PROGRAMME

The 10th International Symposium on Intelligence Computation and Applications

(ISICA 2018)

October 13-14, 2018, Jiujiang, China

Hosted by Jiujiang University

九江學院 JIUJIANG UNIVERSITY　武漢大學 WUHAN UNIVERSITY　Springer

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About the Conference

The 10th International Symposium on Intelligence Computation and Applications 2018 (ISICA 2018) to be held on October 13-14, 2018 at Jiujiang University, Jiujiang, China, will serve as a forum to present current work by researchers and software developers from around the world as well as to highlight activities in the Intelligence Computation and Applications area. It aims to bring together research scientists, application pioneers, and software developers to discuss problems and solutions and to identify new issues in this area. The conference will emphasize both design and analysis of Intelligence algorithms, tools, platforms, and their scientific, engineering, medical and industrial applications.

Sponsored by the China University of Geosciences (CUG), ISICA has successfully held nine times since 2005, and presented eight proceedings, including ten volumes of LNCS/CCIS by Springer and three books by China University of Geosciences Press. The details of the ten volumes of LNCS/CCIS by Springer are as follow: ISICA 2017 (CCIS 873 and CCIS 874), ISICA 2015 (CCIS 575), ISICA 2012 (CCIS 316), ISICA 2010 (LNCS 6382 and CCIS 107), ISICA 2009 (LNCS 5821 and CCIS 51), ISICA 2008 (LNCS 5370), ISICA 2007 (LNCS 4683).

Proceedings of ISICA 2018 will be published by Springer as a volume of CCIS (http://www.springer.com/series/7899). CCIS has been indexed by both EI and ISTP according to the previous ISICA proceedings index results.

ISICA 2018 Organization

Honorary Chairs	Zhangxin Chen, University of Calgary, Canada Qingfu Zhang, City University of Hong Kong, China
General Chair	Changshou Deng, Jiujiang University, China Zhijian Wu, Wuhan University, China Yong Liu, University of Aizu, Japan
Program Chairs	Yuanxiang Li, Wuhan University, China Lixin Ding, Wuhan University, China Kangshun Li, South China Agricultural University, China
Publicity Chairs	Xiaogang Dong, Jiujiang University, China Hui Wang, Nanchang Institute of Technology, China Xinyu Zhou, Jiangxi Normal University, China
Local Chair	Hu Peng, Jiujiang University, China

Secretaries

Feipeng Wang	Haiyan Huang
Juan Zhu	Xiaojing Wang
Yan Zhang	Youxue Zhou
Yan Liu	Jianqiang Chen

Technical Program

Schedule Overview

Saturday, Oct. 13	ISICA 2018 Programme（议政厅）
8:00-8:30	Sign In
8:30-9:00	Opening Ceremony
9:00-9:20	Group Photograph Taking
9:20-10:10	Keynote Speech (1)　Kay Chen Tan
10:10-10:20	Coffee break
10:20-11:10	Keynote Speech (2)　Yong Liu
11:10-12:00	Keynote Speech (3)　Aimin Zhou
12:00-13:30	Lunch
13:30-14:20	Keynote Speech (4)　Feng Wang
14:20-15:10	Keynote Speech (5)　Changhe Li
15:10-15:30	Coffee break
15:30-18:00	Oral Presentation（二号、三号会议室）
18:00	Best paper award ceremony
18:10	Banquet（议政厅）

40 minutes for Keynote Speech and 10 minutes for questions;
7 minutes for Oral Presentation and 3 minutes for questions

Technical Program

Schedule Overview

Sunday, Oct. 14	ISICA 2018 Programme（议政厅）
9:00-11:00	Poster Presentation
12:00-14:00	Lunch
14:00	Conference Close

40 minutes for Keynote Speech and 10 minutes for questions;
7 minutes for Oral Presentation and 3 minutes for questions.

Keynote Speech Overview

Saturday, Oct. 13

9:20-10:10 Keynote Speech (1) Kay Chen Tan

Session Chair: Prof. Changshou Deng

10:10-10:20 Coffee break

10:20-11:10 Keynote Speech (2) Yong Liu

Session Chair: Prof. Zhijian Wu

11:10-12:00 Keynote Speech (3) Aimin Zhou

Session Chair: Prof. Zhijian Wu

13:30-14:20 Keynote Speech (4) Feng Wang

Session Chair: Prof. Yong Liu

14:20-15:10 Keynote Speech (5) Changhe Li

Session Chair: Prof. Yong Liu

15:10-15:30 Coffee break

15:30-18:00 Oral Presentation（二号会议室）

Session Chair: Prof. Zhijian Wu

15:30-18:00 Oral Presentation（三号会议室）

Session Chair: Prof. Yong Liu

Sunday, Oct. 14

9:00-11:00 Poster Presentation （议政厅）

Session Chair: Prof. Changshou Deng

Keynote Speakers (1)

Kay Chen Tan
Professor
Department of Computer Science
City University of Hong Kong
Email: kaytan@ cityu.edu.hk

Title: Advances in Evolutionary Dynamic Multi-objective Optimization

Abstract:

Multi-objective optimization involves simultaneous optimization of two or more objective functions that are conflicting in nature, which results in a set of trade-off solutions for a given optimization problem. Evolutionary algorithms are capable of finding a diverse set of solutions in a single simulation run due to their population-based nature; therefore making them popular for solving multi-objective optimization problems. However real-world optimization problems often involve objective functions, decision variables, and constraints that may change over time. Dynamic multi-objective optimization problems thus require evolutionary algorithms to be capable of detecting changes in the problem's environment, and robustly track the changing optimal solutions to achieve a faster convergence while maintaining diversity of the solutions. In this presentation, various prediction-based strategies such as Kalman filter and Mixture-of-Experts for solving evolutionary dynamic multi-objective optimization

problems will be discussed, These prediction models can learn the patterns from previous experience and predict future changes, i.e., such predictions help to guide the search towards the changed optima; thereby accelerating the convergence. To handle dynamic multi-objective optimization problems in constrained scenarios, an adaptive threshold-based constraint handling mechanism which is utilized together with the dynamic handling strategies will also be presented.

Biography:

Prof. TAN Kay Chen received the B.Eng. degree (First Class Hons.) and the Ph.D. degree from the University of Glasgow, U.K., in 1994 and 1997, respectively. He is a Professor with the Department of Computer Science, City University of Hong Kong, Hong Kong. He has published over 130 journal papers and over 130 papers in conference proceedings, and co-authored six books. His current research interests include artificial/computational intelligence and machine learning, with applications to evolutionary multi-objective optimization, data analytics, prognostics, BCI, and operational research etc.

He is the Editor-in-Chief of IEEE Transactions on Evolutionary Computation (IF: 10.629), was the EiC of IEEE Computational Intelligence Magazine (2010-2013), and currently serves on the Editorial Board of over 10 international journals such as IEEE Transactions on Cybernetics, IEEE Transactions on Computational Intelligence and AI in Games, Evolutionary Computation (MIT Press) etc. He has been an invited Keynote/Plenary speaker for over 60 international conferences and was the General Co-Chair for IEEE World Congress on Computational Intelligence (WCCI) 2016 in Vancouver, Canada. He also serves as the General Co-Chair for IEEE Congress on Evolutionary Computation (CEC) 2019 in Wellington, New Zealand.

He is a Fellow of IEEE, an elected AdCom member of IEEE Computational Intelligence Society (2014-2019), and an IEEE Distinguished Lecturer (2011-2013; 2015-2017). He received the 2016 IEEE Transactions on Neural Networks and Learning Systems Outstanding Paper Award. He was the awardee of the 2012 IEEE Computational Intelligence Society Outstanding Early Career Award for his contributions to evolutionary computation in multi-objective optimization. He also received the Recognition Award (2008) from the International Network for Engineering Education & Research (iNEER)

for his outstanding contributions to engineering education and research.

Websites:

http://www6.cityu.edu.hk/stfprofile/kaytan.htm

Keynote Speakers (2)

Yong Liu
Professor
System Intelligence Laboratory
The University of Aizu
Email: yliu@u-aizu.ac.jp

Title: The Return of Evolutionary Artificial Neural Networks

Abstract:

With the great excitement over deep learning techniques, evolutionary computing has to play a supporting or minor role to deep learning (DL) machines and their huge success in the last few years. Now evolutionary artificial neural networks (EANNs) are making a comeback. EANNs are within artificial intelligence (AI) and machine learning (ML), which seek to evolve neural networks through evolutionary algorithms that apply an evolutionary process similar to the one producing our brains. Like DL, EANNs were introduced decades ago, and are currently experiencing a similar boost from available hardware processing power and big data. We believe that EANNs may well be the next big thing in AI technology.

Different to DL that focuses on modeling what we already know, EANNs focus on creating new knowledge. For examples, DL makes it possible to recognize new instances of objects and speech within familiar categories, EANNs make it possible to discover entirely new objects and behaviors. Therefore, EANNs make a host of new applications possible. In this speech, I will convey some breakthrough technologies of EANNs, and

provide insight into their issues. I hope that this speech will open a window for the young researchers into the quest to evolve brains within computers.

Biography:

Yong Liu is currently a Senior Associate Professor at the University of Aizu, Japan. He received the Ph.D. degrees from Wuhan University, China, and the University of New South Wales, Australia, in 1994, and 1999, respectively. He was a Lecturer at Wuhan University from November, 1994 to March 1999. He was a visiting fellow at Australian Defence Force Academy from September 1994 to December 1995. He was a researcher fellow at Electrotechnical Laboratory, Agency of Industrial Science and Technology (AIST), Ministry of International Trade and Industry (MITI), Japan. He held visiting positions at the University of Birmingham, UK, in from 2003 to 2004, and at the China University of Geosciences (CUG), Wuhan, from 2007 to 2009.

He has been working in the field of computational intelligence for over 20 years. He has over 100 publications in the technical literature, including five papers in IEEE Transactions. He is one of authors of the book "Non-numerical Parallel Algorithms (II): Genetic Algorithms" by Science Press, Beijing. He is also one of editors for 13 volumes published by Springer.

He was the Program Co-Chair of the 4th and the 7th International Conference on Evolvable Systems: From Biology to Hardware (ICES 2001 and ICES 2007), Program Co-Chair of the past 8 events of International Symposium on Intelligence Computation and Applications (ISICAs) from 2007 to 2017, Program Co-Chair of the first International Workshop on Aware Computing (IWAC 2009) and the second International Symposium on Aware Computing (ISAC 2010), Program Co-Chair of the 13th International Conference on Natural Computation, Fuzzy Systems and Knowledge Discovery (ICNC-FSKD 2017).

Websites:

https://www.u-aizu.ac.jp/research/faculty/detail?cd=90020&lng=en

Keynote Speakers (3)

Aimin Zhou
Professor
School of Computer Science and Software Engineering,
East China Normal University
Email: amzhou @cs.ecnu.edu.cn

Title: Learning Guided Evolutionary Multiobjective Optimization

Abstract:

Learning guided evolutionary optimization utilizes statistical & machine learning techniques to assist the evolutionary algorithms. The learning techniques can be used to extract the problem and algorithm information online and thus to improve the algorithm performance. When using learning techniques in evolutionary algorithms, there arises a variety questions, such as why using learning techniques, which learning techniques to use, and how to use learning techniques. In this talk, we firstly try to answer these questions by some analysis. Then from the angle of algorithm design, i.e., initialization, reproduction, selection, stop condition, and algorithm tuning, we give some examples to show how to applying learning techniques to evolutionary multiobjective optimization.

Biography:

Dr. Aimin Zhou is currently a Professor with the Department of Computer Science and Technology, East China Normal University, Shanghai, China. He received the B.Sc. and M.Sc. degrees from Wuhan University, Wuhan, China, in 2001 and 2003, respectively,

and the Ph.D. degree from University of Essex, Colchester, U.K., in 2009, all in computer science. His research interests include evolutionary computation and optimization, machine learning, image processing, and their applications. He has published over 50 peer-reviewed papers, and received the best paper award in IES 2014. He is an Associate Editor of the Swarm and Evolutionary Computation, the Complex & Intelligent Systems, and the Swarm Intelligence and Numerical Methods.

Websites:

http://faculty.ecnu.edu.cn/s/1949/t/22631/main.jspy

Keynote Speakers (4)

Feng Wang
Associate Professor
School of Computer Science,
Wuhan University

Title: External Archive Matching Strategy for MOEA/D

Abstract:

Multiobjective evolutionary algorithms based on decomposition (MOEA/D) decompose a multiobjective optimization problem (MOP) into a group of subproblems and optimizes them at the same time. The reproduction method in MOEA/D, which generates offspring solutions, has crucial effect on the performance of algorithm. As the difficulties of MOPs increases, it requires much higher efficiency for the reproduction methods in MOEA/D. However, for the complex optimization problems whose PS shape is complicated, the original reproduction method used in MOEA/D might not be suitable to generate excellent offspring solutions. In order to improve the property of the reproduction method for MOEA/D, this paper proposes an external archive matching strategy which selects solutions' most matching archive solutions as parent solutions. The offspring solutions generated by this strategy can maintain a good convergence ability. To balance convergence and diversity, a perturbed learning scheme is used to extend the search space of the solutions. The experimental results on three groups of test problems reveal that the solutions obtained by MOEA/D-EAM have better convergence and diversity than the other four state-of-the-art algorithms..

Biography:

Feng Wang is currently an associate professor of School of Computer Science in Wuhan University. She received her B.Sc. and Ph.D. degrees in Computer Science from Wuhan University in June 2003 and June 2008, respectively. Her current research interests mainly include Machine Learning and Computational Intelligence. She has published more than 50 papers in several academic journals and conferences. She serves as a reviewer for several IEEE Transactions, international journals and conferences. She is a member of IEEE and ACM.

Websites:

https://fengwangwhu.github.io/

Keynote Speakers (5)

Changhe Li
Professor
School of Automation,
China University of Geosciences

Title: Designing Multi-Population Methods: The Challenges

Abstract:

The multi-population method has been widely used in dynamic optimization, multi-modal optimization, large scale optimization, and multi-objective optimization. However, to efficiently solve problems, several challenging issues should be addressed, such as the adaptation of the number of populations, resources allocation, determination of the moment to react to changes. In this talk, we will discuss these challenges and show two adaptive frameworks for the control of the number of populations and resources allocation, respectively. We will also present a general framework for producing benchmark test suites in continuous domain. The framework is able to generate problems with different properties, e.g., multi-modal, dynamic, multi-objective, constrained, etc.

Biography:

Prof. Changhe Li is with the School of Automation of China University of Geosciences (Wuhan). He has received Hubei Chutian Scholar Program and Young Talents Program of CUG. He is currently the chair of the Task Force on Evolutionary Computation in

Dynamic and Uncertain Environments (ECiDUE) Association of the IEEE Evolutionary Computation Technical Committee, Associate Editor of Swarm of Evolutionary Computation.

He received the bachelor and master degrees in computer science and technology from the School of Computer Science, China University of Geosciences (Wuhan) in 2005 and 2008, respectively, and the Ph.D in computer science from the University of Leicester, U.K. in 2011. His research interests include swarm intelligence, evolutionary computation, dynamic optimization, multi-objective optimization, and swarm robotics. He hosted two projects of the National Natural Science Foundation of China and published more than 50 academic papers with over 2200 Google Scholar citations, including top journals in the field of evolutionary computing, e.g., IEEE Transactions on Evolutionary Computation, Evolutionary Computation (MIT), IEEE Transactions on Cybernetics, Information Sciences. Three papers have been included in the ESI Highly Cited Papers Database.

Websites:

http://grzy.cug.edu.cn/cli/zh_CN/zhym/20497/list/index.htm

Oral Presentation

Saturday, Oct. 13
3:30-6:00PM

Presentation Track A
Presentation Venue: No. 2 Conference (二号会议室)
Chair: Prof. Zhijian Wu

1. A Novel Discrete Grey Wolf Optimizer for Solving the Bounded Knapsack Problem

Zewen Li, Yichao He, Huanzhe Li, Ya Li and Xiaohu Guo

Grey Wolf Optimizer (GWO) is a recently proposed metaheuristic optimizer inspired by the leadership hierarchy and hunting mechanism of grey wolves. In order to solve the bounded knapsack problem by the GWO, a novel Discrete Grey Wolf Optimizer (DGWO) is proposed in this paper. On the basis of DGWO, a crossover strategy of genetic algorithm is introduced to enhance the local search ability, and the infeasible solutions are processed by the Repair and Optimization method based on the greedy strategy, which could not only ensure the effectiveness but also speed up the convergence. Experiment using three kinds of large-scale instances of the bounded knapsack problem is carried out to verify the validity and stability of DGWO. By comparing and analyzing the results with other well-established algorithms, the computational results show that the convergence speed of DGWO is faster than that of other algorithms, the solutions of these instances of bounded knapsack problem are all well obtained with approximation ratio bound close to 1.

2. A Binary Particle Swarm Optimization for solving the Bounded Knapsack Problem

Ya Li, Yichao He, Xiaohu Guo and Zewen Li

Bounded knapsack problem (BKP) is a classical knapsack problem. At present, methods for solving the BKP are mainly deterministic algorithms. The literature that evolutionary algorithms are used to solve the BKP has not been reported. Therefore, this paper uses a binary particle swarm optimization (BPSO) to solve the BKP. On the basis of using the repair and optimization method to deal with the infeasible solutions, an effective method of using BPSO to solve the BKP is given. For three kinds of large-scale BKP instances, the feasibility and efficiency of the proposed method based on BPSO are verified by comparing the results with whale optimization algorithm and genetic algorithm. The experimental results show that BPSO is not only more stable, but also can obtain the approximation ratio closer to 1.

3. Analysis of optimization capability of selection operator for DE algorithm

Liu Huichao and Yang Fengying

Differential Evolution Algorithm (DE) is an intelligent algorithm widely used in recent years. Many scholars have studied DE algorithm from many aspects, such as theory and application. Selection operator using greedy strategy is an important part of DE algorithm. Traditionally thought, the DE selection operator is only a means to maintain effective population evolution of DE. In fact, the DE selection operator also has some capability to optimize. For this reason, this paper constructs some DE variants, and compares the optimization results of them with the standard DE algorithm. Simulation results show that the new algorithm which only using greedy selection can achieve certain optimization results, meanwhile, DE algorithm which removing its greedy selection operator only has poor performance. This proves that DE selection operator has certain optimization capability.

4. Chinese Text Classification Based on Character-level CNN and SVM
Huaiguang Wu, Daiyi Li and Ming Cheng

With the rapid development of the Internet, the high dimensional text data has increased rapidly. How to build an efficient and extensible text classification algorithm has become a hot topic in the field of data mining. Aiming at the problems of high feature dimension, sparse data and long computation time in traditional SVM classification algorithm based on TF-IDF (Term Frequency-Inverse Document Frequency), we propose a novel hybrid system for Chinese text classification: CSVM, which is independent of the hand-designed features and domain knowledge. Firstly, the encoding words are done by constructing a text vocabulary of size m for the input language, and then quantize each word using 1-of-m encoding. Secondly, we exploit the CNN (Convolutional Neural Network) to extract the morphological features of character vectors from each word, and then through large scale text material training the semantic feature of each word vectors are be obtained the semantic feature of each word vectors. Finally, the text classification is carried out with the SVM multiple classifier. Testing on a text dataset with 10 categories, the experimental results show that the CSVM algorithm is more effective than other traditional Chinese text classification algorithm.

5. Enhanced Fireworks Algorithm with an improved Gaussian Sparks Operator
Jinglei Guo and Wei Liu

As a population-based intelligence algorithm, firework algorithm simulates the firework's explosion process to solve optimization problem. A comprehensive study on Gaussian spark operator in enhanced firework algorithm (EFWA) reveals that the search trajectory is limited by the difference vector and the diversity of swarm is not effectively increased by new sparks adding. An improved version of EFWA(IEFW) is proposed to overcome these limitations. In IEFWA, a new Gaussian spark operator utilizes the location information of the best firework and randomly selected firework to calculate the center position and explosion amplitude, which enhance the search for potential region. Experiments on 20 well-known benchmark functions are

conducted to illustrate the performance of IEFWA. The results turn out IEFWA outperforms EFWA and dynFWA on most testing functions.

6. A Hybrid Algorithm Based on Firefly and Fireworks

Xiaojing Wang, Hu Peng and Changshou Deng

Firefly algorithm (FA) is a global optimization algorithm with simple, less parameter and faster convergence speed. However, the FA is easy to fall into local optimum, and the solution accuracy of the FA is lower. In order to overcome these problems, a hybrid algorithm based on Firefly and Fireworks (FWFA) is proposed in this paper. The algorithm in the neighborhood search framework model, learning the neighborhood search strategy of the Fireworks algorithm (FWA), join the neighborhood search operator of the fireworks style into the FA, to enhance the local exploitation ability of the FA, and re design the generation method of the population, in order to increase the diversity of individuals, so as to improve the search accuracy. Through the simulation and analysis of 28 benchmark functions, verify the effectiveness and reliability of the new algorithm. The experimental results show that the new algorithm has excellent search ability in solving single peak problem and multi peak problem.

7. Artificial Bee Colony Algorithm Based on Uniform Local Search

Yan Zhang, Hu Peng and Changshou Deng

Artificial Bee Colony (ABC) algorithm is simple and efficient. ABC is good at exploration but poor at exploitation and easily falls into local optimum. In order to overcome these drawbacks, this paper proposes a Uniform Local Search Artificial Bee Colony algorithm. The algorithm enhanced exploitation through Uniform Local Search and Gbest. The experiments are conduct by choosing ABC, UABC, GABC and UGABC based on 13 benchmark functions at dimension 30, 50 and 100. The result shows that the UGABC is the best algorithm at solution accuracy, rate of convergence and run time.

8. Adaptively Calling Selection Based on Distance Sorting in CoBiDE

Zhe Chen and Chengjun Li

Differential Evolution is eligible for solving continuous optimization problems. So far, the imbalance between exploration and exploitation in DE runs often leads to the failure to obtain good solutions. In this paper, we propose selection based on distance sorting. In such selection, the individual has the best fitness among parents and offspring is selected firstly. Then, the genotype distance from another individual to it, the distance in their chromosome structure, decides whether the former individual is selected. Under the control of a adaptive scheme proposed by us, we use it replace the original selection of the CoBiDE in runs from time to time. Experimental results show that, for many among the twenty-five CEC 2005 benchmark functions, which have the similar changing trend of diversity and fitness in runs, our adaptive scheme for calling selection based on distance sorting brings improvement on solutions.

9. Causes of the Imbalance Between Exploration and Exploitation in Evolutionary Computation

Zhe Chen and Chengjun Li

Evolutionary algorithms have been used in more and more research fields. However, it is very usual that an optimal of nontrivial problems cannot be found by an evolutionary algorithm. In fact, only if the balance between exploration and exploitation is achieved in runs, good solutions can be obtained. In this paper, we observe the changing trend of genotype diversity in runs, which cannot obtain the optimal, of different EAs. Then, we illustrate the main cause of the imbalance between exploration and exploitation in different situations.

10. 0-1 integer programming based on DNA tetrahedral probe

Jing Yang, Xinmu Yang, Zhixiang Yin, Qiang Zhang and Jianzhong Cui

It is difficult to find an effective algorithm for solving NP complete problems such as integer programming. The nanostructure constructed by DNA origami combines huge parallelism and massive storage capacity of DNA computing. In the calculation process, it can effectively avoid the number of experimental operations required by other DNA computing models. It greatly reduces the time consumption and the rate of misinterpretation, thus providing an effective way to efficiently solve integer programming. DNA tetrahedron is a nanostructure constructed by origami. It has stable structure, good toughness and compression resistance, simple production process, high yield, rich functional modification sites, good biocompatibility, but also resistance to a variety of specific or non-specific nuclease. Therefore it can reduce the misinterpretation rate of biochemical reactions using DNA tetrahedron and DNA single strand to construct probes，finding the true solution according to the constraint condition. And then it can improve the computational efficiency of the model.

Oral Presentation

Saturday, Oct. 13
3:30-6:00PM

Presentation Track B
Presentation Venue: No. 3 Conference (三号会议室)
Chair: Prof. Yong Liu

1. An Improved Artificial Bee Colony Algorithm
Hui Wang and Wenjun Wang

Artificial bee colony (ABC) is an efficient global optimizer, which has bee successfully used to solve various optimization problems. However, most of these problems are low dimensional. In this paper, we propose a new multi-population ABC (MPABC) algorithm to challenge large-scale global optimization problems. In MPABC, the population is divided into three subpopulations, and each subpopulation uses different search strategies. During the search, all subpopulations exchange there best search experiences to help accelerate the search. Experimental study is conducted on ten global optimization functions with dimensions 50, 100, and 200. Results show that MPABC is better than three other ABC variants on all dimensions.

2. Authentication Mechanism for IoT device in Micro Grid Environments
Jeong-Cheol Yeom, Zhou Qing, In-A Song, Young-Seok Lee and In-ho Ra

Recently there is much interest in how to implement IoT/IoE-based Micro Grids(MG). But, privacy and security concerns inhibit the fast adaption of IoT technology for many applications. A number of authentication protocols that address these concerns have been proposed but real-world solutions that are secure, maintain low communication cost. We present a novel authentication protocol, which offers a high level of security through the combination of a random key scheme with a strong cryptography. The protocol is applicable to resource, power and computationally constraint platforms such as IoT devices. Our investigation shows that it can provide mutual authentication, untraceability, forward and backward security as well as resistance to replay, denial-of-service and man-in-the-middle attacks, while retaining a competitive communication cost. The protocol has been integrated into the device authentication protocol, which assures low implementation cost.

3. Application of quantum evolutionary algorithm based on dynamic rotation angle catastrophe technology in 0-1 knapsack problem
Jialin Li and Wei Li

Knapsack problem (KP) is a common optimization problem in the field of operations research. Often used in business, combinatorial mathematics, computational complexity theory, cryptography and applied mathematics. Based on the

characteristics of 0-1 knapsack problem, an improved quantum evolutionary algorithm (IQEA) based on dynamic rotation angle catastrophe technology is proposed in this paper. A quantum rotating gate operator which adaptively adjusts the value of rotation angle according to the evolution generations and fitness value is designed. In the process of evolution, the early quantum rotation angle is used to carry out the catastrophic operation of some individuals. The individual and the individual after the catastrophe are evolved in parallel, and the multipath optimization is carried out to improve the parallelism of the algorithm. This can effectively make the population jump out of the current optimal solution, increase the diversity of the population, carry out multi direction search, and maintain the stability of the population, and ensure that the excellent information in the subpopulation will not be lost. The experimental results of the typical knapsack problem show that the performance of the algorithm is better than the traditional evolutionary algorithm and the traditional quantum evolutionary algorithm in solving the knapsack problem.

4. YVONNE: A Fast And Accurate Prediction Scoring Retrieval Framework Based On MF

Yi Yang, Caixue Zhou, Guangyong Gao, Zongmin Cui and Feipeng Wang

The recommendation system has many successful applications on e-commerce and social media, including Amazon, Netflix, Yelp, etc. It is a personalized recommendation system. It recommends interesting product and information to the user based on the user's interests, information, needs, etc. It is extremely important to use the known user information to get the missing information from other users. Most of previous works focus on the learning phase of the recommendation system. Only a few researches focus on the retrieval stage. In this paper, we propose a fast and accurate prediction scoring retrieval framework based on matrix factorization (MF). Our framework (Yvonne) can effectively predict the score of users' missing items. Experiments with real data show that our framework significantly outperforms other methods on the efficiency and accuracy.

5. Outlier Detection Based on Cluster Outlier Factor and Mutual Density

Zhongping Zhang, Mengfan Zhu, Jingyang Qiu, Cong Liu, Debin Zhang and Jie Qi

Outlier detection is an important task in data mining with numerous applications. Recent years, the study on outlier detection is very active, many algorithms were proposed including that based on clustering. However, most outlier detection algorithms based on clustering often need parameters, and it is very difficult to select a suitable parameter for different data set. In order to solve this problem, an outlier detection algorithm called outlier detection based on cluster outlier factor and mutual density is proposed in this paper which combining the natural neighbor search algorithm of the Natural Outlier Factor (NOF) algorithm and based on the Density and Distance Cluster (DDC) algorithm. The mutual density and γ density is used to construct decision graph. The data points with γ density anomalously large in decision graph are treated as cluster centers. This algorithm detect the boundary of outlier cluster using cluster outlier factor called Cluster Outlier Factor (COF), it can

automatic find the parameter. This method can achieve good performance in clustering and outlier detection which be shown in the experiments.

6. Local Outlier Detection Algorithm Based on Gaussian Kernel Density Function

Zhongping Zhang, Jiaojiao Liu and Chuangye Miao

With the rapid development of information technology, the structure of data resources is becoming more and more complex, and outlier mining is attracting more and more attention. Based on Gaussian kernel function, this paper considers three neighbors: k nearest neighbors, reverse k neighbors and shared nearest neighbors. A local outlier detection algorithm based on Gaussian kernel function is proposed. Firstly, the algorithm stores the nearest neighbors of each data object through kNN maps, including k-nearest neighbors, reverse k-nearest neighbors, and shared nearest neighbors, forming a kernel neighbor set S. Secondly, Estimating density of data objects through kernel density estimation KDE method. Finally, the relative density outlier factor RDOF is used to estimate the degree of data objects deviating from the neighborhood, and then determines whether the data objects are outliers, and the validity of the algorithm is proved on the real and synthetic data sets.

7. Solve the IRP Problem With An Improved PSO

Zelin Wang and Shi Cheng

It is difficult to solve the inventory-routing problem, because it is a NP hard problem. To find the optimal solution with polynomial time is very difficult. Many scholars have studied it for many years to find a good solving method. This paper analyzed the inventory-routing optimization problem. Then considered PSO has a good performance in solving combinatorial optimization problems, The PSO was improved to make it be suitable for solving discrete combination optimization problems. In order to improve the performance of the PSO algorithm to solve the inventory routing problem, this paper put forward dynamic adjustment of inertia weight and accelerator factor of the PSO, and introduced mutation operator in PSO. It is proved by numerical experiments that the proposed algorithm has certain performance advantages, and it also proves that the improved algorithm can improve the performance of the algorithm.

8. Algorithm Research on Distributed Pattern Recognition

Zelin Wang, Zhengqi Zhou and Muyan Zhou

The methodology of tradition pattern recognition is a that of from macroscopic to microcosmos, the source of a pattern is refused or mistake recognition lie in impropriety abstraction and choiceing the character. A framework of distributed pattern recognition be pressented in this paper, it is a methodology of from microcosmos to macroscopic. The main innovation are: (1) avoid the difficulty of abstraction and choiceing the character, provide a new technology for complex object recognition, (2) spread pattern recognition of static sate and concentration into dynamic state and distributed .

9. A Computing Model for Four-Valued Logic AND Gate Based on DNA Origami and DNA Displacement

Zhen Tang, Zhixiang Yin, Xia Sun, Jing Yang and Jianzhong Cui

A four-valued logic AND gate model is constructed by DNA origami and DNA strand displacement. Different input signals are designed into different input DNA strands, the results of the input signals are determined by observing whether the hairpin structures are unwound (the length of the long strand is changed) and the fluorescence colors are quenching. The biological expectation results show that the model can not only judge the false and true states of the four valued logic AND gate, other states in four-valued logic AND gate can also be well displayed by the long strand length changed and fluorescence quenching.

10. Approximate Backbone Subsection Optimization Algorithm for the Traveling Salesman Problem

Feipeng Wang, Hu Peng, Changshou Deng and Xujie Tan

Approximate backbone subsection optimization algorithm is proposed to solve the traveling salesman problem, for the precision accuracy of the basic ant colony algorithm for solving the larger traveling salesman problem is low. First, traveling salesman problem approximate backbone is obtained by the ant colony algorithm, and then the original traveling salesman problem is sectioned based on the approximate backbone. Then the ant colony optimization algorithm is applied to solve the subsections to improve the precision accuracy of the global optimal solution. The experimental results show that the algorithm is more precision accuracy than the basic ant colony algorithms in the solution of the typical traveling salesman problem.

Poster Presentation

Sunday, Oct. 14
9:00-11:00AM

Presentation Venue: 议政厅
Chair: Prof. Changshou Deng

1. Inventory routing optimization using differential evolution algorithm
Hu Peng, Yefu Zhou, Changshou Deng and Jianqiang Chen

The inventory routing problem (IRP) is to minimize inventory and transportation costs simultaneously for increasing profitability of the system. However, the two costs are conflicting in most case and hard to solve. As a promising evolutionary algorithm, differential evolution (DE) has been successfully applied to solve many real-world optimization problems, but we found that it is not used to optimize the IRP. In this paper, for the first time, we utilize the DE algorithm to optimize the one-to-many IRP where a product is shipped from supplier to a set of retailers over a planning period. In the proposed DEIR algorithm, the solution feasible checking method, the local search method and the optimal routing method based on DE are designed to suit the IRP solving. The computational tests have been conducted on 50 benchmark instances. Experimental results and comparison with different parameter settings have proved that the proposed algorithm is competitive.

2. Research on the Construction of Three Level Customer Service Knowledge Graph in Electric Marketing
Zelin Wang and Muyan Zhou

With the explosion of knowledge and information of the enterprise and the growing demand for intelligent knowledge management and application， and improve business performance，the knowledge expression and processing of the enterprise has become a hot topic. Aim at the problems of the electric marketing customer service knowledge map (customer service knowledge map) in building theory and method, electric marketing knowledge map of three levels of customer service was discussed, and realizing knowledge reasoning based on Neo4j, achieve good results in practical application.

3. Anime sketch coloring with swish-gated residual U-net
Gang Liu, Xin Chen and Yanzhong Hu

Anime sketch coloring is to fill the color into the anime sketches to obtain the colorful anime images and it is a new application field of deep learning technology. Currently, generative adversarial networks (GANs) have been used for anime sketch coloring and achieved some results. However, the colorful images generated by the

anime sketch coloring methods based on GANs generally have poor coloring effects. In this paper, an efficient anime sketch coloring method based on swish-gated residual U-net (SGRU) is proposed to solve the above problems. In SGRU, the proposed swish layer and swish-gated residual blocks (SGRBs) effectively filter the information transmitted by each level and speed up the convergence of the network. The perceptual loss and the per-pixel loss are used to constitute the final loss of SGRU. The final loss function reflects the coloring results more realistically and can control the effect of coloring more effectively. SGRU can automatically color the sketch without providing any coloring hints in advance and can be trained end-to-end with the sketch and the corresponding color image. Experimental results show that our method performs better than other state-of-the-art coloring methods, and can achieve the colorful images with higher visual quality.

4. An Enhanced Region-based Model for Segmentation Images with Intensity Inhomogeneity

Haiping Yu and Xiaoli Lin

Segmentation of images with intensity inhomogeneity is always challenging due to low resolution, blurred boundaries and poor illumination. Although existing image segmentation methods were widely used, there exists some shortcomings in segmenting images with intensity inhomogeneity, such as not considering the spatial relationship between the central pixel and its neighborhood. Therefore, this paper presents an enhanced region-based model in a level set formulation for segmentation images with intensity inhomogeneity. In this model, a range-based adaptive bilateral filter is utilized to preserve edge structures and resist the noise of the image. Then an effective energy functional is constructed into the level set framework. With the permission of keeping the original shape of the image, a regularization term is used to avoid the process of re-initialization and speed up the evolution of the curve. Finally, some experiments on artificial and real images and comparisons with the well-known segmentation models are executed. The proposed model yields more accurate segmentation results than other classic models.

5. Detection of Pedestrians Based on the Fusion of Human Characteristics and Kernel Density Estimation

Shi Cheng, Muyan Zhou, Chunhong Lu, Yuanjin Li and Zelin Wang

The kernel density estimate does not need to have the characteristic distribution hypothesis to the background, it also does not require the estimation parameter, and it can deal with the moving target detection under the complex background, but the kernel function bandwidth choice uniformly puzzles the algorithm application. To solve this problem, this paper proposes a fusion method of human body characteristics and kernel density estimation for pedestrian detection. Firstly, the kernel function bandwidth is chosen by the prior information of moving target, then the foreground (moving target) is extracted based on kernel density estimation, finally, using human features to detect video pedestrians. The experimental results show that the calculation of kernel density estimation is reduced by comparing

introduction of prior information with traditional methods, and the pedestrian and non pedestrian can be detected accurately by the interference of light variation and noise. The method can be extended to the detection of vehicles and animals.

6. Language-Ontology-based Russian-Chinese Basic Sentence Bank Construction
Aigang Yao and Wuying Liu

Ontology is one of the research hotspots in artificial intelligence, knowledge engineering and natural language processing. This paper discusses what kind of language ontology is needed for natural language processing and how to construct such language ontology, and tries to establish a Russian-Chinese bank of basic sentences for natural language processing based on language ontology.

7. Malay-Corpus-Enhanced Indonesian-Chinese Neural Machine Translation
Wuying Liu, Lixian Xiao and Lin Wang

Machine translation for low-resource languages faces a scientific problem of cross-language semantic paraphrasing in a lack of structured language resource. The exploration of this problem has important theoretical and application value and is also a challenging research hotspot at present. We address the specific low-resource machine translation issue from Indonesian to Chinese, propose a language resource extension method based on cognate parallel corpus, and train a modified neural machine translation (NMT) model by mixing parallel corpus from cognate language. This modified model achieved 20.30 BLEU4 score in the experiment of Indonesian-Chinese machine translation. The manual analysis after simple random sampling of experimental results finds that the effect of the modified NMT is comparable to that of the current Google translation. The experimental results prove that the cognate parallel corpus can improve the low-resource language NMT effectively, which mainly depends on the morphological similarity and semantic equivalence between the cognate languages.

8. Combining Transformation and Classification Method for Recognizing Textual Entailment
Jing Wan and Han Ren

This paper introduces an approach combining transformation and classification methods for recognizing textual entailment. In transformation model, directional and undirectional inference relations are recognized, and text fragments having such relations in T are replaced by the counterpart in H. In classification model, a hybrid kernel-based approach is introduced, and three kinds of features are employed for classifying entailment. Experimental results show that the combination approach achieves a better performance in comparison with the single classification system.

9. A New Selection Framework for Mutation Operator in Differential Evolution

Xia Dahai, Lin Song, Yan Meng and Xiong Caiquan

How to balance exploration and exploitation is a key issue for evolution algorithm including differential algorithm (DE). Many researchers propose various improved mutation operators to solve this issue for DE. Most of them can be classified as deterministic rules. That is to say, they select individuals according to predetermined methods and so the balance between exploration and exploitation is static. However, different evolution stages require different balance between exploration and exploitation. In this paper, we propose a new selection framework named adaptive stochastic ranking based mutation operators in DE (ASR-DE) to meet this requirement. In ASR-DE, it uses stochastic ranking method to rank all individuals according to their contribution in exploration and exploitation. The parameter P_f in stochastic ranking is adaptive controlled by success rate. The individuals with the samller ranking are more likely to be selected. Experiments on 28 benchmark functions of CEC2013 indicate that ASR-DE improves the original DE and advanced DE very well comparing with other methods.

10. A New Method of Event Relation Identification

Junhui Yang, Zongtian Liu and Wei Liu

Aiming at the problem that the traditional event relation identification cannot be considered semantic relation of event structural characteristics, this paper proposes a method of semantic relation based on dependency and co-occurrences. Dividing the text into event representation, using the distribution characteristics of the event elements, the phenomenon of the co-occurrences elements and the dependence relation between the text events, construct a set of semantic event clues. Then use the improved AP algorithm to cluster the event set with the related thread. Experiments show that the semantic role of the event (six elements) can more accurately for calculate the degree of dependence and the co-occurrences overlap ratio of event elements between the candidate relation events, helpful to the more abundant candidate related event set, so as to improve the recognition ability of the matter.

11. The Research of Data Blood Relationship Analysis on Metadata

Yongping Gao, Congcong Cai and Fenfen Guan

In the process of continuous expansion of data and continuous expansion of the system, various data relations and data forms form crisscross connections, forming an extremely complex network diagram. If there is an error in the data, how do we quickly lock the cause of the problem? How do we find out which entities are affected by the implications or changes of the problem? These issues create challenges and pressures for large-scale, enterprise-level data platforms. The paper proposes to use data blood analysis to solve the relationship among tens of millions of tables. To get this kind of more underlying blood information, we need to add embedded parts to the execution engine, which will be fed into the blood relationship collection system using push mode when the job is executed. The paper is to implement field level blood relationship analysis in the data warehouse of China

Commercial bank on the architecture of Teradata, and separated it from the ETL process and made it into a single part. By parsing multiple ETL jobs, we get a number of mapping relationship of atoms, and atoms and relationships make up the molecules that form the blood relationship network we need. This experimental scheme can be simply embedded into the data platform by eliminating the complexity of the system and achieving a separate component structure. The blood relationship can be conducted any time and temporary scripts and error logic of related data will have no data pollution on the data blood relationship.

12. Entropy Isolation Forest Based on Dimension Entropy for Anomaly Detection

LIAO Liefa, LUO Bin

Anomaly detection, as an important basic research task in the field of data mining, has been concerned by both industry and academia. Among many anomaly detection methods, iForest (isolation Forest) has low time complexity and good detection effect. It has better adaptability in the face of high-capacity and high-dimensional data. However, iForest is not suitable for the special high-dimensional data, is not stable enough, and is not so robust to the noise features. In view of these problems, this paper proposes an improved anomaly detection method E-iForest (entropy-isolation forest) based on dimension entropy. By introducing the dimension entropy as the basis for selecting the isolation attribute and the isolation point during the training process, the method uses three isolation strategies and adjust the path length calculation. The experiments show that the E-iForest has better detection effect, has better speed in high-capacity datasets, is more stable than iForest and is more robust to the noise features.

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路线指引

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路线区间	交通工具	时间
九江远洲国际大酒店 ⟷ 九江庐山机场	出租车	55 分钟
九江远洲国际大酒店 ⟷ 九江火车站	出租车	8 分钟
九江远洲国际大酒店 ⟷ 九江汽车站	出租车	5 分钟

九江学院简介

九江学院是经国家教育部批准设立的国有公办全日制本科普通高等院校，办学历史可上溯至 1901 年由美国基督教卫理公会创办的但福德学校，现办学体制为“省市共建、以市为主”。

学校坐落在长江中下游历史文化名城——江西省九江市，市，地处赣、鄂、湘、皖四省交界区域，位于庐山之麓、长江之滨、鄱阳湖之畔。名城、名山、名江、名湖造就了九江学院的灵气，尤其是具有千年历史、享有“天下书院之首”美誉的白鹿洞书院，更为九江学院赋予深厚的文化气息和办学氛围。

学校占地 2850 多亩，现有主校区、浔东校区、庐峰校区、南湖校区、八里湖校区五个校区。2018 年，在九江市委、市政府的大力支持下，整合现有教育资源，在主校区东侧新建占地约 1380 亩的新校区和占地 200 亩的高端人才公寓。现有校舍面积 105 万平方米。下设 22 个二级学院，1 所“三级甲等”附属医院，1 所附属口腔医院。2018 年招生的本科专业 80 个，涵盖了经济学、法学、教育学、文学、理学、工学、农学、医学、管理学、艺术学等学科门类。面向全国 30 个省（市、自治区）招生，全日制在校生 3.4 万余人。现有国际贸易、凝聚态物理、植物学、材料加工工程、旅游管理、化学工程与工艺、人体解剖学与组织胚胎学、中国古代文学、思想政治教育、会计学等省级重点学科，国际经济与贸易、生物科学等国家级特色专业。

学校现有教职工 2389 人，专任教师 1836 人，其中：享受国务院特殊津贴和省政府特殊津贴 12 人；入选江西省“赣鄱英才 555 工程”4 人；入选省“百千万人才工程”17 人；江西省高校中青年学科带头人和中青年骨干教师 50 人；江西省高校

教学名师 6 人。近年来，学校聘请了 128 位知名专家学者为学校兼职和客座教授；聘请杨叔子院士为名誉校长，潘际銮院士为校学术委员会主任；袁隆平院士、程天民院士和严陆光院士等为名誉教授。

学校基础设施齐全，教学楼、实验楼、图书馆、信息技术楼、田径运动场和室内体育馆、学生活动中心等分布于各个校区，计算机网络覆盖全校，全面实现了教学、科研和办公管理的网络化和校园生活一卡通。图书馆设有 1 个主馆和 4 个分馆，共藏纸质图书 317 万余册、电子图书 200 余万种，有中外文数据库 108 个；建有 22 个各级各类实验教学中心，其中 5 个省级实验教学示范中心，49 个中央与地方共建基础实验室、中央与地方特色优势学科实验室及中央财政支持地方高校改革发展专项资金项目。建有庐山实习基地等校内外实习基地 285 个。现有教学科研仪器设备总值 2.94 亿元。

传承千年文脉，历经百年办学。近年来，学校坚持“质量立校、特色兴校、人才强校、依法治校”办学方针，积极推进教育教学综合改革，持续加强内涵建设，办学水平和综合实力稳步提升。学校各项事业保持快速发展的良好势头。先后获评“全国绿化先进集体”、“全国教育后勤新科技应用领跑单位”、“江西省文明单位”、“江西省汉语国际推广先进单位”、“江西省高校平安校园建设先进单位”等荣誉称号。多年来，学校为国家和社会培养了 20 余万名各类专业人才，涌现出了中国工程院院士候选人、国家杰出青年基金获得者等大批行业领军人物和优秀人才。

聚庐山灵气，蕴长江波澜，展鄱湖浩瀚。迈入新时代，九江学院将坚持以习近平新时代中国特色社会主义思想为指导，遵循高等教育发展规律，积极推进人才培养、科学研究、服务社会、文化传承与创新、国际交流与合作。学校 4 万师生将秉

承“竞知向学，厚德笃行”校训精神，以更加开放的姿态、创新的精神、务实的作风，豪情满怀扬帆起航，为建设“特色鲜明区域领先的综合性应用型大学”而努力奋斗！

九江学院信息科学与技术学院概况

九江学院信息科学与技术学院是 2004 年四校实质性合并组建时由原九江财经高等专科学校（中国人民解放军军需高等专科学校）计算机科学系、原九江师范高等专科学校数学与计算机系、物理与信息工程系进行学科整合组建而成。

学院现有教师 139 人。其中教授 5 人，副教授 32 人；省部级中青年骨干教师 2 人；硕士生导师 6 人；博士 15 人，博士后 2 人，在读博士 18 人。

学院教师主持国家自然科学基金项目 10 项，省部级科研项目 30 余项，横向课题 26 项；近三年，发表高质量教科研论文 260 余篇，其中 SCI 收录 35 篇，EI 收录 64 篇；出版教材 7 部，其中获奖教材 1 部；获得省级教学成果奖 1 项。大学生创新创业项目取得突破性成绩：国家级大创项目 4 项，省级大创项目 8 项。

学院现有全日制普通本科生 1258 人，开设计算机科学与技术，信息管理与信息系统，教育技术学、数字媒体技术、物联网工程、网络工程、软件工程 7 个本科专业。其中计算机科学与技术专业于 2010 年被列为省级特色专业。

学院实验设施较为完善，拥有 22 间专业实验室和综合实训室。2012 年获批中央财政支持地方高校发展专项资金项目——基于 CDIO 模式下的计算机类专业实践基地，2015 年获批中央财政支持地方高校发展专项资金项目——基于云计算的物联网“卓越人才”培养实践平台。