451 4F	Improved cuckoo optimization algorithm for human-machine collaborative disassembly line balancing problem [12451-207]
12451 4G	Design and implementation of website user behavior prediction model based on FP-growth [12451-222]
12451 4H	Object detection algorithm based on improved YOLOv5 [12451-95]
12451 41	CHS: a clustering-based hybrid sampling algorithm for the imbalanced classification [12451-74]
12451 4J	Low-complexity VVC fast intra coding algorithm [12451-150]
12451 4K	Design and implementation of education service platform for innovation and entrepreneurship based on cloud computing technology [12451-227]
12451 4L	DPCB-CycleGAN: a heterologous image migration algorithm based on attention mechanism and CycleGAN [12451-231]

12451 4M The impact of ICT use on students' collaborative problem solving: an empirical study based on PISA 2015 [12451-173]

ARTIFICIAL INTELLIGENCE APPLICATION AND DEEP LEARNING TECHNOLOGY RESEARCH

	ARTIFICIAL INTELLIGENCE APPLICATION AND DEEP LEARNING TECHNOLOGY RESEARCH
12451 4N	Visual odometry based on camera motion and bidirectional long short-term memory network [12451-165]
12451 40	Research on classroom check-in system based on face recognition [12451-67]
12451 4P	Stroke probability prediction and data visualization based on multiple machine learning models [12451-182]
12451 4Q	Adaptive harmonic separation and detection algorithm based on deep neural network [12451-225]
12451 4R	Research on quality monitoring technology of fertilizer granulation based on deep learning [12451-46]
12451 4S	Design of intelligent mining system for learning needs based on intelligent mining technology [12451-48]
12451 4T	Sorting robot based on fuzzy PID and machine vision [12451-178]
12451 4U	Telecommunication customer churn prediction based on multiple machine learning algorithms [12451-139]
12451 4V	Automatic graph generation method used in intelligent tutoring system [12451-135]
12451 4W	An intelligent vehicle-oriented EMC fault dataset augmentation and validity verification method [12451-92]
12451 4X	Interpretability study of pretrained models via transfer learning on ImageNet for lung cancer prediction [12451-198]
12451 4Y	A lightweight and efficient CNN based on VGG-16 variant for emotion recognition [12451-51]
12451 4Z	A vehicle re-identification method fused with multi-scale and multi-granularity features [12451-91]
12451 50	TSVM-PI: transductive support vector machine based on privileged information learning [12451-82]
12451 51	Deep learning-based research on a long-term time-series prediction algorithm for urban air quality [12451-89]
12451 52	Design of intelligent greenhouse system for ultra-low energy plant factory [12451-105]

12451 53	IBMS + BIM + FM technology based intelligent building operation and maintenance management system design solution [12451-29]
12451 54	A leaf disease deep learning classification method using EfficientNet [12451-245]
12451 55	C-DPCL: an adaptive conformer-based source separation method on deep clustering [12451-116]
12451 56	Convolutional neural networks with constrained shortcut connections [12451-200]
12451 57	Image segmentation using deep learning for tongue diagnosis in traditional Chinese medicine [12451-72]
12451 58	Design and realization of blood pressure measuring instrument based on virtual instrument technology [12451-209]
12451 59	Visible and infrared images fusion target tracking based on deep learning, progress, and prospects [12451-35]
12451 5A	A study of human-computer interaction and intimacy in the era of big data and artificial intelligence [12451-77]
12451 5B	Research on heart disease prediction method based on convolutional neural network [12451-223]
12451 5C	Formation control of robot swarm with implicit leaders [12451-134]
12451 5D	Robot-assisted realization of lower limb rehabilitation system combining virtual and real [12451-141]
12451 5E	Research on intelligent transfer and triage technology for ETC customer service hotline [12451-212]
12451 5F	Research and application of ultra-short-term wind power prediction based on gated recurrent neural network [12451-158]
12451 5G	Research on scent multidimensional AI empowers of audio and video of smart home users [12451-162]
12451 5H	Real-time detecting of urban traffic flow based on deep learning [12451-151]
12451 51	Application of blockchain technology in railway information sharing research [12451-221]
12451 5J	A foldable dual propeller crawling robot design [12451-189]
12451 5K	Research on contract review and management methods based on artificial intelligence [12451-244]
12451 5L	Deep reinforcement learning based sensing bidirectional nodes congestion control mechanism in wireless sensor networks [12451-130]

12451 5M	Image inpainting based on improved deep convolutional generative adversarial networks [12451-197]
12451 5N	Intelligent calculation for re-navigation of Beijing-Hangzhou Grand Canal [12451-7]
12451 50	A contrastive learning-based segmentation network for multiple retinal lesions [12451-237]
12451 5P	Mode control system design and implementation of intelligent lighting scene based on Zigbee [12451-229]
12451 5Q	Deepening research on framework and function of operation and maintenance automation tool based on integrated information system [12451-235]
12451 5R	Psychological counseling assistant system based on virtual reality technology [12451-107]