

ICCSS 2015

2015 International Conference on
**Informative and Cybernetics
for Computational Social
Systems**

August 13–15, 2015

Chengdu, Sichuan, China

CONFERENCE DIGEST

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Welcome Message

Welcome to the 2015 International Conference on Informative and Cybernetics for Computational Social Systems (ICCSS2015)!

ICCSS 2015 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 2015, 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 2015.



C. L. Philip Chen
General Chair, ICCSS 2015



Fei-Yue Wang
General Co-Chair, ICCSS 2015

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Committee

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Committee

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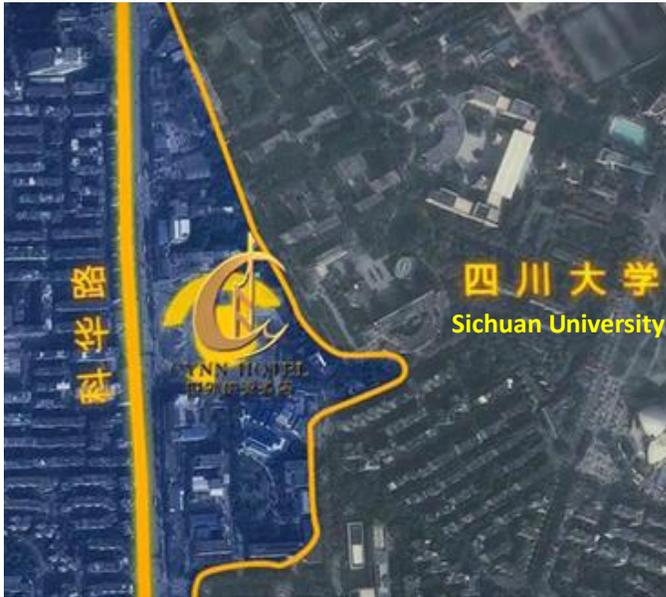
Venue Information

Hotel Accommodations

Chengdu Xanadu Hotel

Yihuan located south section of the North Branch Road Interchange, near Chunxi Road commercial center, south of CBD and Sichuan University campus
Tel: 86-28-8558 9999

Chamber Hall area of 6,000 square meters, the height of 14 meters, two floors perfectly seated and have different functions of the small conference hall can accommodate 3,000 people meeting the same time, each small hall can accommodate 50-200 people meeting or banquet, and for enterprises to provide large-scale business meetings, new product launches, press conferences, product demonstrations, business training, remote video and other forms of business activities.



Location	Distance	
Airport	Chengdu Shuangliu International Airport	15 km
Downtown	Chunxi Road	2.7 km

Technical Program Schedule

Thursday, August 13

Room: infrastructure teaching building B302, Sichuan University

Keynotes session: 9:30AM-12:30AM

Keynote 1: Prof. Shun-Feng Su, National Taiwan University of Science and Technology, Taiwan

Teabreak

Keynote 2: Prof. Ching-Chih Tsai, National Chung-Hsing University, Taichung, Taiwan

Session A: 1:30PM-5:00PM

Session 1: 1:30PM-3:00PM Chair: Chen-Chia Chunag

- #3: Robust Audio Watermarking Scheme via QIM of Correlation Coefficients using LWT and QR decomposition, Jinfeng Li, Tao Wu
- #20: Deep Learning and its Application to general Image Classification, Po-Hsien Liu, Shunfeng Su, Mingchang Chen, Chih-Ching Hsiao
- #40: The research of automatic horizontal adjustment of stereoscopic video shooting cradle head, Qi Guo , Nan Wang , Shilei Bai
- #19: A Novel Feature Fusion Method for Predicting Protein Subcellular Localization with Multiple Sites, Dong Wang, Shiyuan Han, Xumi Qu, Wenzheng Bao, Yuehui Chen, Yuling Fan, Jin Zhou
- #17: A Novel Approach for Virtual Facial Shape Cloning and Makeup Reproducing, Chiu-Shan Chen, Yu-Ju Lin, Tzu-Ang Chen, Ying-Qi Chen and Cheng-Chin Chiang

Teabreak

Session 2: 3:30PM-5:00PM Chair: Jin Zhou

- #44: A Distributed K-means Clustering Algorithm in Wireless Sensor Networks, Jin Zhou, Yuan Zhang, Yuyan Jiang, C. L. Philip Chen, Long Chen
- #18: A Flick Biometric Authentication Mechanism on Mobile Devices, Dong-Her Shih, Chia-Ming Lu, Ming-Hung Shih
- #26: Intelligent Mobile Web Service for Bioinformatics Systems, Chen-Chia Chuang, Jin-Tsong Jeng, Chih-Ching Hsiao, Yu-Yang Ho, Yue-Shiang Liu
- #29: Enhanced Hierarchical Fuzzy Model using Evolutionary GA with Modified ABC Algorithm for Classification Problem, Ting-Cheng Feng, Tsung-Ying Chiang, Tzue-Hseng S. Li
- #12: Matrix completion via extended linearized augmented Lagrangian method of multipliers, Feng Ma, Mingfang Ni, Wei Tong, Xinrong Wu

Banquet: 6:00PM-8:00PM

Location: Chengdu Xanadu Hotel 1nd Floor

Technical Program Schedule

Friday, August 14

Room: infrastructure teaching building B302, Sichuan University

Session B: 9:00AM-12:30AM

Session 1: 9:00AM-10:30AM Chair: Junwei Duan

- #5: Formation Control for Multiple Nonlinear Autonomous Agents Based on Iterative Method, Xixin Yang, Shiyuan Han, Dong Wang, Jin Zhou
- #6: Approximate optimal vibration control for systems with delayed state under persistent disturbances, Shi-Yuan Han, Yue-Hui Chen, Dong Wang, Jin Zhou, Cheng-Hui Zhang
- #21: Adaptive RFWCMAC Cooperative Formation Control for Multiple Ballbots Incorporated with Coupling Dynamics, Ching-Chih Tsai, Chang Hsuan Chiang, Feng-Chun Tai, Kao-Shing Hwang
- #31: Control of Nonlinear Systems with Full State Constraints Using Integral Barrier Lyapunov Functionals, Jing Li, Yan-Jun Liu
- #16: An Improvement of Recommender System to Find Appropriate Candidate for Recruitment with Collaborative Filtering, Chanawee Chanavaltada, Panpaporn Likitphanitkul, Manop Phankokkrud

Teabreak

Session 2: 11:00AM-12:30AM Chair: Zhulin Liu

- #9: An Improved LMMSE Algorithm for SC-FDMA, Yating Luan, Chunrong Kan, Haoyang Du, Qian Zhao
- #22: Prediction of Protein Structure Classes, Dong Wang, Wenzheng Bao, Shiyuan Han, Yuehui Chen, Likai Dong, Jin Zhou
- #24: Instant Flicker Detection and Automatic Resolution for Smart Remote Collaboration Systems, Hyoseok Yoon, Se-Ho Park, Kyung-Taek Lee
- #30: Two-Step Gravitational Search Algorithm, Tsung-Ying Chiang, Ting-Cheng Feng, Tzoo-Hseng S. Li
- #45: A New Fast-F-CONFIS Training of Fully-Connected Neuro-Fuzzy Inference System, Jing Wang, C. L. Philip Chen, Yuan-Yan Tang, Chao-Tian Chen
- #46: Mixed Radix Systems of Fully Connected Neuro-Fuzzy Inference Systems with Special Properties, Jing Wang, C. L. Philip Chen, Chao-Tian Chen, Yong-Quan Yu

Session C: 2:00PM-3:30PM Chair: Change Ren

- #2: Collaborative Filtering Recommendation Combining FCM and Slope One Algorithm, Yan Ying, Yan Cao
- #11: Detecting Image Forgery Using Linear Constraints Based on Shading and Shadows, Huayong Ge, Shujuan Fang
- #23: Detection Method for Cheating Behavior in Examination Room Based on Artificial Bee Colony Algorithm, Yongzheng Lin, Jin Zhou
- #25: Separate Modal Analysis using Scale Invariant Feature Transform (SIFT) with Digital Image Elastography (DIET) for breast cancer screening test, Mubashir Hussain, Hamood Ur Rehman, Owais Nazir, Amer Kashif, Ali Hassan, Muhammad Awais Dildar
- #32: Time-varying Universe Based Linguistic Dynamic Analysis of Timing Design for Parallel Traffic Light, Hong Mo, Fei-Yue Wang, Fenghua Zhu

Thursday, August 13,
Session A: 1:30PM-5:00PM

Room: infrastructure teaching
building B302, Sichuan University

Session 1: 1:30PM-3:00PM

[#3] Robust Audio Watermarking Scheme via QIM of Correlation Coefficients using LWT and QR decomposition
Jinfeng Li, Southwest Jiaotong University
Tao Wu, Beijing University of Posts and Telecommunications

In order to realize the copyright protection of audio information and improve the security of the watermarking algorithm, a secure robust audio watermarking algorithm via quantization of the random correlation coefficients in lifting wavelet transform domain and QR decomposition is proposed. Firstly, lifting wavelet transform is performed on the audio data, the approximate components are mapped into matrix, and QR decomposition is done to the blocks of the matrix. The watermark is embedded by quantization the correlation coefficient of R matrix vector and a random vector using quantization index modulation. Simulation results show that the algorithm not only have good imperceptibility and high embedding capacity, but also strong robustness against common signal processing, such as noise addition, resampling, low-pass filtering, re-quantization, MP3 compression and so on.

[#20] Deep Learning and its Application to general Image Classification
Po-Hsien Liu, National Taiwan University of Science and Technology
Shun-Feng Su, National Taiwan University of Science and Technology
Ming-Chang Chen, National Taiwan University of Science and Technology
Chih-Ching Hsiao, Kau Yuan University

Deep learning has recently exhibited good performance in many applications. The convolution neural network is an often-used architecture for deep learning and has been widely used in computer vision and audio recognition, and outperformed other related handcraft designed feature in recent years. These techniques compared to other artificial intelligence algorithms and handcraft features need extremely much more time in training and testing and then were not widely used in the early days. Our study is about the impacts of different factors used in the convolution neural network. The considered factors are network depth, numbers of filters, and filter sizes. The used data set is the CIFAR dataset. According to our experiments, some suggestions about those factors are recommended in this study.

[#40] The research of automatic horizontal adjustment of stereoscopic video shooting cradle head
Qi Guo, Communication University Of China
Nan Wang, Communication University Of China
Shilei Bai, Communication University Of China

With the worldwide popular of the stereoscopic film "Avatar", stereoscopic video has become the focus of the industry, and also greatly promoted the development of stereoscopic video shooting technology. On the market nowadays, the stereoscopic video shooting cradle head gets horizontal mostly through the manual setting of the independent knobs and the legs of the tripod by observing the change of the spirit level. If the tripod is not stable enough, the camera's position and angle will change. The paper is about the automatic adjustment of the stereoscopic video shooting cradle head. The tri-axis accelerometer installed on the shooting cradle head works as the collection module of position and attitude data. The collected signal will be transmitted through the A/D conversion module to 51 series single chip microcomputer (SCM) for real-time processing. The difference value of the current angle and horizontal angle will be inputted to PID, and then produce

an adjustable of duty cycle, thus we can modify the horizontality of the cradle head. By compensating and correcting the deviation angle to achieve the automatic adjustment of the cradle head's horizontal, basically satisfy the requirements of stability, accurate, fast to control system.

[#19] A Novel Feature Fusion Method for Predicting Protein Subcellular Localization with Multiple Sites,
Dong Wang, University of Jinan
Shiyuan Han, University of Jinan
Xumi Qu, University of Jinan
Wenzheng Bao, University of Jinan
Yuehui Chen, University of Jinan
Yuling Fan, University of Jinan
Jin Zhou, University of Jinan

This paper proposes a novel feature fusion method for the protein subcellular multiple-site localization prediction. Several types of features are employed in this novel protein coding method. The first one is the composition of amino acids. The second is pseudo amino acid composition, which mainly extract the location information of each amino acid residues in protein sequence. Lastly, the information for local sequence of amino acids is taken into consideration in this research. Generally, k nearest neighbor, supporting vector machine and other methods, has been used in the field of protein subcellular localization prediction. In our research, the multi-label k nearest neighbor algorithm has been employed in the classification model. The overall accuracy rate may reach 66.7304% in Gnos-mploc dataset.

[#17] A Novel Approach for Virtual Facial Shape Cloning and Makeup Reproducing
Chiu-Shan Chen, National Dong Hwa University
Yu-Ju Lin, National Dong Hwa University
Tzu-Ang Chen, National Dong Hwa University
Ying-Qi Chen, National Dong Hwa University
Cheng-Chin Chiang, National Dong Hwa University

Facial shape cloning (FSC) is a task aiming to simulate the plastic surgery result of reshaping a user's face to bear analogy to a model's facial appearance. Facial cosmetic reproducing (FMR) is another task intending to emulate the transfer of the cosmetic effects on a model face to the user's face. This paper presents a method which can perform both the FSC and the FMR. This proposed method features the approach of synthesis by example (SBE) meaning that a user can accomplish both tasks by just supplying an example picture with the desired model face or the cosmetic effects. The techniques devised in this method exploit no sophisticated domain knowledge in facial plastic surgery and physical modeling of cosmetic materials. The users need not to have any professional background in image processing and synthesis. Besides the above prominent features, another major superiority of proposed method over other existing methods is that the devised techniques can generically achieve the synthesis of any facial reshaping and cosmetic effect on the provided example picture. We need not to dedicatedly develop different synthesizing techniques for various designated reshaping or cosmetic effects. Thus, the design complexity of the system is significantly reduced.

Session 2: 3:30PM-5:00PM

[#44] A Distributed K-means Clustering Algorithm in Wireless Sensor Networks
Jin Zhou, University of Jinan
Yuan Zhang, University of Jinan
Yuyan Jiang, Hong Kong and Macao Affairs Office of the State Council
C. L. Philip Chen, University of Macau
Long Chen, University of Macau

It is a hard work for the traditional k-means algorithm to perform data clustering in a large, dynamic distributed wireless sensor networks. In this paper, we propose a distributed k-means clustering algorithm, in which the distributed clustering is performed at each sensor with the collaboration of its neighboring sensors. To extract the important features and improve the clustering results, the attribute-weight-entropy regularization technique is used

in the proposed clustering method. Experiments on synthetic datasets have shown the good performance of the proposed algorithms.

[#18] A Flick Biometric Authentication Mechanism on Mobile Devices

Dong-Her Shih, National Yunlin University of Science and Technology

Chia-Ming Lu, National Yunlin University of Science and Technology

Ming-Hung Shih, Iowa State University

Smartphones nowadays are used not only for communication but also for many emerging applications, such as m-commerce. And, biometric methods can provide promising applications to secure mobile devices. In this paper, we propose a novel authentication mechanism using the information collected from the accelerometer sensor and touchscreen of the smartphone. We design an authentication mechanism that adopts features transformed from those readings. Experimental result show that the proposed mechanism can build a robust authentication environment for smartphone users.

[#26] Intelligent Mobile Web Service for Bioinformatics Systems

Chen-Chia Chuang, Kao Yuan University

Jin-Tsong Jeng, Kao Yuan University

Chih-Ching Hsiao, National Formosa University

Yu-Yang Ho, National Formosa University

Yue-Shiang Liu, National Formosa University

In this paper, to integrate android systems, intelligent computing and web service on an intelligent mobile web service computing systems for bioinformatics is proposed. That is, users can send parameters to control the intelligent computing system under Matlab/C#/Java and query from client-side to server-side in the proposed bioinformatics systems with their android phone. Besides, the proposed system can also deal with disease genes search under web service with bioinformatics web. At the same time, web service is important communication protocol in the proposed systems. Consequently, the proposed systems can provide that user can modify parameters for controlling the proposed intelligent computing, deal with disease genes search under web service with bioinformatics web and obtain results from the proposed systems by android phone arbitrarily.

[#29] Enhanced Hierarchical Fuzzy Model using Evolutionary GA with Modified ABC Algorithm for Classification Problem

Ting-Cheng Feng, National Cheng Kung University

Tsung-Ying Chiang, National Cheng Kung University

Tzau-Hseng S. Li, National Cheng Kung University

This paper enhances the hierarchical fuzzy model to deal with the classification problems by adopting evolutionary genetic algorithm (GA) with a modified artificial bee colony (ABC) algorithm. Traditionally, fuzzy classifier could not provide a sufficiently high classification rate in higher feature dimension with few rules. In the literature, the genetic algorithm can take advantage from the global searching; moreover, the characteristic of ABC can enhance the local searching. Therefore, the hierarchical fuzzy model integrates GA with a modified ABC algorithm is constructed in this study to recognize some classification problems. The classification simulation includes three benchmark databases such as Glass, Wine, and Iris database. The result demonstrates that using evolutionary GA and modified ABC algorithm is beneficial than that without turning. Therefore, it is clearly that our methodology considers not only the global exploration but also the local exploitation.

[#12] Matrix completion via extended linearized augmented Lagrangian method of multipliers

Feng Ma, PLA University of Science and Technology

Mingfang Ni, PLA University of Science and Technology

Wei Tong, PLA University of Science and Technology

Xinrong Wu, PLA University of Science and Technology

The problem of recovering low-rank matrix from only a subset of observed entries is known as the matrix completion problem. Many problems arising in compressive sensing, image processing, machine learning, can be usefully cast as this problem. In this paper, we

propose an extended linearized augmented Lagrangian method of multipliers for the problem, and prove its global convergence. We show that all the resulting subproblems have closed-forms solutions. Finally, some numerical experiments are conducted to show its efficiency.

Friday, August 14,
Session B: 9:00AM-12:30AM

Room: infrastructure teaching
building B302, Sichuan University

Session 1: 9:00AM-10:30AM

[#5] Formation Control for Multiple Nonlinear Autonomous Agents Based on Iterative Method
Xixin Yang, Qingdao University
Shi-Yuan Han, University of Jinan
Dong Wang, University of Jinan
Jin Zhou, University of Jinan

This paper is concerned with approximate optimal formation control for multiple nonlinear autonomous agents based on iterative method. By designing some concatenation vectors, a whole multi-agent system is obtained, and the original formation control problem is transformed into a classic tracking problem. Based on the classic optimal tracking control theories, the optimal formation control problem is viewed as a two-point boundary value problem. Then, the approximate formation controller is obtained by using the successive approximation approach, which composes of analytic feedback terms and a compensation term. The compensation term can be obtained by calculating an iteration adjoint vectors. By introducing a finite term of the adjoint vector sequence, an approximate formation controller is designed. Simulation results show that the proposed approximate formation controller produces the better value of control performances.

[#6] Approximate optimal vibration control for systems with delayed state under persistent disturbances
Shi-Yuan Han, Jinan University
Yue-Hui Chen, Jinan University
Dong Wang, Jinan University
Jin Zhou, Jinan University
Cheng-Hui Zhang, Shandong University

This paper studies the vibration control problem for systems with delayed state under persistent disturbances. In order to simply the vibration control problem for system with delayed states, a free-delayed-state method is proposed to reform the original problem into an equivalent optimal regulate problem with delay-free ones. Then, an approximate optimal vibration controller is obtained from a Riccati equation and a Sylvester equation. The results of numerical simulations illustrate that the proposed vibration controller can eliminate the unstable influences caused by the persistent disturbances and delayed state, and improve control performance effectively.

[#21] Adaptive RFWCMAC Cooperative Formation Control for Multiple Ballbots Incorporated with Coupling Dynamics
Ching-Chih Tsai, National Chung Hsing University
Chang Hsuan Chiang, National Chung Hsing University
Feng-Chun Tai, National Chung Hsing University
Kao-Shing Hwang, National Sun Yat-Sen University

This paper presents an intelligent consensus-based cooperative formation control using recurrent fuzzy wavelet cerebellar-model-articulation-controller (RFWCMAC) for a team of uncertain multiple ballbots. The dynamic model of each ballbot is formulated as one multivariable second-order underactuated dynamic system model, and the multirobot system is modeled by graph theory. By online learning the system uncertainties using RFWCMAC, an intelligent consensus-based cooperative formation control approach is presented using the Lyapunov stability theory and sliding-mode control approach, in order to carry out formation control in the presence of uncertainties. Simulations are conducted to show the effectiveness and merits of the proposed method.

[#31] Control of Nonlinear Systems with Full State Constraints Using Integral Barrier Lyapunov Functionals

Jing Li, Liaoning University of Technology,
Yan-Jun Liu, Liaoning University of Technology,

In this paper, we present controller design for strict feedback nonlinear systems with full state constraints. An Integral Barrier Lyapunov Functionals (iBLF) is employed to obtain the adaptation law and the controllers. Compared with existing methods, the unknown parameters are considered in the system. Under the proposed iBLF-based control, we show that tracking errors are achieved without violation of any constraint and the closed loop signals remain bounded. The stability of the closed-loop system is proven by using the Lyapunov theorem.

[#16] An Improvement of Recommender System to Find Appropriate Candidate for Recruitment with Collaborative Filtering

Chanawee Chanavaltada, King Mongkut's Institute of Technology Ladkrabang
Panpaporn Likitphanitkul, King Mongkut's Institute of Technology Ladkrabang
Manop Phankokkruad, King Mongkut's Institute of Technology Ladkrabang

Recruitment is a significant process that affects to organizational performance. Recruiters expect to meet the most appropriate employee for the right job, but a large number of resumes make more difficult to their decision. For this reason, this paper proposed the recommender system to support recruiter in the decision and manage recruitments. The two techniques include matching and collaborative filtering. In the matching process, it compares the profile data and takes a score in order to rank the candidates. However, the scoring remains some problem that candidate scores are low dispersion. Therefore, the collaborative filtering technique was used to solve scoring problem. By applying this technique, the results shown that the scores were adjusted the distinction. Thus, the collaborative filtering could improve the score dispersion and easy to identify the most appropriate candidates, who had the best required qualification.

Session 2: 11:00AM-12:30AM

[#9] An Improved LMMSE Algorithm for SC-FDMA,
Yating Luan, University of PLA of Science and Technology
Chunrong Kan, University of PLA of Science and Technology
Haoyang Du, University of PLA of Science and Technology
Qian Zhao, University of PLA of Science and Technology

The channel estimation algorithm which has excellent performance is necessary for Single Carrier Frequency Division Multiple Access (SC-FDMA) system. The traditional Least Square (LS) algorithm and Linear Minimum Mean-Square (LMMSE) algorithm exist many problems. The problem of the LMMSE algorithm which is too complex is found to be applied effectively by researching LMMSE algorithm. The traditional LMMSE algorithm can be improved with the help of Jacobi iterative algorithm for solving linear equations. Meantime, theoretical analysis and simulation results indicate that: The improved LMMSE algorithm has more superior performance at low SNR, it not only can reduce the computational complexity, but also has more precise estimation result.

[#22] Prediction of Protein Structure Classes
Dong Wang, University of Jinan
Wenzheng Bao, University of Jinan
Shiyuan Han, University of Jinan
Yuehui Chen, University of Jinan
Likai Dong, University of Jinan
Jin Zhou, University of Jinan

Prediction of protein special structural plays a significant role to better recognize the protein folding patterns. Multiple prediction methods may be used to predict the structures based on the information of sequences and biostatistics. The accuracy, nevertheless, is strongly affected by the efficiency of classification, the robustness of model and other factors. In our research, flexible neutral tree (FNT), a novel classification model, is employed as the base classifiers. The alterable structural tree take advantage of the selection of available features, aims to improve

the efficiency. To examine the performance and efficiency of such algorithm combination, an ASTRAL dataset is selected as the test dataset. Our results show that a higher prediction accuracy could be achieved compared with other methods, the structure of the classification model for prediction of protein structural may make incremental improvements possible.

[#24] Instant Flicker Detection and Automatic Resolution for Smart Remote Collaboration Systems

Hyoseok Yoon, Korea Electronics Technology Institute
Se-Ho Park, Korea Electronics Technology Institute
Kyung-Taek Lee, Korea Electronics Technology Institute

In a remote smart collaboration application, sharing seamless and consistent information between a local site and interacting remote participants is essential. Often visual seams are created when inconsistent visual information is shared due to heterogeneous projector-camera systems (ProCams). One known issue is flickering noise occurred from re-capturing projected scenes with the camera of ProCams. In this paper, we design and implement an automatic and instant flicker-free calibration. With the proposed method, ProCams can remove or mitigate flicker problems by controlling both camera and projectors of ProCams to detect and resolve flickers. To illustrate our method, we present an exemplar ProCams configuration, flicker detection options and automatic flicker resolution strategy.

[#30] Two-Step Gravitational Search Algorithm

Tsung-Ying Chiang, National Cheng Kung University
Ting-Cheng Feng, National Cheng Kung University
Tzoo-Hseng S. Li, National Cheng Kung University

In this paper, we present an efficient algorithm for solving optimization problems, which is based on gravitational search algorithm (GSA). In the proposed technique, called Two-Step method, the best solution of position will be considered and calculated with another agents, and the fitness of extended agents are compared with agents in original gravitation field, which can reinforce the exploration and exploitation performance. Ten benchmark functions are used to evaluate and to compare performance of the presented algorithm with GSA based on the same function evaluations. The initialized populations are produced randomly and are identical for each round of all the algorithms in the same benchmark function. The obtained results confirm the better performance of the proposed method in solving various nonlinear functions.

[#45] A New Fast-F-CONFIS Training of Fully-Connected Neuro-Fuzzy Inference System

Jing Wang, University of Macau
C. L. Philip Chen, University of Macau
Yuan-Yan Tang, University of Macau
Chao-Tian Chen, Guangdong polytechnic Normal University

In this paper, Fuzzy Neural Network (FNN) is transformed into an equivalent Fully Connected Neuro-Fuzzy Inference System (F-CONFIS). The F-CONFIS is a new type of neural network that differs from traditional neural networks, which there are the dependent and repeated weights. For these special properties, its learning algorithm should be different from that of the conventional neural networks. Therefore, a new efficient training algorithm for F-CONFIS is proposed. Simulation examples are given to verify the validity of the proposed method, and achieve satisfactory results. In all engineering applications using FNN, developing Fast-F-CONFIS training has its emerging values.

[#46] Mixed Radix Systems of Fully Connected Neuro-Fuzzy Inference Systems with Special Properties

Jing Wang, University of Macau
C. L. Philip Chen, University of Macau
Chao-Tian Chen, Guangdong polytechnic Normal University
Yong-Quan Yu, Guangdong University of Technology

In this paper, based on the transformation from the fuzzy inference system into a fully connected neural network, F-CONFIS, the mixed radix systems in Fully Connected Neural Fuzzy Inference Systems are derived. The functional equivalence between a fuzzy system and a neural network has been proved, however, they are non-constructive. F-CONFIS provides constructive steps to build the equivalence

between a neuro-fuzzy system and a NN. F-CONFIS differs from traditional neural networks by its special properties and can be considered as the variation of a kind of multilayer neural network. It is important to find the mixed radix systems and the properties of this new type of fuzzy neural networks properties so that the training algorithm can be properly carried out for the F-CONFIS. The simulation results indicate that the proposed approach achieves excellent performance.

**Friday, August 14,
Session C: 2:00PM-3:30PM**

**Room: infrastructure teaching
building B302, Sichuan University**

[#2] Collaborative Filtering Recommendation Combining FCM and Slope One Algorithm

**Yan Ying, Dalian Maritime University
Yan Cao, Dalian Maritime University**

In view of the data sparseness problem existed in the traditional collaborative filtering recommendation algorithm, this paper proposes a hybrid collaborative filtering recommender framework integrated FCM clustering and Slope One algorithm and FSUBCF algorithm. Firstly this algorithm use the Slope One algorithm based on FCM cluster to predict item ratings that users have not rated in matrix, and then, to implement recommendation by the collaborative filtering recommendation algorithm based on user. The experimental results show that this algorithm can improved the prediction accuracy compared to the original Slope One algorithm and can adapt to the data sparser recommendation system. Compared with other traditional collaborative filtering algorithms, the recommendation accuracy also has obvious advantages.

[#11] Detecting Image Forgery Using Linear Constraints Based on Shading and Shadows

**Huayong Ge, Donghua University
Shujuan Fang, Donghua University**

According to the shadows and shading constraints in the Lambert illumination model, the paper proposes a method to detect image forgery. This method describes a multitude of constraints in shading and shadows based on the direction of the light source, by analyzing the intersection of the wedges to verify the images. The linear programming problem is employed to confine the direction and angle in the wedge, and the conjugate gradient methods are employed to describe the shading to verify the direction of the light source. The tampering image can be determined by the inconsistency in light source direction with shading and the intersection with wedges. Combining both the shading and shadow make the parameters in wedge more accurate. By the improved corresponding algorithms, the experimental results show that the light source direction and consistency can be calculated accurately in the shadows and shading.

[#23] Detection Method for Cheating Behavior in Examination Room Based on Artificial Bee Colony Algorithm

**Yongzheng Lin, Beijing Jiaotong University
Jin Zhou, University of Jinan**

A detection method for cheating behavior in examination room based on artificial bee colony algorithm is presented. The problem of moving objects detection is transformed into the difference function of color value between foreground and background. Artificial bee colony algorithm is applied for optimizing the objective function. The background component is separated from the sequence images by value of comparing with proper threshold and the moving target track can be successfully extracted. Simulation experiments with real surveillance image show that the method can attain good results for finding the track of moving objects and achieve the purpose of detecting the cheating behaviors in examination room.

[#25] Separate Modal Analysis using Scale Invariant Feature Transform (SIFT) with Digital Image Elasto Tomography (DIET) for breast cancer screening test

**Mubashir Hussain, National University of Sciences and Technology (NUST)
Hamood Ur Rehman, National University of Sciences and Technology (NUST)
Owais Nazir, National University of Sciences and Technology (NUST)
Amer Kashif, National University of Sciences and Technology (NUST)**

Ali Hassan, National University of Sciences and Technology (NUST)

Muhammad Awais Dildar, National University of Sciences and Technology (NUST)

Digital Image Elasto Tomography (DIET) is noninvasive approach for detection and screening test of breast cancer at an early stage. In DIET mechanical vibrations are applied on the surface of breast after applying fiducial markers and images are taken to capture surface motion using five digital cameras. Applying Scale Invariant Feature Transform (SIFT) on the unmarked surface of the breast to produce reference points for tracking surface motion. Using Separate Modal Analysis frequency and amplitude response of oscillations are evaluated using markers. SIFT features are used to detect change in stiffness which refers to presence and/or location of tumor. This increases motion data and reduces noise for detection of cancerous tumours.

[#32] Time-varying Universe Based Linguistic Dynamic Analysis of Timing Design for Parallel Traffic Light

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Reasonable timing design for traffic light can induce and maintain the transportation systems in good order. How to allocate the time are the keys. In the paper, the theory of time-varying universe is used to describe the circle time, and corresponding fuzzy sets on the universe are also discussed to modeling the situation of traffic flow, then the parallel traffic management and control methods which are dynamic with the time change are presented. A simulation example are provided to analyze the linguistic dynamic evolution of timing design of traffic light when the traffic flow is change with time-varying for an intersection

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