2015 11th International Conference on Computational Intelligence and Security

CIS 2015

Table of Contents

Preface....................................................................................................................................................................xiv
Organizing Committee..............................................................................................................................................xv
Program Committee...............................................................................................................................................xvi
Additional Reviewers............................................................................................................................................xvii

Intelligent Computation

A Recognition Algorithm for Similar Characters on License Plates Based on Improved CNN .................................................................................................................................1
    Shanshan Li and Yimin Li

Algorithm for Distance Constrained Aerial Vehicle Routing Problem: Based on Minimum Spanning Tree and Genetic Computation .................................................................................5
    Zhihua Song, Han Zhang, Wantang Che, and Xiaobin Hui

An Improvement and Application of Genetic BP Neural Network ...........................................................................10
    Juan Yang and Li Huang

Cost-Efficient Divisible Load Scheduling Using Genetic Algorithm .........................................................................14
    Hejun Xuan, Yuping Wang, Shanshan Hao, and Xiaoli Wang

Evaluation Model of Web Service Health Level on End-to-End Network Based on Artificial Immune .........................18
    Liping Chen, Weitao Ha, and Guojun Zhang

Intelligence Computing Technology for UAV’s Autonomy .......................................................................................22
    Pengcheng Wen, Yadi Zhang, Yahui Li, and Xiaoan Li

Interbank Offered Rate Forecasting Using PSO-LS-SVM .......................................................................................26
    Xin Lin and Yizhou Tang

Memory Based Differential Evolution Algorithms for Dynamic Constrained Optimization Problems .........................30
    Chenggang Cui, Feng Tian, Ning Yang, and Junfeng Chen
Predicting Algorithm of RNA Folding Structure with Pseudoknots .........................................................34
Zhendong Liu, Daming Zhu, and Qionghai Dai

Solving Linear Bilevel Programming Problems Using a Binary Differential Evolution .........................................................38
Hong Li and Li Zhang

Study on Emergency Relief VRP Based on Clustering and PSO .................................................................43
Yong He, Jiechang Wen, and Meihua Huang

Teaching-Learning Based Optimization Algorithm Based on Course by Course Improvement .................................................................48
Dapeng Qu, Shuwen Liu, Di Zhang, Jun Wang, and Chengxi Gao

Waste Electrical Recycling Network Optimum Design under the Carbon Cap Constraint .................................................................53
Yushi Guo, Zuqing Huang, and Yuxiang Yang

Learning Algorithms

A Hybrid Image Feature Descriptor for Classification .................................................................58
Hassan Dawood, Hussain Dawood, and Ping Guo

A Novel SVM-Based Reduced NN Classification Method .................................................................62
Chi-Chun Huang and Hsin-Yun Chang

Fault Diagnosis Based on Prior Knowledge for Train Air-Conditioning Unit .................................................................66
Yu Liu, Xinhong Hei, Jinwei Zhao, Yikun Zhang, and Guo Xie

Improved Electromagnetism-Like Algorithm for Nonlinear Bilevel Programming Problem .................................................................70
Aihong Ren and Xingsi Xue

Model of Environmental Reason Analysis and Prevention of Stroke on Linear Regression .................................................................74
Tianxiang Feng and Qiujie Zhang

Network Traffic Classification with Improved Random Forest .................................................................78
Chao Wang, Tongge Xu, and Xi Qin

On Locating All Local Minima of Multidimensional Function for Box Constrained .................................................................82
Jie Liu

Recycling BiCG for Families of Shifted Linear Systems .................................................................86
Jing Meng and Houbiao Li

Research on Mobile Learning Platform Construction in Higher Vocational Colleges Based on Cloud Computing .................................................................91
Jing Nie
Robust Stability of Uncertain Nonlinear Delay Segmentation System Based on Delay .................................................................95

Shan Sun and Ruliang Wang

Study on the Convergence of Solving Linear Equations by Gauss-Seidel and Jacobi Method ..........................................................100

Hongxia Liu and Tianxiang Feng

**Intelligent Systems and Complex Systems**

A 2-Approximation Algorithm for the Single Machine Due Date Assignment Scheduling Problem in Fuzzy Environment to Minimize the Total Costs .................................................................104

Jinquan Li and Jinhua Zhang

A Quantity-Flexibility Contract in Two-Stage Decision with Supply Chain Coordination ........................................................................109

Xin Li

A Robust Quasi-Dense Wide Baseline Matching Method ..................................................................................................................113

Wei Wang, Hai Zhu, and Xiaoli Wang

An Effective Energy-Based Multi-view Piecewise Planar Stereo Method ..........................................................................................117

Hai Zhu, Wei Wang, Xiaoli Wang, and Fei Wei

An Efficient Address Mapping Algorithm for Multichannel Structure SSD ......................................................................................121

Xiaole Cai, Yahui Li, Yadi Zhang, and Peng Li

Design and Implementation of Embedded Remote Control System in High-Precision Time Data Acquisition .........................................125

Zhao Fang, Jianjun Zhao, Haifeng Tang, and Guangmin Wu

Dynamic Quaternary Circuit with Neuron-MOS Transistor .................................................................................................................129

Guoqiang Hang, Yang Yang, Xuanchang Zhou, Xiaohui Hu, and Danyan Zhang

Parallel Large Average Submatrices Biclustering Based on MapReduce ..............................................................................................134

Qin Lin, Yun Xue, Wensheng Chen, Shuqun Ye, Wanli Li, and Jingjing Liu

Reconfigurable Computing Availability and Developing Trends ........................................................................................................138

Yulin Hai, Xiaodong Zhao, and Yongqiang Liu

**Pattern Recognition and Knowledge Discovery**

3D Video Coding Using Just Noticeable Depth Difference Based on H.265/HEVC ..................................................................................142

Yuejin Bai, Yana Zhang, and Zhaohui Li

A Hybrid Approach for Reducing Textual Formal Context Based on Thesaurus ...............................................................................146

Wei He, Shuang Li, and Xiaoping Yang


Jingzhe Wang, Yue Cheng, Jianchun Xie, and Wensheng Niu
A Retinex Algorithm for Image Enhancement Based on Recursive Bilateral Filtering .................................................................154
  Di Li, Yadi Zhang, Pengcheng Wen, and Linting Bai
A Wavelet Image Denoising Based on the New Threshold Function ..................................................................................................................158
  Guanghui Deng and Zengli Liu
An Improved Image Denoising Method Applied in Resisting Mixed Noise Based on MCA and Median Filter ..........................................................162
  Xiangyu Deng and Zengli Liu
Application of Image Classification Technology in Mangrove Information Extraction ...........................................................................................167
  Shulei Wu, Liya Dong, Huandong Chen, and Jinmei Zhan
Image Denoising Based on the Bivariate Model of Dual Tree Complex Wavelet Transform .............................................................................................171
  Fuqiang Zhang and Zengli Liu
Image Reconstruction Algorithm for Modified SART Based on PM Model ..............................................................................................175
  Jie Liang, Wenzhang He, Dongjiang Ji, and Lina Wang
Image Retargeting Based on a New Salient Region Detection Method .................................................................................................................179
  Jing Li, Weiwei Wang, and Xiaoping Li
Monitoring the Deformation of the Facade of a Building Based on Terrestrial Laser Point-Cloud ...........................................................................183
  Xu Zhao, Fei Deng, Hua Liang, and Long Zhou
Multi-direction Edge Detection Operator ..................................................................................................................................................187
  Pengfei Xu, Qiguang Miao, Tiange Liu, and Xiaojiang Chen
Nonlinear Nonnegative Matrix Factorization Based on Discriminant Analysis with Application to Face Recognition ................................................................191
  Wensheng Chen, Yang Zhao, Binbin Pan, and Chen Xu
PCANet for Blind Image Quality Assessment ..............................................................................................................................................195
  Huizhen Jia, Quansen Sun, and Tonghan Wang
Some Properties of (F-K)-Convex Mapping in Vector Spaces ..............................................................................................................................199
  Yuhui Liu
Study of Edge Detection Based on SQI Algorithm and Morphology ..................................................................................................................203
  Guanghui Deng and Zengli Liu

Data Mining
A Feature Subset Selection Algorithm Based on Feature Activity and Improved GA ...............................................................................................................206
  Juan Li
A Method of Circle Curve Fitting Based on the Cumulative Error of the Radius
Error ..........................................................................................................................................................211
  Chunlong Fan, Chang Liu, Guohui Ding, and Li Xu

Analysis of Sunspot Time Series (1749-2014) by Means of 0-1 Test for Chaos Detection ...................................................................................................................................................215
  Qingtai Xiao, Shibo Wang, Zhan Zhang, and Jianxin Xu

Content-Based Image Retrieval for Medical Image .................................................................219
  Kaimei Zheng

Identifying Influential Actors in Social Network Platforms .................................................223
  Qin Liu, Zhongwei Ma, Xiaowen Yang, and Hongming Zhu

Nonconvex Low-Rank Sparse Factorization for Image Segmentation ........................................227
  Xiaoping Li, Weiwei Wang, Amir Razi, and Tao Li

Optimizing Ontology Alignment by Using Compact Genetic Algorithm ................................231
  Xingsi Xue, Jianhua Liu, Pei-Wei Tsai, Xianyin Zhan, and Aihong Ren

Research Methods of Sensors Validation Based on Naïve Bayesian Classifier .......................235
  Peng Sun, Ziyan Wu, Haifeng Yang, Zhengfeng Ming, and Xin Guo

Robust Object Tracking Enhanced by Correction Dictionary .............................................239
  Yanan Zhang and Yao Lu

Saliency Detection via Nonconvex Regularization Based Matrix Decomposition ...................243
  Zhixiang He, Xiaoli Sun, Xiujuan Zhang, and Chen Xu

Optimization Theory and New Methods

4G Heterogeneous Networks Base Station Planning Using Evolutionary Multi-objective Algorithm ..............................................................248
  Xueyi Liang, Hailin Liu, and Qiang Wang

A Differential Evolution Algorithm Based on Local Search and Boundary Reflection for Global Optimization ..........................................................253
  Hongwei Lin

A Fuzzy Multi-objective Portfolio Selection Model with Transaction Cost and Liquidity .......................................................................................258
  Wei Yue and Yuping Wang

A Hybrid Algorithm for Global Optimization ..............................................................................262
  Fei Qin and Jie Liu

A Novel Differential Evolution Algorithm with K-Means and Simplex Search Method for Absolute Value Equations .............................................266
  Jing Li and Baoming Qiao

A Novel Evolutionary Algorithm Based on Decomposition and Adaptive Weight Adjustment for Synthesis Gas Production ................................270
  Cai Dai and Xiujuan Lei
Adaptive Differential Evolution Algorithm Based on Gradient and Polar Coordinates Search Strategies .................................................................274
  Jun Yang, Jingxuan Wei, and Jiang Liu
Construction of Pooling Designs with Affine Symplectic Space ...............................................................278
  Haixia Guo
Cooperative Co-evolution with Formula Based Grouping and CMA for Large Scale Optimization ............................................................282
  Haiyan Liu, Shiwei Guan, Fangjie Liu, and Yuping Wang
Evolutionary Many-Objective Optimization Algorithm Based on Improved K-Dominance and M2M Population Decomposition .................................................286
  Shuiqin Dai, Hailin Liu, and Lei Chen
MOEA/D with Adaptive Weight Vector Design ..............................................................................................291
  Xiaofang Guo, Xiaoli Wang, and Zhen Wei
Target-Vector Based Particle Swarm Optimization for Multi-objective Bilevel Programming Problem ..............................................................295
  Liping Jia, Guocheng Zou, and Zhonghua Li

Access Control and Protection
A Novel Detection Algorithm for Ring Oscillator Network Based Hardware Trojan Detection with Tactful FPGA Implementation .................................................................299
  Kaige Qu, Liji Wu, and Xiangmin Zhang
A Novel Multi-classification Intrusion Detection Model Based on Relevance Vector Machine ..................................................................................303
  Jianguo Jiang, Xiang Jing, Bin Lv, and Meimei Li
A Two-Stage Process Based on Data Mining and Optimization to Identify False Positives and False Negatives Generated by Intrusion Detection Systems ..................................................................................308
  Hachmi Fatma and Mohamed Limam
Protocol Reverse Engineering Using LDA and Association Analysis ........................................................312
  Haifeng Li, Bo Shuai, Jian Wang, and Chaojing Tang
Software Vulnerability Detection Based on Code Coverage and Test Cost ..................................................................................317
  Bo Shuai, Haifeng Li, Lei Zhang, Quan Zhang, and Chaojing Tang

Cryptography and Cryptanalysis
A New SPA Attack on ECC with Regular Point Multiplication ..................................................................................322
  Lihui Wang, Qing Li, Gang Zhang, Jun Yu, Zhimin Zhang, Limin Guo, and David Wei Zhang
An Efficient Identity-Based Signature Scheme for Vehicular Communications ..........................................................326
  Yaling Zhang, Liang Yang, and Shangping Wang
Combined Attack on Blinded Fault Resistant Exponentiation Algorithm and Efficient Countermeasure ..........................................................331  
Liangjian Su, Wei Guo, and Zheng Guo

Design of Parallel Algorithms for Super Long Integer Operation Based on Multi-core CPUs .................................................................335  
Shifeng Zhang and Shenghui Su

Further Attacks and Improvement of a Certificateless Signature Scheme ..........................................................340  
Bo Yang, Zhao Yang, Nengfei Liu, and Shougui Li

The Design of a Key Expansion Algorithm Based on Dynamic Dislocation Counts .................................................................345  
Zhouquan Du, Qijian Xu, Jie Zhang, and Xudong Zhong

Data Security and Integrity

A Chosen - Plaintext Differential Power Analysis Attack on HMAC - SM3 ..........................................................350  
Limin Guo, Lihui Wang, Dan Liu, Weijun Shan, Zhimin Zhang, Qing Li, and Jun Yu

Differential Power Analysis on Dynamic Password Token Based on SM3 Algorithm, and Countermeasures ..........................................................354  
Limin Guo, Lihui Wang, Qing Li, Jun Yu, and Peng Luo

Dynamic Tracking Reinforcement Based on Simplified Control Flow ..........................................................358  
Jiani Li, Donghai Tian, and Changzhen Hu

Perceptual Audio Hashing Using RT and DCT in Wavelet Domain ..........................................................363  
Jinfeng Li and Tao Wu

Towards a Built-In Digital Forensics-Aware Framework for Web Services ..........................................................367  
Aymen Akremi, Hassen Sallay, Mohsen Rouached, Mohamed-Fouad Sriti, Mohamed Abid, and Rafik Bouaziz

Information System Safety

A Circuit Design of SMS4 against Chosen Plaintext Attack ..........................................................371  
Jiachao Chen, Qin Wang, Zheng Guo, Junrong Liu, and Haihua Gu

A Generalized Stability Theorem for Continuous Chaos Systems and Design of Pseudorandom Number Generator ..........................................................375  
Xue Wang, Lequan Min, and Mei Zhang

A Template Attack-Resistant Masking Scheme for RC4 Based on FPGA ..........................................................381  
Shaozhang Zhang, Lijin Wu, Xiangmin Zhang, Xingjun Wu, Xiangyu Li, and Huajun Fang

Concolic Execute Fuzzing Based on Control-Flow Analysis ..........................................................385  
Jingxi Li, Xin Xu, Lejian Liao, and Lu Li
### Dynamic Defense Architecture for the Security of the Internet of Things
Caiming Liu, Yan Zhang, Zhonghua Li, Jiandong Zhang, Hongying Qin, and Jinquan Zeng

---

### Improving Second-Order DPA Attacks with New Modeled Power Leakages
Miao Yuan and Guoqiang Bai

---

### Software Hardware Co-design for Side-Channel Analysis Platform on Security Chips
Qian Lei, Liji Wu, Shaohui Zhang, Xiangmin Zhang, Xiangyu Li, Liyang Pan, and Zhimeng Dong

---

## Network and Wireless Security

### A Combination of Timing Attack and Statistical Method to Reduce Computational Complexities of SSL/TLS Side-Channel Attacks
Jing Wang, Ying Yang, Lijuan Chen, Guang Yang, Zhenya Chen, and Liqiang Wen

### An Online Flow-Level Packet Classification Method on Multi-core Network Processor
Wei Li and Xiufen Yu

### DDoS Attack Detection Using Flow Entropy and Clustering Technique
Xi Qin, Tongge Xu, and Chao Wang

### Exact Physical Layer Security in SIMO Wiretap Channels with Antenna Correlation
Jingbo Jiao, Gangcan Sun, Zhuo Han, and Zhongyong Wang

---

## Security Methodologies and Management

### A New Minimum Exposure Path Problem and Its Solving Algorithm
Miao Ye, Meiling Zhao, and Xiaohui Cheng

### A Software Assessment Method Based on Relevance Vulnerability
Xudong Miao, Yongchun Wang, Xingchen Cao, Binbin Qu, Sheng Jiang, and Feng Fang

### An Efficient Trusted Chain Model for Real-Time Embedded Systems
Yahui Li, Yadi Zhang, Peng Li, and Peng Guo

### An Enhanced Reconfiguration Method for the Second Generation Integrated Modular Avionics
Le Wang, Yunmin Sun, Peng Guo, and Yadi Zhang

### Immunity-Based Detection for Large-Scale Behavior of Denial of Service
Yan Zhang, Caiming Liu, Zhonghua Li, Hongying Qin, Qin Li, and Jinquan Zeng

### Strategies for Analysis against Redundant Reused Codes in Safety-Critical Software
Xiao Liang
System Analysis and Modeling

A Research on the Localization Technology of Wireless Sensor Networks
Employing TI's CC2530 Instrument ........................................................................................................446
  Yingjiu Guo and Xuemei Liu

Application of an Improved Method of Wavelet Transform in Image Edge Detection ..................................................450
  Shulei Wu, Zongan Zhang, Huandong Chen, and Jinmei Zhan

Data-Based Health State Analysis for the Axle of High Speed Train ..........................................................454
  Guo Xie, Minying Ye, Xinhong Hei, Jinwei Zhao, and Fucai Qian

Experimental Analysis on CTT-SP Algorithm for Intermediate Data Storage in Scientific Workflow Systems ........................................458
  Lei Fan, Sha Meng, Yanfang Liang, and Xiyang Liu

Method of Multi-resolution and Effective Singular Value Decomposition in Under-determined Blind Source Separation and Its Application to the Fault Diagnosis of Roller Bearing ........................................................................462
  Baitong Zhou and Zengli Liu

Research on Rural Population Flow of China's County Urbanization ........................................................................466
  Wenxue Niu, Congmou Yuan, and Dansong Zhang

Research on Semantic Representation to Promote the Correlation of Instructional Micro Video .................................................470
  Mi Wang and Dong Kang

Research on Storage and Retrieval Method of Mass Data for High-Speed Train .........................................................474
  Bin Wang, Fan Li, Xinhong Hei, Weigang Ma, and Lei Yu

Research on the Influence Factors of Entrepreneurial Environment ........................................................................478
  Qian Xu, Yajuan Yang, and Quanju Zhang

Toward Automatic Calculation of Construction Quantity Based on Building Information Modeling ........................................482
  Qin Zhao, Yuchao Li, Xinhong Hei, and Xiaofan Wang

Author Index ............................................................................................................................................486