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Welcome Message

Welcome to the 2014 International Conference on Informative and Cybernetics for Computational Social Systems (ICCSS2014)!

ICCSS 2014 provides an international forum that brings together those actively involved in computational social systems, cybernetics, and information processing, to report on up-to-the-minute innovations and developments, to summarize the state-of-the-art, and to exchange ideas and advances in all aspects of social systems, computation, cybernetics, and information processing.

We would like to take this opportunity to thank the Technical Program Committee comprising of many Area Chairs and Reviewers from all over the world, who have worked diligently to ensure that high quality papers will be presented and published in the proceedings. We also acknowledge the support of and express our sincere appreciation to the members of the local organizing committee. We are also grateful to the advice and guidance of the Executive Committee of the University of Macau and the IEEE SMC Society (SMCS). Lastly and most importantly, we thank all of you, the authors and delegates, for participating in ICCSS 2014, sharing your knowledge and experience and contributing to the advancement of science and technology for the improvement of the quality of our lives.

We wish each and every one a most pleasant experience at ICCSS 2014.



Fei-Yue Wang
General Chair, ICCSS 2014



C. L. Philip Chen
General Co-Chair, ICCSS 2014

Tips

- Lunch and banquet on October 9-10 will be included.
- The attendees will collect all the conference materials on October 9, and can join that day's ITSC 2014 sessions.

Program at a Glance

Oct 9, Registration day

The attendees will collect all the conference materials and can join ITSC sessions

Oct 10, Conference day

Room: Salon 5, Hyatt Regency

Keynotes Session: 9:00-12:00

1. Prof. Fei-Yue Wang, Chinese Academy of Sciences
2. Prof. Lefei Li, Tsinghua University

Tea Break

3. Prof. Beichuan Zhang, University of Arizona

Afternoon Session A: 13:30-15:00

Two parallel sessions: (paper #27 #28 #30 #37 #16) and (paper #21 #41 #44 #45 #46)

Tea Break

Afternoon Session B: 15:30-18:00

Two parallel sessions: (paper #43 #48 #49 #50 #51 #52 #13) and (paper #14 #18 #19 #24 #40 #31 #34 #54)

Banquet: 18:30-21:00

Hyatt Regency 2nd Floor: Donghai 88 restaurant, reserved room 1, 2 and 3

Keynote I

Title: **Road to Computational and Smart Societies: An ACP-based Parallel Systems Approach**



Speaker: **Fei-Yue Wang**, Institute of Automation, Chinese Academy of Sciences

Bio: Fei-Yue Wang received his Ph.D. in Computer and Systems Engineering from Rensselaer Polytechnic Institute, Troy, New York in 1990. Dr. Wang has been a researcher, educator, and practitioner of intelligent and complex systems for over 30 years.

He joined the University of Arizona in 1990 and became a Professor and Director of the Robotics and Automation Lab (RAL) and Program in Advanced Research for Complex Systems (PARCS). In 1999, he found the Intelligent Control and Systems Engineering Center at the Institute of Automation, Chinese Academy of Sciences (CAS), Beijing, China, under the support of the Outstanding Oversea Chinese Talents Program from the State Planning Council and “100 Talent Program” from CAS, and in 2002, was appointed as the Director of the Key Lab of Complex Systems and Intelligence Science, CAS. From 2006 to 2010, he was Vice President for research, education, and academic exchanges at the Institute of Automation, CAS. In 2011, he was supported by the “1000 Talent Program” and became the Director of the State Key Laboratory of Management and Control for Complex Systems. Dr. Wang has published extensively in modeling, analysis, control and management of complex systems. His current research is focused in methods and applications for parallel systems and social computing. He was the Founding Editor-in-Chief of the International Journal of Intelligent Control and Systems from 1995 to 2000, the Series on Intelligent Control and Intelligent Automation from 1996 to 2004, and IEEE Intelligent Transportation Systems, and the EIC of IEEE Intelligent Systems from 2009 to 2012. Currently, he is the EIC of IEEE Transactions on ITS. Since 1997, he has served as General or Program Chair of more than 20 IEEE, INFORMS, ACM, ASME conferences. He was the President of IEEE ITS Society from 2005 to 2007, Chinese Association for Science and Technology (CAST, USA) in 2005, and the American Zhu Kezhen Education Foundation from 2007-2008. Since 2008, he is the Vice President and Secretary General of Chinese Association of Automation. Dr. Wang is member of Sigma Xi and an elected Fellow of IEEE, INCOSE, IFAC, ASME, and AAAS. In 2007, he received the 2nd

Class National Prize in Natural Sciences of China and awarded the Outstanding Scientist by ACM for his work in intelligent control and social computing. He received IEEE ITS Outstanding Application and Research Awards in 2009 and 2011, respectively.

Keynote II

Title: **Parallel Service Management: Better Understanding, Better Life**



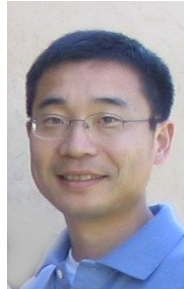
Speaker: **Lefei Li**, Tsinghua University

Abstract: We always say: the customer is god. However, do we really understand this 'god'? In practice, the nature of service, such as intangibility and heterogeneity, make the effective management of service operations difficult. Besides, the latest advancement of ICT and analytics tools are opening a wide space for smarter services. To better incorporate human behaviors and other complex factors to facilitate service management decisions, we propose a new approach, Parallel Service Management (PSM), which follows the ACP framework, an emerging methodology in complex systems modeling and analysis. In PSM, customer agents, service employee agents, service organization agents and service environment construct an artificial service system, which can run in parallel with the real service system. In this way, the artificial system can learn from the real system dynamically. By doing vast computational experiments, we are able to feedback good decision suggestions to the real system, and therefore providing a better service to the customers.

Bio: Lefei Li (Member 2006) is an associate professor in the department of Industrial Engineering, Tsinghua University. He is serving as the co-director of the Tsinghua Operations and Service Research Lab (TOPS). He received his B.S. degree in Electronic Engineering from Zhejiang University in 2002, M.S. (2004) degree in Industrial Engineering and Ph.D. (2006) degree in Systems and Industrial Engineering from the University of Arizona. Lefei Li joined Tsinghua University in 2006, conducting research in ITS, logistics and other service systems. His current research interests include Artificial Transportation Systems, Service Operations and Management. Dr. Li has managed or actively participated in several urban transportation and logistics/service network design projects, sponsored by top logistics companies or public agencies in China. Dr. Li has published several journal papers and peer-reviewed conference papers, which present his research in artificial urban transit system and other service management problems. Dr. Li is associate editor for the IEEE Transactions on Intelligent Transportation Systems and for IEEE Intelligent Systems. Dr. Li is the chair of IEEE ITSS Technical Committee on Logistics and Services. He is also serving as the past president of INCOSE (International Council on Systems Engineering) Beijing Chapter.

Keynote III

Title: **Information-Centric Smart Home Networking: Driving the Future Network Architecture**



Speaker: **Beichuan Zhang**, University of Arizona

Abstract: Started as a futuristic concept, the idea of smart home has come a long way in recent years. As the number and types of smart devices keep increasing quickly, home network is transforming from the simplest local area network to one of the most heterogeneous networks supporting intelligent applications that will revolutionize how we live. This smart home environment, however, poses serious challenges to conventional TCP/IP based technologies, and fits much more naturally to the emerging Named Data Networking (NDN) architecture. In this talk, I will elaborate on the challenges, introduce the basic concepts of NDN, and discuss how smart home networking can drive the development of future network architecture and benefit from it as well.

Bio: Dr. Beichuan Zhang is currently an Associate Professor at the Computer Science Department, the University of Arizona, USA. He has been working on information-centric networking, green networking, internet routing, and content distribution. Dr. Zhang was a recipient of the first Applied Networking Research Prize in 2011 awarded by the Internet Society and the Internet Research Task Forces for his research into "green traffic engineering". His work also received the best paper awards at the International Symposium on Quality of Service (2014) and the International Conference on Distributed Computing Systems (2005). Dr. Zhang received his Ph.D. from UCLA (2003) and B.S. from Peking University (1995).

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Committee

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Venue Information

Hotel Accommodations

Hyatt Regency Qingdao

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Qingdao, Shandong, China
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Hyatt Regency Qingdao is ideally situated in the heart of the city's new business, commercial and entertainment district, right on the famous Shi Lao Ren beach. This new landmark 5-star luxury hotel on Qingdao's waterfront offers easy access to Lao Shan District government offices, and the International Exhibition Centre. Moreover, it is only 15 minutes' drive from the CBD, 30 minutes' drive from the airport and 30 minutes' drive from the railway station.

Transportation Services

- From the Qingdao International Airport drive along Yingbin Road for 1 km, then turn right onto the Qing Yin Expressway (G20).
- You will be required to pay a CNY5 toll fee for use of the expressway.
- At the end of the expressway turn left onto Shenzhen Road, go along for 3 km then turn right onto Hong Kong East Road.
- After 1 km, turn left onto Haier Road and finally right onto Haikou Road.
- The hotel is on the left hand side.



Technical Program Schedule

Keynotes: Friday, October 10, 9:00AM-12:00AM, Room: Salon 5, Hyatt Regency

Keynote 1: Prof. Fei-Yue Wang, Chinese Academy of Sciences

Keynote 2: Prof. Lefei Li, Tsinghua University

Keynote 3: Prof. Beichuan Zhang, University of Arizona

Session 1: Friday, October 10, 1:30PM-3:00PM, Room: Salon 5-1, Hyatt Hotel

Chair: Dewang Chen

- #27: Satisfaction Assessment and Analysis for Power Customer Based on Interval Type-2 Fuzzy Sets, Fan Peng, Hong Mo, Dan Tan, Yuchen Ou Yang
- #28: Interval Type-2 Fuzzy Analysis for E-commerce Online Review on Time-varying Universe, Dan Tan, Hong Mo, Fan Peng, Yuchen Ou Yang
- #30: Traffic light Time adjustment based on Interval Type-2 Fuzzy Sets, Gao Zhen, Hong Mo, Fenghua Zhu
- #37: Interventions of Traffic Flow for Intersection Based on Interval Type-2 Fuzzy Sets, Xuan Li, Hong Mo, Fenghua Zhu
- #16: High-speed Maglev Parallel Control and Management System—Overview and Framework, Weilong Gai, Dewang Chen, Jiateng Yin, Long Chen

Session 2: Friday, October 10, 1:30PM-3:00PM, Room: Salon 5-2, Hyatt Regency

Chair: Jin Zhou

- #21: Linguistic Dynamic Analysis for Single Lane's Traffic Status Based on FCM, Jie Wang, Hong Mo, Fenghua Zhu
- #41: Trajectory Planning for Vehicle Autonomous Driving with Uncertainties, Hao Sun, Weiwen Deng, Sumin Zhang, Shanshan Wang, Yutan Zhang
- #44: An Integrated Shelter Location and Route planning Approach for Emergent Evacuation in Transportation Networks, Yishan Wang, Yunyue He, Zhong Liu, Jianmai Shi
- #45: An Evacuation Network Flow Optimization Model for City Transportation Systems with Policemen Resource Allocation, Yunyue He, Yishan Wang, Jianmai Shi, Zhong Liu
- #46: On Discovering Regional Taxi Service Disequilibrium with Geographical Collaborative Filtering, Qi Luo, Junming Zhang, Zhihan Liu, Jinglin Li

Session 3: Friday, October 10, 3:30PM-6:00PM, Room: Salon 5-1, Hyatt Regency

Chair: Dewang Chen

- #43: Intelligent Vehicle Trajectory Tracking Based on Neural Networks Sliding Mode Control, Guo Lie, Pingshu Ge, Xiaoli Yang, Bing Li
- #48: A Lane Departure Warning System Developed under a Virtual Environment, Ye Wang, Weiwen Deng, Yutan Zhang, Sumin Zhang
- #49: A Lane Marking Detection and Tracking Algorithm Based on Sub-Regions, Wenhui Li, Xiaohu Gong, Ying Wang, Peixun Liu
- #50: A New Method Based on Wavelet and Greedy Pursuit Analysis for Neuro-Spike Detection, Junwei Duan, Long Chen, C. L. Philip Chen
- #51: Particle-Optimized Control for Automatic Train Operation Based on Sliding Mode Observer, Mengyang Zhang, Hairong Dong, Yao Chen, Xubin Sun, Xiaowei Hou, Hu Cai
- #52: Belief Rule-based Methodology and Particle Filtering for Radar Target Tracking, Wei Liu
- #13: Application of Z-numbers in Multi-criteria Decision Making, Zhi-quan Xiao

Session 4: Friday, October 10, 3:30PM-6:00PM, Room: Salon 5-2, Hyatt Regency

Chair: Jin Zhou

- #14: SGCMG Non-singularity Steering based on Adaptive Gauss Pseudospectral Method, Zhiyuan Sun, Shujuan Ding
- #18: Detecting Spam Reviewers by Combing Reviewer Feature and Relationship, Dongxu Liang, Xinyue Liu, Hua Shen
- #19: Research and Implementation of PAM Algorithm with Time Constraints, Xiao Dong, Zhongnan Zhang
- #24: A Model to Forecast the Matched-degree between Staffs and Jobs, Yuchen Ou Yang, Fan Peng
- #40: Distance Measuring Using Calibrating Subpixel Distances of Stereo pixel Pairs in Artificial Compound Eye, Tao Jiang
- #31: Quaternion-based Color Difference Measure for Removing Impulse Noise in Color Images, Yicong Zhou, Lunbo Chen, C. L. Philip Chen
- #34: Freight Transport Prediction Using Electronic Waybills and Machine Learning, Shoaib Bakhtyar, Lawrence Henesey
- #54: Train Timetable Optimization Research Based on PSO Energy-Efficient Operation Strategy, Xiaoyu Ren, Youneng Huang, Miao Zhang

Friday, October 10, 1:30PM-3:00PM

Session 1: Room: Salon 5-1, Hyatt Regency

[#27] Satisfaction Assessment and Analysis for Power Customer Based on Interval Type-2 Fuzzy Sets

Fan Peng, Changsha University of Science & Technology
Hong Mo, Changsha University of Science & Technology
Dan Tan, Changsha University of Science & Technology
Yuchen Ou Yang, Changsha University of Science & Technology

In the paper, the customer satisfaction index for power system is measured based on the characteristics of the power supply service quality. For the uncertainty of assessment, interval type-2 fuzzy set (IT2FS) is applied to evaluate it. The model of improving the power customer satisfaction is built and the corresponding linguistic dynamic orbits are given. In addition, the feasibility and effectiveness of the method is validated by an example.

[#28] Interval Type-2 Fuzzy Analysis for E-commerce Online Review on Time-varying Universe

Dan Tan, Changsha University of Science & Technology
Hong Mo, Changsha University of Science & Technology
Fan Peng, Changsha University of Science & Technology
Yuchen Ou Yang, Changsha University of Science & Technology

It is not easy for fuzzy model to describe the uncertainty of language, because the fuzzy model is a conventional function. The membership function of type-2 fuzzy sets (T2 FS) combines a variety of possible type-1 membership, and the primary membership function reflects the impact of uncertain factors. Online reviews are perceptive informatics, and with the time varying, the evaluation criteria also changes. In the paper, some words are used to cover the universe of online comments semantic, which are interval type-2 fuzzy sets on time-varying universe, and fuzzy comprehensive evaluation and dynamic fuzzy rules are applied to analyze online review. Finally, the linguistic dynamic orbit of the online review is achieved. Show that type-2 fuzzy sets on time-varying universe and dynamic fuzzy rules are more in line with the objective rules that people use language to describe the development of objective and provided their evaluations.

[#30] Traffic light Time adjustment based on Interval Type-2 Fuzzy Sets

Gao Zhen, Changsha University of Science & Technology
Hong Mo, Changsha University of Science & Technology
Fenghua Zhu, State Key Laboratory of Management

According to the actual circumstance of the intersection, reasonably adjusting traffic light time can help to ease traffic pressure and save transportation time. In this paper, Interval type - 2 fuzzy sets and matched-degree are applied to the time of intersection signal adjusting, and five words are used to cover the range of adjusting lights' time, finally according to the average number of stranded vehicles, a query table is built to inquire and control the signal time during a certain period.

[#37] Interventions of traffic flow for Intersection Based on Interval Type-2 Fuzzy Sets

Xuan Li, Changsha University of Science & Technology
Hong Mo, Changsha University of Science & Technology
Fenghua Zhu, State Key Laboratory of Management

Assessment and analysis of the intersection status can help to make the right choice of interventions, it's can bring convenience to solve the traffic congestion. In this paper, interval type-2 fuzzy sets is applied in the analysis of the intersection state and congestion intervention, dynamic fuzzy comprehensive evaluation and footprint of uncertainty are used to assess the intersection condition. Combined with the example of intersection congestion, through corresponding intervention measures to improve the intersections crowded conditions. Thus the linguistic dynamic orbits of road status figured out.

[#16] High-speed Maglev Parallel Control and Management System—Overview and Framework

Weilong Gai, Beijing Jiaotong University
Dewang Chen, Beijing Jiaotong University

Jiateng Yin, Beijing Jiaotong University
Long Chen, University of Macau

Firstly, this paper puts forward the framework of high-speed maglev parallel control and management system, then builds a high-speed maglev artificial system model on the basic of multi-agent which is consistent with actual high-speed maglev system. Secondly, we do computing experiments and summarize the law of the system on the basic of high-speed maglev artificial system. Lastly, we can achieve parallel controlling and managing actual high-speed maglev system through the parallel interaction between artificial and actual high-speed maglev system. Ensuring the safety and reliability of the high-speed maglev system, we evaluate the high-speed maglev system from overall, management and implementation, then provide solutions and recommendations for the safety control and effective management of the high-speed maglev system.

Session 2: Room: Salon 5-2, Hyatt Regency

[#21] Linguistic Dynamic Analysis for Single Lane's Traffic Status Based on FCM

Jie Wang, Changsha University of Science & Technology
Hong Mo, Changsha University of Science & Technology
Fenghua Zhu, State Key Laboratory of Management

The results of traditional traffic status analysis are mostly single values, whose accuracy can't be determined; fuzzy c-means clustering (FCM) algorithm based on fuzzy theory can calculate the clustering center of plenty data quickly and easily; linguistic dynamic systems could describe the dynamic rules of complex systems in the language level. In this paper, membership functions are decided by FCM; result of a specific time period taken as one example is obtained; it's discussed that linguistic dynamic analysis of traffic status in different period within a day by the same method.

[#41] Trajectory Planning for Vehicle Autonomous Driving with Uncertainties

Hao Sun, Jilin University
Weiweng Deng, Jilin University
Sumin Zhang, Jilin University
Shanshan Wang, Jilin University
Yutan Zhang, Jilin University

This paper proposes a novel method on dynamic trajectory planning for intelligent vehicle driving under traffic environment with uncertainties. The statistical characteristics of traffic vehicle motion are first analyzed with a traffic vehicle model, in which the inputs are considered to be random variables with certain probability distribution. Therefore the output of the model can be calculated via unscented transformation for probabilistic spread. Then the overall collision probability of the candidate trajectories is assessed with certain confidence level. Finally a trajectory planning method is employed to achieve multiple objectives for lane change maneuver with combined efficiency and comfort. Simulation is conducted with results demonstrating that the proposed method is valid and effective.

[#44] An Integrated Shelter Location and Route planning Approach for Emergent Evacuation in Transportation Networks

Yishan Wang, National University of Defense Technology
Yunyue He, National University of Defense Technology
Zhong Liu, National University of Defense Technology
Jianmai Shi, National University of Defense Technology

This paper presents an integrated shelter location and route allocation approach for the emergent evacuation problem with multiple sources and multiple shelters in city transportation networks. A mixed integer linear programming model is developed to formulate the problem, in which the overall evacuation time is minimized subject to capacity constraints on both shelters and roads. Dijkstra algorithm and A* algorithm are utilized to search the kth shortest paths between each source and each shelter, and Cplex is used to solve the model. Based on the practical traffic networks of a provincial capital city in China, two cases are constructed: the first one consists of 84 nodes and 276 arcs, and the second one consists of 317 nodes and 1042 arcs. The proposed approach is illustrated by the two cases with practical capacities, and the computational results are reported and analyzed.

[#45] An Evacuation Network Flow Optimization Model for City Transportation Systems with Policemen Resource Allocation

Yunyue He, National University of Defense Technology

Yishan Wang, National University of Defense Technology

Jianmai Shi, National University of Defense Technology

Zhong Liu, National University of Defense Technology

Emergency evacuation has increasingly gained wide attention. In order to improve the evacuation efficiency, it is important to optimally allocate policemen to crucial roads in the city transportation systems. In this paper, we propose an evacuation network flow optimization model in which the policemen allocation decisions are integrated. It is assumed that the probability of traffic jams in one road is related with its flow and the allocated policemen resource. The problem is formulated as a nonlinear mixed integer program model which is proved to be NP-Hard, and a residual-network-based heuristic algorithm is developed to solve the model. We demonstrate the computational efficiency and effectiveness of the proposed model and algorithm by two practical transportation systems in Changsha, China.

[#46] On Discovering Regional Taxi Service Disequilibrium with Geographical Collaborative Filtering

Qi Luo, Beijing University of Posts and Telecommunications

Junming Zhang, Beijing University of Posts and Telecommunications

Zhihan Liu, Beijing University of Posts and Telecommunications

Jinglin Li, Beijing University of Posts and Telecommunications

A challenging problem that taxi service faces is to fulfill all passenger requests in different regions of a city and different time periods. Taxicab service rate of a region calculated from existing trajectory data can indicate the utilization rate of taxicabs in the region and help solving the problem. However, as trajectory data often contain corrupt or missing records in real scenarios, taxicab service rates of some region may not be available. This paper proposed a method to estimate taxicab service rates based on collaborative filtering with geographical factors and improved similarity measurements. The method proves to be efficient after validation on a large taxicab trajectory dataset.

Friday, October 10, 3:30PM-6:00PM

Session 3: Room: Salon 5-1, Hyatt Regency

[#43] Intelligent Vehicle Trajectory Tracking Based on Neural Networks Sliding Mode Control
Guo Lie, Dalian University of Technology
Pingshu Ge, Dalian University of Technology
Xiaoli Yang, Dalian University of Technology
Bing Li, Dalian University of Technology

The problem of lateral control in intelligent vehicle trajectory tracking for automated highway system is studied. The article deduced the vehicle's desired yaw rate through real time planning virtual path between the vehicle mass center and prediction aiming point which is planned according to the vehicle's kinematic model and pose error model. Based on the lateral dynamic model of vehicle, radical basis function (RBF) neural networks based sliding mode variable structure trajectory tracking controller is designed. A multi-body dynamics model of vehicle is built in ADAMS/Car. The interactive combination control dynamic simulation between Matlab/Simulink and ADAMS is realized through designing the data interface between Matlab and ADAMS. Simulations were conducted and the results show that the proposed algorithm improves the control precision of the system and improves the tracking performance of the system.

[#48] A Lane Departure Warning System Developed under a Virtual Environment

Ye Wang, Jilin University
Weiwen Deng, Jilin University
Yutan Zhang, Jilin University
Sumin Zhang, Jilin University

In recent years, many advanced driver assistant systems (ADAS) are developed to address great concerns on vehicle safety. However, the testing and verification of ADAS can be very time consuming, costly and even dangerous. This paper presents a vision-based lane departure warning system (LDW) that is developed under a virtual environment. The lane departure warning system consists of an image processing module and a pre-warning module. The LDW system in this paper is not novel or creative, it's just a object to show how a LDW system can be developed under a virtual environment. The LDW system is largely developed under a real-time virtual environment that includes two dSpace1401-based MicroAutoboxes (MABX), a desktop PC, a dSpace1006-based real-time simulator, and the required communication buses. Some preliminary simulation has been conducted to verify the proposed camera model and virtual driving environmental model, and the results show that the proposed verification environment is valid and effective.

[#49] A Lane Marking Detection and Tracking Algorithm Based on Sub-Regions

Wenhui Li, Jilin University
Xiaohu Gong, Jilin University
Ying Wang, Jilin University
Peixun Liu, Jilin University

In this paper, we present a lane marking detection and tracking method for the Lane Departure Warning system (LDWs). The method can both detect straight and curve lanes on the highway and urban road. The lane marking detection part is divided into three phases. First, bisect the ROI (region of interest). Then get lines by processing Hough transformation on each sub-region, after this phase, we can get a set of seed points. Finally, judge the lane's type (straight or curve) by its slope. If it's a curve line, fitting the lane by using the rational cubic B-spline curves. In the lane tracking part, we use Extended Kalman Filter to make sure continuous lane detection results. In the experiment part, we use a dataset which includes virtual videos and real videos to measure our method's performance under the virtual and real environment. Experiment results show that the average detection rate of virtual video is 80%, and the real video is 85%. And the average processing time of virtual video is about 5.3ms/frame, and the real video is about 14.0ms/frame.

[#50] A New Method Based on Wavelet and Greedy Pursuit Analysis for Neuro-Spike Detection

Junwei Duan, University of Macau
Long Chen, University of Macau

C. L. Philip Chen, University of Macau

This paper introduces a novel greedy model for spike detection system aimed to neural signal obtained from the brain such as EEG, ECG. This Presented algorithm combines wavelet transform and simultaneous orthogonal matching pursuit (SOMP). The proposed method is capable of data compression for spike detection. The spike detection experiment demonstrates the TPR in ROC curve is up to 98.76% and the compact factor reaches 42.52 when the length of window we used is 500. Moreover, our method is simple for low power system design and real-time hardware realization.

[#51] Particle-Optimized Control for Automatic Train Operation Based on Sliding Mode Observer

Mengyang Zhang, Beijing Jiaotong University
Hairong Dong, Beijing Jiaotong University
Yao Chen, Beijing Jiaotong University
Xubin Sun, Beijing Jiaotong University
Xiaowei Hou, Beijing Jiaotong University
Hu Cai, Beijing Jiaotong University

This paper investigates the automatic control problem of high speed train systems under uncertain resistance conditions such as time-varying resistance, unknown aerodynamic drag and wind gust. A sliding mode observer (SMO) based control method is designed for tracking given position-velocity profile precisely. The control method is disturbance rejective that does not rely on specific resistance coefficient. Proposed Method's parameters have been optimized by particle swarm optimization. The effectiveness of the proposed method is verified via numerical simulations.

[#52] Belief rule-based methodology and Particle filtering for radar target tracking

Wei Liu, Wuhan University of Technology

With the rapid development of information technology in inland waterway, radar was widely used to track the ship running, in order to ensure the safe and efficient shipping industry development, as well as to avoid a ship collision causing unnecessary economic losses. For the problem of radar target tracking data associated, a method of data association with radar data was proposed, which was based on radar target course and speed. By this method, the target error or loss problem was solved when the target density was large and used belief rule-based (BRB) methodology to verify the reliability of this method. Real target points obtained by this method had been filtered through particle filter. And then the radar target tracking was achieved. This method has a good target tracking results, verified by Monte Carlo simulations.

[#13] Application of Z-numbers in Multi-criteria Decision Making

Zhi-quan Xiao, Wuhan Textile University

The Z-number contains both uncertain variable and its reliability, and it has stronger potential in applications in the fields of decision making, risk assessment etc. In this paper, a method of multi-criteria fuzzy decision making with Z-numbers is proposed, where the evaluation of each alternative with respect to each criterion is described as a Z-number, including both the evaluation and its reliability from evaluators. The reliability towards the evaluation is here regarded as the uncertain region of the fuzzy number of evaluation. Then the Z-number is converted to the interval-valued fuzzy set with footprint of uncertainty (FOU). By computing the centroid of the interval-valued fuzzy set with K-M algorithm, the Z-numbers in the decision making matrix are converted to the crisp numbers for decision making. A numerical example is given to illustrate the procedure and effectiveness of the method.

Session 4: Room: Salon 5-2, Hyatt Regency

[#14] SGCMG Non-singularity Steering based on Adaptive Gauss Pseudospectral Method

Zhiyuan Sun, Beijing Insititute of Control Engineering
Shujuan Ding, Beijing Insitute of Control Engineering

In this paper, a kind of fast trajectory optimization method based on adaptive Gauss pseudospectral method was introduced to solve the singularity problem on large-angle maneuver of the satellites taking SGCMG as their actuators. This method took the large-angle maneuver problem as an optimization problem, which met the boundary condition and a series of path constraint, inclusive of gimbal

angle constrain, gimbal rates constrain, singularity index constrain and satellite angular rates constrain, and at the same time minimize some performance criterion. And then, taking combination with adaptive Gauss pseudospectral method and nonlinear programming technic to solve the optimization problem, the optimal non-singularity gimbal angle trajectory could be gotten in a few seconds. Numerical simulation suggests that the smooth optimization trajectory, satisfied with all constrains, of a 4-successive attitude maneuver mission could be produced in 140s or less with a precision above 10^{-3} .

[#18] Detecting Spam Reviewers by Combing Reviewer Feature and Relationship

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Xinyue Liu, DalianUniversity of Technology
Hua Shen, DalianUniversity of Technology

Nowadays consumers can obtain abundant information for products and service from online review resources, which can help them make decisions. Moreover, it motivates some manufactures to hire spammers writing fake reviews on some target products. How to detect spam review/reviewer is drawing more and more attention of e-commerce. In this paper, we construct a novel multi-edge graph model in which each node represents a reviewer and each edge represents an inter-relationship between reviewers on one special product. Combing with the features based on reviewers' unreliability score, we propose an unsupervised iterative computation framework. It is the first algorithm to consider both of the reviewers' features and their inter-relationships, and places emphasis on detecting the spammers who always work together. Experimental results show that the method is effective in detecting spam reviewers with a satisfied precision.

[#19] Research and Implementation of PAM Algorithm with Time Constraints

Xiao Dong, Xiamen University
Zhongnan Zhang, Xiamen University

Traditional clustering analysis only takes the distance factor into account. When the clustering conditions contain factors other than distance, using traditional clustering algorithm usually can't obtain feasible results. Based on the PAM clustering algorithm and combined with a certain application background, this paper proposes a clustering algorithm with time constraints for small-scale datasets called TCPAM and applies this algorithm to a mobile platform application. The algorithm introduces restrictions combining distance factor and time factor into the clustering process, so that to cluster the data objects by the "principle of proximity" and "time constraints" of the dual restrictions. The experimental results show that our algorithm can achieve a good clustering performance.

[#24] A Model to Forecast the Matched-degree between Staffs and Jobs

Yuchen Ou Yang, Changsha University of Science & Technology
Fan Peng, Changsha University of Science & Technology

In the paper, a scheme is proposed to predict whether the new employees could match their jobs or not, and discrete interval type-2 fuzzy set on time-varying universe is used for evaluating the experts' view of the employees' performance. The evaluation results are sent into a BP neural network to get the predicted value. Finally, the Markov model is adopted to revise the result and achieve a final forecasting result. By using Markov model, the result is more accurate than BP neural network.

[#40] Distance Measuring Using Calibrating Subpixel Distances of Stereo pixel Pairs in Artificial Compound Eye

Tao Jiang, Control Engineering College

The electronic cluster eye (eCley) is a new artificial compound eye with some prominent properties of high resolution, miniature volume, and large field of view. Although having the potential capability of obtaining the depth information, the limitation of the short focal length and tiny volume of the eCley still confine the conventional stereo matching algorithms to determine the distances of objects. In this paper, a new method of measuring the subpixel distances of stereo pixel pairs for the eCley is introduced to implement the function of perceiving the depth information. According to the property of the intensity transitional area, the proposed algorithm employs the corrected coefficients to eliminate the deviation of lightness, identifies the transitional area between the objects and background, fits the edge intensity distribution with the Sigmoid function, and derives the

optimal subpixel distances of pixel pairs. The detailed experiments and analysis further demonstrate the effectivity of this method. In the real application the method achieves the accuracy of 90% and satisfies real demands.

[#31] Quaternion-based Color Difference Measure for Removing Impulse Noise in Color Images

Yicong Zhou, University of Macau
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This paper introduces a new color difference measure based on quaternion representation and a filtering algorithm for impulse noise removal in color images. Simulations and comparisons demonstrate that our measure and algorithm have excellent performance in detecting and removing impulse noise.

[#34] Freight Transport Prediction Using Electronic Waybills and Machine Learning

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Lawrence Henesey, Blekinge Institute of Technology

A waybill is a document that accompanies the freight during transportation. The document contains essential information such as, origin and destination of the freight, involved actors, and the type of freight being transported. We believe, the information from a waybill, when presented in an electronic format, can be utilized for building knowledge about the freight movement. The knowledge may be helpful for decision makers, e.g., freight transport companies and public authorities. In this paper, the results from a study of a Swedish transport company are presented using order data from a customer ordering database, which is, to a larger extent, similar to the information present in paper waybills. We have used the order data for predicting the type of freight moving between a particular origin and destination. Additionally, we have evaluated a number of different machine learning algorithms based on their prediction performances. The evaluation was based on their weighted average true-positive and false-positive rate, weighted average area under the curve, and weighted average recall values. We conclude, from the results, that the data from a waybill, when available in an electronic format, can be used to improve knowledge about freight transport. Additionally, we conclude that among the algorithms IBk, SMO, and LMT, IBk performed better by predicting the highest number of classes with higher weighted average values for true-positive and false-positive, and recall.

[#54] Train Timetable Optimization Research Based on PSO Energy-Efficient Operation Strategy

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Youneng Huang, Beijing Jiaotong University
Miao Zhang, Beijing Jiaotong University

Railway transportation, as one of the most energy-intensive industries, consumes a large amount of energy each year and train energy-efficient operations are paid more attention to reduce energy consumption and operation costs. This paper proposes to optimize the energy-efficient operation strategy and the integrated train timetable together. After considering the variable fiction and the speed limits and gradients of the real subway line, this paper applies a PSO analytical formulation to calculate the optimal speed profile with fixed trip time for each trip. Then paper designs a numerical algorithm to distribute the total trip time among different sections to minimize the total energy consumption and prove the optimality of the distribution algorithm. Finally, the paper presents some examples based on the operation data from the Yizhuang Line of the Beijing Subway. The simulation results show the optimality of energy-efficient operation strategy and integrated timetable.

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