

PROCEEDINGS OF SPIE

Third International Conference on Biomedical and Intelligent Systems (IC-BIS 2024)

**Pier Paolo Piccaluga
Zulqarnain Baloch**
Editors

**26–28 April 2024
Nanchang, China**

Organized by
Nanchang University (China)

Sponsored by
Kunming University of Science and Technology (China)
AEIC—Academic Exchange Information Centre (China)

Published by
SPIE

Volume 13208

Proceedings of SPIE 0277-786X, V. 13208

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

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 *Third International Conference on Biomedical and Intelligent Systems (IC-BIS 2024)*, edited by Pier Paolo Piccaluga, Zulqarnain Baloch, Proc. of SPIE 13208, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510681279

ISBN: 9781510681286 (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

xi *Conference Committee*

BIOGENETIC ENGINEERING AND CELL AND TISSUE MODELING

- 13208 02 **Computer programs of rapid eye movement and relaxation for acute stress in adult: controlled study of intervention effectiveness** [13208-92]
- 13208 03 **Computer simulation and prediction of spectral and molecular properties of artemisinin** [13208-81]
- 13208 04 **Expression and characterization of the antifungal protein PtAFP from *Pyrenophora tritici-repentis* by synonymous codon bias in *Escherichia coli*** [13208-39]
- 13208 05 **Single cell clustering using ZINB model and variational graph attention autoencoder** [13208-124]
- 13208 06 **Probe-screened carbon nanotube field-effect transistor biosensor to enhance breast cancer-related gene assay** [13208-91]
- 13208 07 **The mechanism of Yinma Jiedu granules in the treatment of acute bronchitis was explored based on network pharmacology and molecular docking** [13208-60]
- 13208 08 **Modeling Lamprey gender dynamics: insights from the Verhulst-Volterra approach** [13208-74]
- 13208 09 **Computer simulations predict the effects of methylation substitution on the molecular properties of cytosine and cytosine deoxynucleotides** [13208-120]
- 13208 0A **Study on the construction of gene regulatory network based on non-homogeneous dynamic Bayesian network** [13208-78]
- 13208 0B **Research on high throughput automated pipette workstation** [13208-135]
- 13208 0C **Asymptotic stability of an HIV latent infection model with both virus-to-cell infection and cell-to-cell transmission** [13208-11]
- 13208 0D **Acquisition of skeletal muscle blood flow based on NIRS** [13208-130]
- 13208 0E **Innovative two-photon technology reveals novel biological phenomena** [13208-116]
- 13208 0F **A system for uniform cell spheroid preparation based on inkjet printing** [13208-5]
- 13208 0G **Potential molecular mechanisms of postoperative restenosis in lower extremity atherosclerotic occlusive disease** [13208-27]

- 13208 OH **Current research trends and foci of cell-laden scaffold based on bibliometrics and visualization analysis** [13208-12]
- 13208 OI **Preparation and characterization of NIR photothermal agents with high biocompatibility** [13208-86]
- 13208 OJ **Exploring the heterogeneity of immune cell infiltration pattern in liver cancer based on RNA-seq data deconvolution** [13208-46]
- 13208 OK **Brilliant Green: a long-buried water-soluble AIEgen with near-infrared fluorescence for living cell actin staining** [13208-56]
- 13208 OL **Medical application research based on deep learning-cancer cell classification and recognition** [13208-85]
- 13208 OM **Exploring the protective effect of morroniside on neuroinflammation based on combined GEO analysis and molecular docking experiments** [13208-88]
- 13208 ON **An improved predictor of thermophilic protein using protein language model** [13208-110]

MEDICAL SIGNAL PROCESSING AND IMAGE ANALYSIS

- 13208 OO **Investigating the correlation between sampling rate of surface electromyography signal and hand pose estimation** [13208-114]
- 13208 OP **Multiple-network poroelastic model for subject-specific myocardial perfusion simulation** [13208-22]
- 13208 OQ **Attention mechanism and graph augmented network for medication recommendation** [13208-54]
- 13208 OR **Enhancing the performance of steady-state visually evoked potentials-based brain-computer interfaces by utilizing information from independent harmonics** [13208-79]
- 13208 OS **Exploring brain imaging and genetic risk factors for Alzheimer's disease by using a SnetNMF-based approach** [13208-70]
- 13208 OT **Sparse angle CT reconstruction based on neural radial field** [13208-66]
- 13208 OU **Research on the identification method of Chinese medical named entities** [13208-61]
- 13208 OV **A dynamic time warping-based algorithm for characteristic peak group localization from ballistocardiograms** [13208-76]
- 13208 OW **A study of channel switching model based on calcium signalling** [13208-57]
- 13208 OX **A deep learning model using localized attention mechanism for brain MRI registration** [13208-62]

- 13208 0Y **Investigation of transcutaneous auricular vagus nerve stimulation for neural modulation based on neuroimaging analysis** [13208-13]
- 13208 0Z **Electrocardiogram signal processing and recognition techniques based on the ESPRIT algorithm** [13208-80]
- 13208 10 **Advances in three-dimensional reconstruction of medical images for clinical diseases of the lungs** [13208-87]
- 13208 11 **Intelligent brain tumor segmentation based on improved U-Net** [13208-48]
- 13208 12 **Classifying static muscle fatigue: an surface electromyography signal analysis approach** [13208-16]
- 13208 13 **A GMSK-based conductive intracardiac communication method** [13208-45]
- 13208 14 **Electroencephalogram-based ling six-sound perception classification using deep learning** [13208-34]
- 13208 15 **Research on fatigue characteristics of static muscle contraction based on surface electromyography** [13208-8]
- 13208 16 **Diagnosis of pathological myopia using vision transformer based on fundus color photography** [13208-100]
- 13208 17 **Thyroid nodule ultrasound image segmentation method integrating multiscale features** [13208-58]
- 13208 18 **Integrated deployment and operation system for pulmonary CT image analysis model in ARDS patients on a server** [13208-25]
- 13208 19 **Neural networks for registration based on perceptual loss** [13208-43]
- 13208 1A **A multiscale attention network for grading of invasive ductal cancer** [13208-17]
- 13208 1B **Design comparison of colored stimuli for dynamic visual acuity assessment** [13208-128]
- 13208 1C **Optimization analysis of CFD flow field of the blade of the artificial heart pump** [13208-134]
- 13208 1D **A weakly supervised multiple instance learning approach for classification of breast cancer HER-2 status using whole slide images** [13208-131]
- 13208 1E **Optical fiber sensing-based respiratory signals motion artifacts suppression using empirical mode decomposition** [13208-108]
- 13208 1F **Dual contrastive learning for incomplete multiview clustering on enhanced liver tumor CT diagnosis** [13208-89]
- 13208 1G **The diagnostic value of a coronary computed tomography angiography scan-based radiomics model for coronary stenosis** [13208-102]

- 13208 1H **Construction of medical information knowledge graph question and answer system based on deep learning** [13208-2]
- 13208 1I **The integration of egocentric and allocentric spatial information is important for navigation** [13208-101]
- 13208 1J **An improved YOLOv5 infrared image algorithm for depression diagnosis** [13208-68]
- 13208 1K **An automated test tube identification and sorting system based on machine vision** [13208-41]
- 13208 1L **PointNet-based feature extraction of falciform ligament and ridgeline in preoperative liver 3D point cloud** [13208-103]

MEDICAL DETECTION MODELING AND DATA ANALYSIS

- 13208 1M **Dynamical analysis for a stochastic Ebola virus epidemic model with age-structured effect** [13208-82]
- 13208 1N **Sensitivity analysis and numerical simulation of a human papillomavirus infection model** [13208-4]
- 13208 1O **An annotated corpus about lactic acid bacteria biomedical entity and automatic identification method** [13208-26]
- 13208 1P **Pre-sleep anxiety detection by multimodal signal** [13208-83]
- 13208 1Q **A matrix completion-based multikernel learning approach for predicting the association between piRNA and diseases** [13208-106]
- 13208 1R **Hyperbolic Lorentz attention for synthetic lethality prediction** [13208-119]
- 13208 1S **An improved multiomics data clustering algorithm based on graph regularization constraints** [13208-72]
- 13208 1T **Exploring alterations in low-frequency bands with frequency dependence amplitudes within major depressive disorder** [13208-19]
- 13208 1U **Establishment and application of a population prediction model for lamprey based on gender ratio transformation** [13208-51]
- 13208 1V **Research on vehicle comfort testing and evaluation based on the characterization of passenger motion sickness degree** [13208-112]
- 13208 1W **Development of a transcutaneous monitoring system for carbon dioxide partial pressure measurement** [13208-59]
- 13208 1X **An accurate clustering algorithm for single-cell multiomics data** [13208-31]

- 13208 1Y **A comparative study on eye movement classification using foresteye classifier and other deep learning methods** [13208-49]
- 13208 1Z **Epidemiological trends and new prognostic assessment methods for patients: a study based on the SEER database** [13208-122]
- 13208 20 **Research on adolescents with CHD-PAH based on the Choi-Williams analysis of the second heart sound** [13208-104]
- 13208 21 **Bayesian mentalizing model for the Prisoner's Dilemma** [13208-115]
- 13208 22 **Non-contact sensor-based human fall detection method** [13208-20]
- 13208 23 **Establishment of personalized adolescent idiopathic scoliosis model and analysis of musculoskeletal mechanics** [13208-109]
- 13208 24 **A task offloading algorithm for Internet of medical Things based on reinforcement learning** [13208-117]
- 13208 25 **A new retinal vessel segmentation algorithm based on saliency-guided level set** [13208-129]
- 13208 26 **The methodology of mapping relational data to graph data for the construction of knowledge graph in Chinese medical records** [13208-69]
- 13208 27 **Prodigiosin: a bibliometric analysis from 1990 to 2023** [13208-6]
- 13208 28 **A new strategy for the treatment of Hepatitis B patients based on data mining** [13208-38]
- 13208 29 **Development of novel peptides filtering algorithm based on peptide information** [13208-28]
- 13208 2A **Numerical simulation of flow field in vascular after artery bypass and stents surgery based on FLUENT** [13208-77]
- 13208 2B **Measurement of whole-body lymphoma segmentation and prognostic indicators based on 3D UNET network** [13208-18]
- 13208 2C **Visual analysis of hospital pharmacy performance appraisal based on bibliometrics** [13208-36]
- 13208 2D **Blockchain-based medical data proxy re-encryption access control scheme** [13208-65]
- 13208 2E **Consider the association test of rare variant loci quantitative traits** [13208-35]
- 13208 2F **Ultrasonic speckle tracking blood flow velocimetry based on the moth-flame optimization** [13208-21]

INTELLIGENT MEDICAL SYSTEM AND DRUG MECHANISM RESEARCH

- 13208 2G **Intelligent diagnosis strategies of Alzheimer's disease** [13208-132]
- 13208 2H **Anchoring force analysis of capsule robot positioning mechanism based on the hyperelastic model of the intestine** [13208-24]
- 13208 2I **The research of brain network structure in artificial intelligence** [13208-113]
- 13208 2J **Integrating convolutional and graph neural networks for diagnosis and prognosis of hematologic diseases** [13208-7]
- 13208 2K **Machine-learning-based modeling of the mother-infant health relationship** [13208-53]
- 13208 2L **Research on multirobot collaboration platform for logistic distribution of medical consumables in the operating room** [13208-44]
- 13208 2M **Optimizing clinical decisions: integrating side effect implications into support systems** [13208-52]
- 13208 2N **Utilizing the knowledge graph for better drug discovery** [13208-3]
- 13208 2O **Exploration of the pathogenesis of allergic asthma using microfluidics and electrospinning technologies** [13208-111]
- 13208 2P **Research on intelligent healthcare scenario construction of one hospital for the whole city** [13208-73]
- 13208 2Q **A novel method for predicting the interaction between Chinese herbal compounds and targets** [13208-137]
- 13208 2R **Human-robot interaction for orthopedic surgical robots based on fuzzy variable admittance control** [13208-10]
- 13208 2S **Towards the software-hardware co-design for the refined management system of medical consumables combined with information technology in hospitals** [13208-50]
- 13208 2T **Analysis of brain cognition in artificial intelligence** [13208-107]
- 13208 2U **Auxiliary diagnosis of children with autism based on high-order brain functional connectivity networks and graph attention networks** [13208-55]
- 13208 2V **Drug-target affinity prediction based on bilinear networks and protein large language model** [13208-97]
- 13208 2W **Multimodal graph representation learning for drug repositioning** [13208-138]
- 13208 2X **Digital interventions preventing adolescent anxiety: a meta-analysis and systematic review** [13208-67]

- 13208 2Y **Visual analysis of research hotspots and frontiers of telemedicine** [13208-15]
- 13208 2Z **Tongue image feature classification and gastric disease diagnosis using deep learning in traditional Chinese medicine** [13208-14]
- 13208 30 **Sex-stratified neural connectivity patterns in Alzheimer's disease: a resting-state fMRI study unraveling distinct topological alterations** [13208-125]
- 13208 31 **Predicting cervical lymph node metastatic cancer based on attention mechanism** [13208-63]
- 13208 32 **Based on network pharmacology, the mechanism of action of knee three-organ decoction in the treatment of knee Osteoarthritis was discussed** [13208-99]
- 13208 33 **Design and implementation of traditional Chinese medicine diagnosis and treatment platform** [13208-30]
- 13208 34 **Research on intelligent medicine delivery trolley** [13208-126]
- 13208 35 **The potential of ChatGPT as clinical diagnostician for aortic dissection** [13208-33]
- 13208 36 **Investigating the mechanisms of Fuyuan capsule in treating type 2 diabetes using network pharmacology** [13208-40]
- 13208 37 **Design and implementation of antibody generation system based on diffusion model** [13208-127]
- 13208 38 **Current research and prospects of federated language large models in the medical field** [13208-136]
- 13208 39 **The selection of the drugs for Toxoplasma gondii and dynamics of the chosen drugs** [13208-140]
- 13208 3A **Deep learning methods in liver diseases** [13208-47]
- 13208 3B **Mechanical structure design of automatic colony counter** [13208-32]
- 13208 3C **Research on optimization methods of vaccine supply chain based on intelligent Internet of Things** [13208-98]