

PROCEEDINGS OF SPIE

International Conference on Algorithms, High Performance Computing, and Artificial Intelligence (AHPCAI 2024)

**Liang Hu
Pavel Loskot**
Editors

**14–16 August 2024
Zhengzhou, China**

Organized by
Guangdong AiScholar Institute of Academic Exchange (China)

Sponsored by
AEIC—Academic Exchange Information Centre (China)

Published by
SPIE

Volume 13403

Part One of Two Parts

Proceedings of SPIE 0277-786X, V. 13403

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

International Conference on Algorithms, High Performance Computing, and Artificial Intelligence
(AHPCAI 2024), edited by Liang Hu, Pavel Loskot, Proc. of SPIE Vol. 13403, 1340301
© 2024 SPIE · 0277-786X · doi: 10.1117/12.3055421

Proc. of SPIE Vol. 13403 1340301-1

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 SPIDigitalLibrary.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 *International Conference on Algorithms, High Performance Computing, and Artificial Intelligence (AHPCAI 2024)*, edited by Liang Hu, Pavel Loskot, Proc. of SPIE 13403, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X
ISSN: 1996-756X (electronic)

ISBN: 9781510685840
ISBN: 9781510685857 (electronic)

Published by
SPIE
P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone +1 360 676 3290 (Pacific Time)
SPIE.org
Copyright © 2024 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.

SPIE. DIGITAL LIBRARY
SPIDigitalLibrary.org

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

xiii *Conference Committee*

Part One

INTELLIGENT ALGORITHM AND DATA-DRIVEN TECHNOLOGY

- 13403 02 **A convolutional neural network training algorithm based on frequency domain transform** [13403-98]
- 13403 03 **Optimization of single-agent path planning algorithm based on space-time Astar** [13403-27]
- 13403 04 **A fast algorithm for maximizing monotone non-submodular functions** [13403-44]
- 13403 05 **The application and evaluation of hybrid GRASP algorithm in power transmission network planning** [13403-154]
- 13403 06 **Research on key factors of quality management and control in equipment maintenance based on genetic-neural-network algorithm** [13403-50]
- 13403 07 **Violent behavior detection algorithm in aerial images based on YOLOv9** [13403-102]
- 13403 08 **Research on building optimization design based on genetic algorithm** [13403-89]
- 13403 09 **Research on air pollution index prediction strategy based on LSTM and ridge regression** [13403-2]
- 13403 0A **Research on risk prediction of civil aircraft based on intelligent algorithms** [13403-93]
- 13403 0B **An efficient multi-step parallel FFT algorithm on GPU** [13403-136]
- 13403 0C **Ant colony algorithm in the application of path planning research** [13403-41]
- 13403 0D **Statistical inference for the generalized inverse exponential distribution under progressive first failure censoring scheme** [13403-58]
- 13403 0E **Research and application of joint optimal operation of reservoir group flood control based on improved particle swarm optimization algorithm** [13403-91]
- 13403 0F **Analysis and prediction model of population contribution in underdeveloped areas based on GBDT-XGBoost algorithm** [13403-165]

- 13403 OG **An improvement of a decision tree ID3 algorithm** [13403-16]
- 13403 OH **Design and analysis of intelligent heuristic search algorithms in mathematical optimization problems** [13403-120]
- 13403 OI **A hyperchaotic secure encryption algorithm for private user information in power big data centers** [13403-86]
- 13403 OJ **Research and analysis of decision-making algorithm based on consuming users in B2C rankings** [13403-78]
- 13403 OK **Application of the stacking integrated model in the prediction of breast cancer survival** [13403-159]
- 13403 OL **Research on collaborative filtering recommendation algorithm based on comprehensive cloud model similarity** [13403-125]
- 13403 OM **MSCBU-Net for non-invasive blood pressure estimation through PPG signals** [13403-31]
- 13403 ON **Prediction and analysis of tomato greenhouse environment based on deep learning** [13403-144]
- 13403 OO **An effective algorithm of key frames extraction for sports videos** [13403-155]
- 13403 OP **Multimodal data fusion algorithm for power marketing inspection based on knowledge graph** [13403-153]
- 13403 OQ **Fusion strategy-driven dung beetle optimization algorithm** [13403-20]
- 13403 OR **Analysis and prediction of Wordle game result variation using an improved SIR model** [13403-156]
- 13403 OS **Federated learning with improved aggregation via optimal transport algorithm** [13403-39]
- 13403 OT **Dark-channel a priori adaptive image defogging algorithm based on RGB channels and retinex reflectance maps** [13403-6]
- 13403 OU **Research on multi-task assignment method of multi-configuration UAV based on improved hybrid algorithm** [13403-54]
- 13403 OV **Apple surface defect detection algorithm based on improved YOLOv8** [13403-87]
- 13403 OW **Research on common algorithms of convolutional codes and turbo codes** [13403-82]
- 13403 OX **Seaplane motion prediction based on EMD-CNN-GRU coupled modeling** [13403-55]

INTELLIGENT IMAGE PROCESSING AND INFORMATION TECHNOLOGY

- 13403 0Y **Attention network based on discrete wavelet transform for low-light image enhancement** [13403-92]
- 13403 0Z **A structured pruning method based on MobileNetV3** [13403-168]
- 13403 10 **Research on numerical simulation and prediction methods for ocean waves and wind waves based on ocean station data** [13403-126]
- 13403 11 **Research on the risk assessment method of forest fire induced by distribution lines in forest areas based on fuzzy theory** [13403-36]
- 13403 12 **A collaborative multi-agent reinforcement learning approach based on reward adaptive allocation** [13403-147]
- 13403 13 **Artificial instinct** [13403-74]
- 13403 14 **CDM-IE: comprehensive dependence mining for document-level information extraction** [13403-51]
- 13403 15 **Progress research of reversible information hiding in encrypted domain based on secret sharing** [13403-146]
- 13403 16 **A wireless sensor network message processing model for application in data link** [13403-113]
- 13403 17 **Unpaired medical image translation based on WaveUNIT** [13403-52]
- 13403 18 **An enhanced distance-based parameter adaptation multi-population ensemble differential evolution** [13403-160]
- 13403 19 **An adaptive differential evolution with accompanying population for permutation flowshop scheduling problems** [13403-25]
- 13403 1A **Research on Chinese named entity recognition based on multi-feature fusion using transformer** [13403-4]
- 13403 1B **Analysis of two-agent risk game strategies under parallel allocation** [13403-53]
- 13403 1C **A spatiotemporal attention multitasking sleep staging method based on ECG signal** [13403-122]
- 13403 1D **Multitarget-tracking airborne method for radar based on a mamba network** [13403-111]
- 13403 1E **An approach of occlusion perception based on knowledge distillation in complex vineyard environment** [13403-129]

- 13403 1F **Entity linking method based on Longformer and adversarial training** [13403-28]
- 13403 1G **Explainable text representation method with a learnable and explicit semantic space** [13403-95]
- 13403 1H **HA-Net: bare soil extraction from optical remote sensing images** [13403-124]
- 13403 1I **Centrality-guided deep dynamic graph clustering** [13403-29]
- 13403 1J **Airborne data fast download technology based on the laser communication** [13403-7]
- 13403 1K **Revealing the powerful ability of large language model prompts in Text-to-SQL tasks** [13403-23]
- 13403 1L **Defense methods against multi-language and multi-intent LLM attacks** [13403-64]
- 13403 1M **Research on graphite ore grade classification based on the integration of multi-level features from ResNet and transformer** [13403-107]
- 13403 1N **Merging approach of pre-trained deep learning models for edge-cloud collaborative inference** [13403-30]
- 13403 1O **Research on synthetic aperture radar recognition method based on deep learning** [13403-103]
- 13403 1P **Defocus deblurring for infrared images using dynamic large separate kernel convolution** [13403-40]
- 13403 1Q **Leveraging deep residual learning with Atrous-based UNet for enhanced cloud segmentation in satellite imagery** [13403-169]
- 13403 1R **Research on fusion scheduling based on Slurm and Kubernetes** [13403-72]
- 13403 1S **Enhanced image encryption technique utilizing chaotic mapping and dynamic DNA encoding** [13403-33]
- 13403 1T **A survey of lightweight block cipher** [13403-166]
- 13403 1U **Emotion classification of Chinese text using improved NEZHA model** [13403-12]
- 13403 1V **A method for generating Dunhuang dance instrumental images based on optimized diffusion model** [13403-83]

Part Two

- 13403 1W **Research on knowledge fusion method of heterogeneous data in aerospace control software** [13403-167]
- 13403 1X **Research on interactive exhibition of science popularization based on ecological and climate environmental protection with coral crisis as an example** [13403-123]

INTELLIGENT SYSTEM RESEARCH AND COMPUTER SECURITY TECHNOLOGY

- 13403 1Y **Research on the design of multi-source and multi-granularity educational information system based on deep learning** [13403-112]
- 13403 1Z **Assessing and enhancing GNSS positioning performance: a geometric analysis of GDOP minimization under varying satellite numbers, configurations, and occlusion scenarios** [13403-9]
- 13403 20 **Subgrid-scale stress model for large-eddy simulation of turbulence using an artificial neural network** [13403-18]
- 13403 21 **Research on parallel optimization and acceleration technology for new energy power generation large model computing based on localized supercomputing platforms** [13403-68]
- 13403 22 **Research and application of initial phase angle calibration technology for smart grids based on cloud platform** [13403-47]
- 13403 23 **Research on voltage real-time computing system based on Flink framework in autonomous and controllable environment** [13403-150]
- 13403 24 **Embodied intelligence in unmanned surface vehicles: current applications and future perspectives** [13403-56]
- 13403 25 **Blockchain signature acceleration engine based on SM2 algorithm** [13403-8]
- 13403 26 **A knowledge graph and large language model based approach to security measure** [13403-145]
- 13403 27 **Research on hybrid parallel technology of MPI combined with OpenMP for domestic supercomputing platforms** [13403-76]
- 13403 28 **Research on network traffic anomaly detection technology based on XGBoost** [13403-69]
- 13403 29 **A multiscale feature extraction feedback network for single image super-resolution** [13403-158]

- 13403 2A **Enhancing network traffic classification with CNN and multilayer BiGRU-attention**
[13403-133]
- 13403 2B **Intrusion detection based on the SS-CBLM model** [13403-13]
- 13403 2C **Design method of FMEA-based operating system robust testing case design method**
[13403-15]
- 13403 2D **PointVQDM: point cloud completion via vector quantized diffusion model** [13403-5]
- 13403 2E **Semi-supervised log anomaly detection based on clustering** [13403-114]
- 13403 2F **Automated process allocation for construction projects based on partial multi-label recognition** [13403-3]
- 13403 2G **A new principle memristive device parameter control system based on Moku:Go**
[13403-24]
- 13403 2H **Optimizing action segmentation with linear self-attention and pyramidal pooling**
[13403-110]
- 13403 2I **Exploring ChatGPT's code summarization capabilities: an empirical study** [13403-108]
- 13403 2J **HPNet: hybrid pyramid network for cardiac segmentation** [13403-42]
- 13403 2K **An adaptive carbon accounting model combining migration learning and dynamic feature selection** [13403-121]
- 13403 2L **Improved YOLOv5-based cigarette butt waste suction sanitation robot** [13403-157]
- 13403 2M **MPI toolkit: MPI-based performance analysis software for parallel programs** [13403-117]
- 13403 2N **Analysis on the application of deep neural network model in the improvement of traditional PHP source code auditing tools** [13403-79]
- 13403 2O **Adaptive federated learning with non-IID data** [13403-106]
- 13403 2P **Diabetes prediction models based on intrinsic explainable machine learning** [13403-130]
- 13403 2Q **Research on compensation control algorithm for electro-hydraulic servo system of collaborative robot handarm** [13403-134]
- 13403 2R **The emergency material allocation prediction model for power grids based on the DGM-GRU framework** [13403-135]
- 13403 2S **Machine learning algorithm for self-powered wireless humidity sensor system** [13403-66]

- 13403 2T **Design and development of a popular science platform for toxic species identification based on small sample learning** [13403-105]
- 13403 2U **Optimized finite state machine design for autonomous decision-making of VR intelligent agents in nuclear emergency response training** [13403-132]
- 13403 2V **Urban regional fire risk prediction based on FIRE-CLA** [13403-71]
- 13403 2W **Research on network intrusion detection methods based on deep learning** [13403-115]
- 13403 2X **Research on intelligent vehicle adaptive control technology considering vehicle yaw and roll stability** [13403-140]

ARTIFICIAL INTELLIGENCE TECHNOLOGY AND ELECTROMECHANICAL DETECTION

- 13403 2Y **Prediction of corrosion fatigue crack growth rate in 7050 aluminum alloy based on machine learning** [13403-116]
- 13403 2Z **Research on production scheduling method considering multidimensional testing ability of employees** [13403-35]
- 13403 30 **Research on low carbon dispatching model and simulation of power system based on data analysis algorithm** [13403-152]
- 13403 31 **Design and application of the standard tag set in the oil and gas pipeline domain** [13403-118]
- 13403 32 **Research on digitalized design of nuclear power plant switchboards based on VBA technology** [13403-14]
- 13403 33 **Dynamic responses of transmission line tower subjected to the nonstationary typhoon** [13403-11]
- 13403 34 **Research on detection method for distribution network deteriorated insulators based on sound light collaborative detection technology acoustic emission technology** [13403-81]
- 13403 35 **Design of intelligent slag removal system in power plant based on image recognition** [13403-80]
- 13403 36 **Research on electrical equipment temperature anomaly detection method based on red target detection** [13403-62]
- 13403 37 **Hybrid forecasting framework for propulsion load of hydrogen energy ship power system** [13403-162]
- 13403 38 **Research on PID control method for predictive modeling of oil pipeline infrastructure under Industrial Internet of Things driving** [13403-151]

- 13403 39 **Current development status of intelligent diagnosis technology for nuclear power equipment** [13403-48]
- 13403 3A **Detection of bolt looseness in power tower based on Chirplet decomposition algorithm of laser vibration signal** [13403-163]
- 13403 3B **ICT industry development and electricity demand forecasting based on machine learning methods** [13403-19]
- 13403 3C **Mining algorithm for typical electricity consumption behavior patterns of power users based on graph neural network** [13403-119]
- 13403 3D **Research on optimal energy efficiency piping system layout of intelligent workshop based on improved ant colony** [13403-60]
- 13403 3E **Cross-room cluster fault detection for distributed storage based on improved Gaussian mixture modeling** [13403-100]
- 13403 3F **Research on the detection of dislodged fault in photovoltaic modules based on line scanning** [13403-37]
- 13403 3G **Data-driven power load forecasting with neural attention mechanism** [13403-70]
- 13403 3H **Research on fatigue evaluation model of electric power operators based on deep learning and information fusion** [13403-45]
- 13403 3I **A new deepfake detection method by vision transformers** [13403-143]
- 13403 3J **YOLOv8s-SLS: a mulberry leaves pest detection model integrating lightweight and multiscale** [13403-22]
- 13403 3K **Bird detection based on improved YOLOv8** [13403-88]
- 13403 3L **Pavement breakage detection from unmanned aerial vehicle viewpoint based on improved Detr** [13403-59]
- 13403 3M **Physic-embedded hierarchical Kriging and its application to aerodynamic performance prediction of a tandem cascade** [13403-101]
- 13403 3N **Hybrid EEMD-WOA-LSTM model for enhanced power load prediction** [13403-148]
- 13403 3O **Sub-pixel edge detection of electron beam welded parts based on machine vision** [13403-61]
- 13403 3P **Real-time weld seam localization for electron beam welding based on secondary electrons** [13403-65]
- 13403 3Q **A study of defect detection in the first layer of FDM3D printing based on improved YOLOv8s** [13403-21]

- 13403 3R **Bins relocation problem in AutoStore: an overview** [13403-84]
- 13403 3S **A lightweight fruit detection based on improved YOLOv5s** [13403-43]
- 13403 3T **MODCL: multi-modal object detection with end-to-end contrastive learning in indoor scene**
[13403-38]
- 13403 3U **Multi-scale and multi-view fusion-based state space model for bridge health monitoring
sensor fault diagnosis** [13403-10]
- 13403 3V **Fault diagnosis method for rolling bearings based on adaptive dynamic mode
decomposition** [13403-104]
- 13403 3W **Power industry large language model capability evaluation research** [13403-85]
- 13403 3X **Transmission line image defect diagnosis method based on large power inspection model**
[13403-142]

Conference Committee

Conference Honorary Chair

Kun Yang, University of Essex (United Kingdom)

Conference General Chairs

Guangjie Han, Hohai University (China)

Hai Jin, Huazhong University of Science and Technology (China)

Technical Program Committee Chairs

Peng Yu, Beijing University of Posts and Telecommunications (China)

Ran Cheng, Southern University of Science and Technology (China)

Publication Chairs

Sandeep Saxena, Greater Noida Institute of Technology (India)

Liang Hu, Tongji University (China)

Pavel Loskot, Zhejiang University-University of Illinois at
Urbana-Champaign Institute (China)

Publicity Chairs

Peng Lv, Central South University (China)

Yonghui Wu, Fudan University (China)

Organizing Committee Chair

Mingfang Lv, Guangdong AiScholar Institute of Academic Exchange
(China)

Organizing Committee

Jumin Zhao, Taiyuan University of Technology (China)

Yiyuan Xie, Southwest University (China)

Yilin Wu, Guangdong University of Education (China)

Xingbo Wang, Foshan University (China)

Zhonghua Li, Yat-sen University (China) and Guangdong High
Performance Computing Society (China)

Qian Tao, South China University of Technology (China)

Lei Zhang, Henan University (China)

Yi Li, Wenzhou University (China)

Deqing Ding, National University of Defense Technology (China)

Dahan Wang, Xiamen University of Technology (China)

Ziyan Zhang, Hainan Tropical Ocean University (China)

Mahmoud AlShawabkeh, Guangxi Normal University for Nationalities
(China)

Muhammad Aslam, Wuhan University (China)

Omar Dib, Wenzhou-Kean University (China)

Genhua Huang, Guangdong Planning and Designing Institute of
Telecommunications Company Ltd. (China)

Technical Program Committee

Zhiheng Wu, Institute of Manufacturing, GDAS (China)

Jiongcheng Li, Guangdong Planning and Designing Institute of
Telecommunications Company Ltd. (China)

Yong Xu, Guangzhou Institutes of Biomedicine and Health, Chinese
Academy of Sciences (China)

Zhi Xie, Sun Yat-sen University (China)

Jiahai Wang, Sun Yat-sen University (China)

Hongmin Cai, South China University of Technology (China)

Yuedong Yang, Sun Yat-sen University (China)

Xiaolin Qin, Cheng Du Information Technology of Chinese Academy of
Sciences Co., Ltd. (China)

Aslina Baharum, Universiti Malaysia Sabah (Malaysia)

Siting Chen, South China University of Technology (China)

Azim Zaliha Abd Aziz, Universiti Sultan Zainal Abidin (Malaysia)

Marina Yusoff, Universiti Teknologi MARA (Malaysia)

Md Khaja Mohiddin, Bhilai Institute of Technology, Raipur (India)

Rajeev Tiwari, University of Petroleum and Energy Studies (India)