

# 2021 20th International Symposium on Distributed Computing and Applications for Business Engineering and Science (DCABES) DCABES 2021

## Table of Contents

<b>Preface</b> .....	<b>xii</b>
<b>Conference Organization</b> .....	<b>xiii</b>

### E-Business and Commerce

Modification Terms to the Black-Scholes Model Based on the Functional Volatility Model .....	1
<i>Xiaozheng Lin (Fuzhou University, China), Wei Chen (Fuzhou University, China), Meiqing Wang (Fuzhou University, China), and Choi-Hong Lai (University of Greenwich, UK)</i>	
Empirical Research on the Impact of Margin Selling on the Volatility of China's Stock Market .....	5
<i>Xi Gao (Guilin University of Electronic Technology, China) and Song Ruimin (Guilin University of Electronic Technology, China)</i>	
E-Commerce Service Equilibrium Prediction Simulation Based on Ontology .....	9
<i>Zhong Wu (Wuhan Business University, China)</i>	
A Review on the Issues in Usability Evaluation of eHealth Applications: From a COVID-19 Pandemic Perspective .....	13
<i>Bashair AlThani (Imam Abdulrahman Bin Faisal University, Saudi Arabia)</i>	

### Big Data and Data Mining

Political Economy Analysis of Carbon Emissions: Based on Empirical Data from the Central Region .....	18
<i>Lipeng Wen (Guilin University of Electronic Science and Technology, China), Tingting Yin (Guilin University of Electronic Science and Technology, China), Xuemei Long (Guilin University of Electronic Science and Technology, China), and KengCheng Zheng (Zhongnan University of Economics and Law, China)</i>	
Digital Economy Has Become a New Engine for Regional Development .....	22
<i>Zemin Hu (Guilin University of Electronic Technology, China), Jinghao Zhao (Guilin University of Electronic Technology, China), and Lu Shi (Guilin University of Electronic Technology, China)</i>	

Analysis and Decision-Making of Regional Economic Vitality .....	25
<i>Chunan Zhang (Chengdu University of Information Technology, China), Ying Gan (Chengdu University of Information Technology, China), Hao Yang (Chengdu University of Information Technology, China), Bingyun Wang (Chengdu University of Information Technology, China), and Ping Shao (Chengdu University of Information Technology, China)</i>	
Research and Application of Community Pension Service Data Analysis System Based on Data Mining Algorithm .....	29
<i>Xiaofeng Yao (Wuxi Taihu University, China) and Cheng Jiang (Wuxi Taihu University, China)</i>	
Machine Learning Techniques to Predict Academic Performance of Health Sciences Students . 33	
<i>Hana Alharthi (Imam Abdulrahman Bin Faisal University, Saudi Arabia)</i>	
Research Progress, Hot Spots and Prospects in the Field of Agricultural Innovation in China—CiteSpace Analysis Based on 2258 Articles .....	37
<i>Shuqi Zhu (Guilin University of Electronic Technology, China), Qian Lu (Guilin University of Electronic Technology, China), and Yun Xiang (Sun Yat-sen University, China)</i>	
Gender Classification for Online Shopping .....	41
<i>Yimeng Zhang (Taiyuan No. 20 High School, China)</i>	
Mining Model of Purchase Intention Based on Support Vector Machine Algorithm .....	45
<i>Mengtong Zhang (Wuhan University of Technology, China), Jichang Dong (Wuhan University of Technology, China), and Wenkan Huang (Wuhan University of Technology, China)</i>	
A Study of the Influence of Different Opinion Leaders on the Evolution of Followers' Views in Social E-Commerce Networks .....	49
<i>Jianhong Jiang (Guilin University of Electronic Technology, China) and Li Wang (Guilin University of Electronic Technology, China)</i>	
Level-Based E-Government Cloud Cross-Domain Access Control Technology .....	53
<i>Jing Gao (Jilin Institute of Chemical Technology, China)</i>	

## Intelligent Transportation

Trajectory Tracking of Unmanned Vehicle Based on Improved Model Predictive Control .....	57
<i>Miao Wang (Wuhan University of Technology, China), Yefu Wu (Wuhan University of Technology, China), and Fengyu Huang (Wuhan University of Technology, China)</i>	
NDT-Based Robot Positioning System for Large Scale Diversity Environment .....	61
<i>Qi Min (Shanghai DianJi University, China), Niansheng Chen (Shanghai DianJi University, China), Guangyu Fan (Shanghai DianJi University, China), Lei Rao (Shanghai DianJi University, China), Zhaohui Xu (AVIC Huadong Photoelectric Shanghai Co., Ltd., China), and Yiping Ma (AVIC Huadong Photoelectric Shanghai Co., Ltd., China)</i>	
Research on Detection Method of Abnormal Trajectory of Port Operation Vehicles .....	65
<i>Shuaihui Li (Wuhan University of Technology, China), Hongxing Liu (Hubei Provincial Key Laboratory of Transportation Internet of Things Technology, China), and Hanbing Yao (Hubei Provincial Key Laboratory of Transportation Internet of Things Technology, China)</i>	

Research on Model and Method of Inland River Ship Overload Measurement .....	69
<i>Lirong Ai (Wuhan Institute of Shipbuilding Technology, China), Yanchun Wang (Huangshi Second High School, China), Jia Yi (Wuhan University of Technology, China), and Shengping Jin (Wuhan University of Technology, China)</i>	
Research on Path Planning Algorithm of Intelligent Wheeled Robot Based on ROS .....	73
<i>Ming-Yuan Wang (Jilin Institute of Chemical Technology, China), Meng-Yao Zhao (Jilin Institute of Chemical Technology, China), and Jian-Jun Zhu (Jilin Institute of Chemical Technology, China)</i>	
Research on Scheduling Algorithm of Multi-AGVS System .....	77
<i>Yao Xiang (Wuxi Taihu University, China) and Peng Li (Wuxi Taihu University, China)</i>	

## Image and Vision Processing

Contourlet Transform Based Reduced-Reference Image Quality Assessment .....	80
<i>Fengping Xu (Nantong Normal College, China)</i>	
Emotional Conversational Analytics—An Experimental Case Study .....	84
<i>Jay Kiruthika (Kingston University, UK)</i>	
Application of Face Recognition in Port Unrestricted Scene .....	88
<i>Qi Song (Wuhan University of Technology, China), HanBing Yao (Wuhan University of Technology, China), and WenBo Wu (Chongqing Gangjiu Co., Ltd., China)</i>	
DP-Face: Privacy-Preserving Face Recognition Using Siamese Network .....	92
<i>Nazhao Yan (Fuzhou University, China), Hang Cheng (Fuzhou University, China), Meiqing Wang (Fuzhou University, China), Qinjian Huang (Fuzhou University, China), and Fei Chen (Fuzhou University, China)</i>	
SSD Small Object Detection Algorithm Based on Feature Enhancement and Sample Selection .	96
<i>Zhipeng Liu (Jiangnan University, China), Wei Fang (Jiangnan University, China), and Jun Sun (Jiangnan University, China)</i>	
Application of CNN-Based Face Recognition Technology in Smart Logistics System .....	100
<i>Miao Geng (Wuxi Taihu University, China)</i>	
Multiscale Global Channel Network for Edge Detection .....	104
<i>Wang Zhang (Jiangnan University, China), Wei Fang (Jiangnan University, China), Jun Sun (Jiangnan University, China), and Qidong Chen (Jiangnan University, China)</i>	
Classroom Monitoring System Based on Facial Expression Recognition .....	108
<i>Boxuan Zhang (Huaiyin Institute of Technology, China), Mengzhong Wei (Huaiyin Institute of Technology, China), Qianying Zhang (Huaiyin Institute of Technology, China), Quanyin Zhu (Huaiyin Institute of Technology, China), and Xiang Li (Huaiyin Institute of Technology, China)</i>	
Research on Campus Physical Measurement System Based on CNN-LSTM .....	112
<i>Mengzhong Wei (Huaiyin Institute of Technology, China), Yuting Fu (Huaiyin Institute of Technology, China), Chao Li (Huaiyin Institute of Technology, China), Yuanyuan Wang (Huaiyin Institute of Technology, China), Wanli Feng (Huaiyin Institute of Technology, China), and Quanyin Zhu (Huaiyin Institute of Technology, China)</i>	

Campus Safety Monitoring System Based on Deep Learning .....	116
<i>Qianying Zhang (Huaiyin Institute of Technology, China), Jin Hang (Huaiyin Institute of Technology, China), Boxuan Zhang (Huaiyin Institute of Technology, China), Mengzhong Wei (Huaiyin Institute of Technology, China), Quanyin Zhu (Huaiyin Institute of Technology, China), and Xiang Li (Huaiyin Institute of Technology, China)</i>	

## Algorithm Design and Implementation

Parallelization Implementation of Topographic Viewpoint Filtering Algorithm Based on Terrain Viewshed Using MPI and OpenMP .....	119
<i>Yiwen Wang (Nanjing Normal University, China), Tao He (Nanjing Normal University, China), and Wanfeng Dou (Nanjing Normal University, China)</i>	
A Weight-Based Clustering Routing Algorithm for Ad Hoc Networks .....	123
<i>Sihai Zheng (Jiangnan University, China) and Changrui Zheng (Jiangnan University, China)</i>	
A Railway Station Scheduling Algorithm Based on Multi-Objective Particle Swarm Optimization Algorithm .....	127
<i>RuiMin Deng (Wuhan University of Technology, China), YongHua Li (Wuhan University of Technology, China), JunYa Hu (Wuhan University of Technology, China), and Qi Chen (Chongqing Guoyuan Port Co., Ltd., China)</i>	
Recognition of Power Quality Disturbance Based on Artificial Bee Colony Algorithm to Optimize Kernel Extreme Learning Machine .....	131
<i>Liping Qu (Beihua University, China), Chang-Long He (Beihua University, China), Jie Zhang (Beihua University, China), and Tai-Lu Gao (Beihua University, China)</i>	
Improved Yolov4-Tiny Algorithm Based on Cascade Residual Dilated Fusion .....	136
<i>Qinggang Gong (Wuhan University of Technology, China) and Yefu Wu (Wuhan University of Technology, China)</i>	
An Effective Lightweight Attention Mechanism .....	140
<i>Zhipeng Liu (Jiangnan University, China), Wei Fang (Jiangnan University, China), and Jun Sun (Jiangnan University, China)</i>	
Traceability Method between Design Documents and Source Codes Based on SQL Dependency .....	144
<i>Lujing Yu (Wuhan University of Technology, China), Yonghua Li (Wuhan University of Technology, China), Yuqing Feng (Wuhan Social Work Polytechnic, China), and Chen Qi (Chongqing Guoyuan Port Co., Ltd., China)</i>	
KTSP Solution Based on Workload Balance and Genetic .....	148
<i>Zejun Hu (Guangdong Mechanical &amp; Electrical Polytechnic, China) and Guohua Yang (Guangdong Mechanical &amp; Electrical Polytechnic, China)</i>	
An Intelligent Identification and Detection Method for Forest Pests Based on YOLOv5s Algorithm .....	152
<i>Zhihong Wang (Shandong Agriculture and Engineering University, China), Zhanhao Shi (Shandong Agriculture and Engineering University, China), Honglei Wang (Jinan Landscape and Forestry Science Research Institute, China), Fengju Bu (Shandong Agriculture and Engineering University, China), Tian Liang (Shandong Agriculture and Engineering University, China), and Xingbo Zhang (Shandong Agriculture and Engineering University, China)</i>	

Improve the Performance of LSM-Tree Based on Key-Value via Multithreading .....	155
<i>Yuan Gao (Qinghai Normal University, China; State Key Laboratory of Tibetan Intelligent Information Processing and Application, China; Key Laboratory of Internet of Things of Qinghai Province, China; Academy of Plateau Science and Sustainability, China), Ping Xie (Qinghai Normal University, China; State Key Laboratory of Tibetan Intelligent Information Processing and Application, China; Key Laboratory of Internet of Things of Qinghai Province, China; Academy of Plateau Science and Sustainability, China), Wendi Hua (Qinghai Normal University, China; State Key Laboratory of Tibetan Intelligent Information Processing and Application, China; Key Laboratory of Internet of Things of Qinghai Province, China; Academy of Plateau Science and Sustainability, China), Meng Lv (Qinghai Normal University, China; State Key Laboratory of Tibetan Intelligent Information Processing and Application, China; Key Laboratory of Internet of Things of Qinghai Province, China; Academy of Plateau Science and Sustainability, China), and Jiating Lu (Qinghai Normal University, China)</i>	
Quantile Regression Method of House Price Index for Newly Building Condominiums in China .....	159
<i>Lirong Ai (Wuhan Institute of Shipbuilding Technology, China), Saiqi He (Wuhan University of Technology, China), and Shengping Jin (Wuhan University of Technology, China)</i>	
A Hybrid ARIMA—ANN Model for Internet Food Safety Risks .....	163
<i>Wei Wang (Jiangnan University, China) and Jun Sun (Jiangnan University, China)</i>	
Model Checking the Efficiency of Blockchain-Based Edge Computing Network .....	168
<i>Kai Zheng (Taihu University of Wuxi, China), Xiang Yao (Taihu University of Wuxi, China), Zhe Zhang (Taihu University of Wuxi, China), Liyou Fang (Taihu University of Wuxi, China), and Xin Huang (Xi'an Jiaotong-liverpool University, China)</i>	
Development of Classroom Assistant Software Based on Mini Program .....	172
<i>Yucheng Guo (Wuhan University of Technology, China) and Yufei Liang (Yangtze Optical Fiber and Cable Joint Stock Ltd. Co., China)</i>	
Research on Amazon Forest Fire Based on Cellular Automata Simulation .....	175
<i>Weizheng Sun (Hunan University of Science and Technology, China), Wenxiang Wei (Hunan University of Science and Technology, China), Jingyu Chen (Hunan University of Science and Technology, China), and Kaiqi Ren (Hunan University of Science and Technology, China)</i>	
Improved BiLSTM Model for Online Food Safety Risk Prediction .....	179
<i>Zekai Zhang (Jiangnan University, China), Jun Sun (Jiangnan University, China), Li Mao (Jiangnan University, China), and Qidong Chen (Jiangnan University, China)</i>	
Coefficient Optimization Based on Genetic Algorithm for Hybrid Control of Semi-Active Suspension System .....	184
<i>Li Wei (Wuhan University of Technology, China) and Zhang Chencai (Wuhan University of Technology, China)</i>	
Research on Historical Concept Modeling Language and Modeling Tool Based on Model Driven Architecture .....	188
<i>Mingzhu Ma (Wuhan University of Technology, China), Hongxing Liu (Wuhan University of Technology, China), and Zhenqi Li (Wuhan Baijia Cloud Technology Co., Ltd., China)</i>	

Fungal Growth Kinetics Model Based on Carbon Cycle .....	192
<i>Aichen Ni (Wuhan University of Technology, China), Qiang Huang (Wuhan University of Technology, China), and Chuanbin Cheng (Wuhan University of Technology, China)</i>	

## Network Security

Research on Multi-Level Malicious Web Page Recognition Based on Topic Fusion and Improvement of CNN .....	196
<i>Zhou Huang (Wuhan University of Technology, China) and HanBing Yao (Wuhan University of Technology, China)</i>	
Application and Research of Intelligent Security System Based on NFC and Cloud Computing Technology .....	200
<i>Hua Jiang (Shandong Vocational College of Science and Technology, China)</i>	
Research on Network User Behavior Management System Based on Blockchain Technology ...	203
<i>Sun Jianjun (Shandong Vocational College of Science and Technology, China)</i>	
Research on Smart Home Security Threat Modeling Based on STRIDE-IAHP-BN .....	207
<i>Rongrong Zhu (Jiangnan University, China), Xinke Wu (Jiangnan University, China), Jun Sun (Jiangnan University, China), and Zhihua Li (Jiangnan University, China)</i>	

## Other Topics

A High Precision Refresh Method to Improve the Performance of Flash Storage Devices ...	214
<i>Peixuan Li (Qinghai Normal University, China; State Key Laboratory of Tibetan Intelligent Information Processing and Application, China; Key Laboratory of Internet of Things of Qinghai Province, China; Academy of Plateau Science and Sustainability, China), Yaofang Zhang (Qinghai Normal University, China; State Key Laboratory of Tibetan Intelligent Information Processing and Application, China; Key Laboratory of Internet of Things of Qinghai Province, China; Academy of Plateau Science and Sustainability, China), Deli Yin (Chuzhou Polytechnic, China), and Ping Xie (Qinghai Normal University, China; State Key Laboratory of Tibetan Intelligent Information Processing and Application, China; Key Laboratory of Internet of Things of Qinghai Province, China; Academy of Plateau Science and Sustainability, China)</i>	
A Power-On Hardware Self-Test Framework in Web-Based OS .....	218
<i>Hao Xu (National University of Defense Technology, China), Long Peng (National University of Defense Technology, China), Jun Ma (National University of Defense Technology, China), Shasha Li (National University of Defense Technology, China), Jie Yu (National University of Defense Technology, China), and Qingbo Wu (National University of Defense Technology, China)</i>	
Prestress Optimal Design of Deployable Antenna Considering the Effect of Gravity .....	225
<i>Guanlong Su (Xi'an Institute of Space Radio Technology, China), Yang Li (Xi'an Institute of Space Radio Technology, China), Yesen Fan (Xi'an Institute of Space Radio Technology, China), Huanxiao Li (Xi'an Institute of Space Radio Technology, China), and Xiaofei Ma (Xi'an Institute of Space Radio Technology, China)</i>	

Electrostatic Interaction Investigations of the Barnase-Barstar Complex Using Molecular Dynamics Simulation .....	229
<i>Yi Fu (Wuxi City College of Vocational Technology, China; Wuxi Research Center for Environmental Science &amp; Engineering, China), Ji Zhao (Wuxi City College of Vocational Technology, China; Wuxi Research Center for Environmental Science &amp; Engineering, China), and Juan Mei (Wuxi City College of Vocational Technology, China; Wuxi Research Center for Environmental Science &amp; Engineering, China)</i>	
Research on the Method of Leakage Inductance Suppression of High Frequency Transformer of Switching Power .....	233
<i>Jianbin Liu (Wuxi Taihu University, China) and Sha Li (Wuxi Taihu University, China)</i>	
Study on Carbon Sink Value of Marine Resources .....	237
<i>Ying Zou (BNUZ, China), Xinyi Liu (BNUZ, China), and Liying Luo (CPU, China)</i>	
<b>Author Index .....</b>	<b>241</b>