2019 International Conference on Robotics Systems and Vehicle Technology (RSVT 2019)

18-20, October, 2019

Wuhan, China

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Welcome Message from Organizing Committee

It is our great pleasure to invite you to join our international conferences - 2019 International Conference on Robotics Systems and Vehicle Technology (RSVT 2019). This event will provide a unique opportunity for editors and authors to get together and share their latest research findings and results. We look forward to welcoming you at Wuhan.

We're confident that over the two days you'll get the theoretical grounding, practical knowledge, and personal contacts that will help you build long-term, profitable and sustainable communication among researchers and practitioners working in a wide variety of scientific areas with a common interest in Robotics Systems and Vehicle Technology.

On behalf of all the conference committees, we would like to thank all the authors as well as the technical program committee members and reviewers. Their high competence, their enthusiasm, their time and expertise knowledge, enabled us to prepare the high-quality final program and helped to make the conference become a successful event.

We truly hope you'll enjoy the conference and get what you expect from the conference.

Organizing Committee
October 18, 2019

Table of Contents

Keynote Speakers Introductions

Keynote Speaker I

Prof. Bo-Chiuan Chen
National Taipei University of Technology, Taiwan

Bo-Chiuan Chen received his Ph.D. degree in Mechanical Engineering from the University of Michigan, Ann Arbor in 2001. He is now a Professor in Vehicle Engineering at National Taipei University of Technology, Taipei, Taiwan. He obtained the Outstanding Young Engineer Award and the Educational Achievement Award from SAE Taipei Section in 2008 and 2011, respectively. He currently serves as a part-time technical specialist at Automotive Research and Test Center, Taiwan. His main research focuses include automated driving, advanced driver assistance system, vehicle dynamics and control, hybrid electric powertrain vehicle, electric vehicle and engine control.

Keynote Speaker II

Prof. Chin-Chen Chang
Feng Chia University, Taiwan

Professor C.C. Chang obtained his Ph.D. degree in computer engineering from National Chiao Tung University. He's first degree is Bachelor of Science in Applied Mathematics and master degree is Master of Science in computer and decision sciences. Both were awarded in National Tsing Hua University. Dr. Chang served in National Chung Cheng University from 1989 to 2005. His current title is Chair Professor in Department of Information Engineering and Computer Science, Feng Chia University, from Feb. 2005.

Prior to joining Feng Chia University, Professor Chang was an associate professor in Chiao Tung University, professor in National Chung Hsing University, chair professor in National Chung Cheng University. He had also been Visiting Researcher and Visiting Scientist to Tokyo University and Kyoto University, Japan. During his service in Chung Cheng, Professor Chang served as Chairman of the Institute of Computer Science and Information Engineering, Dean of College of Engineering, Provost and then Acting President of Chung Cheng University and Director of Advisory Office in Ministry of Education, Taiwan.

Professor Chang's specialties include, but not limited to, data engineering, database systems, computer cryptography and information security. A researcher of acclaimed and distinguished services and contributions to his country and advancing human knowledge in the field of information science, Professor Chang has won many research awards and honorary positions by and in prestigious organizations both nationally and internationally. He is currently a Fellow of IEEE and a Fellow of IEE, UK. On numerous occasions, he was invited to serve as Visiting Professor, Chair Professor, Honorary Professor, Honorary Director, Honorary Chairman, Distinguished Alumnus, Distinguished Researcher, Research Fellow by universities and research institutes. He also published over 1,100 papers in Information Sciences. In the meantime, he participates actively in international academic organizations and performs advisory work to government agencies and academic organizations.

Keynote Speaker III

Prof. Wai Yuen Szeto
The University of Hong Kong, Hong Kong

Dr. Wai Yuen Szeto is an Associate Professor at the Department of Civil Engineering at The University of Hong Kong, and the Deputy Director of the Institute of Transport Studies at that university. Dr. Szeto is a Top 1 % Scholar (2015-2017) according to ISI's Essential Science Indicators. His current h-index is 38 (Google scholars). Dr. Szeto is an author of around 120 refereed journal papers, with two papers in Operations Research and more than 25 papers in Transportation Research Part B. His publications have been cited over 4370 times (Google scholars). The publications are related to public bikes, dynamic traffic assignment, transport network design, public transport, network reliability, transport big data, taxi, game theoretic approaches to transport and logistic problems, modeling land use, transport and environment interaction, and sustainable transport. He received the World Conference on Transport Research Prize (2001), the Eastern Asia Society for Transportation Studies Outstanding Paper Award (2003), the Hong Kong Society for Transportation Studies Outstanding Dissertation Paper Award and the Gordon Newell Memorial Prize (2005), the Hong Kong Institute of Engineers Outstanding Paper Award for Young Engineers/Researchers (2008), and the Best Paper Award in the 10th International Workshop on Computational Transportation Science (2018).

Currently, Dr. Szeto is an Editor of Transportmetrica B, the Editor in Asian Region of International Journal of Transportation, an Area Editor of Networks and Spatial Economics, an Associate Editor of Journal of Intelligent Transportation Systems, Transportmetrica A, Travel Behaviour and Society, and an Editorial Board Member of Transportation Research Part B, Transportation Research Part C, Transportation Research Part D, Transportation Research Part E, Journal of Advanced Transportation, International Journal of Sustainable Transportation. He is also a Guest Editor of 8 journals and a reviewer for about 60 international journals. He received Certificate of Excellence in Reviewing from Transportation Research Part B and Part C in 2013.

Keynote Speaker IV

Prof. Dan Chen
Wuhan University, Wuhan

Prof. Dan Chen is currently a professor in Computer School, Wuhan University, Wuhan, China. He obtained B.Sc., M. Eng., and Ph.D. from Wuhan University, Huazhong University of Science & Technology, and Nanyang Technological University (Singapore) respectively. He held the “ChuTian” Distinguished Professorship with Hubei Province, China. He was an HEFCE research fellow with the University of Birmingham, United Kingdom. He was an Associate Research Fellow with Singapore Institute of Manufacturing Technology (A*Star).

Conference Introductions

Welcome to 2019 RSVT Wuhan conference. This conference is organized by ACM Chapter Singapore. The objective of the conference is to provide a platform for researchers, engineers, academicians as well as industrial professionals from all over the world to present their research results and development activities on Robotics Systems and Vehicle Technology.

Papers will be published in the following proceeding:

International Conference Proceedings Series by ACM (ISBN: 978-1-4503-6242-9), which will be archived in the ACM Digital Library, and indexed by Ei Compendex, Scopus and submitted to be reviewed by Thomson Reuters Conference Proceedings Citation Index (ISI Web of Science).

Conference website and email: http://www.rsvt.org and rsvt@acm-sg.org

Conference Venue

Wendu Lecture Hall, School of Computer Science & Engineering,

Liufang Campus, Wuhan Institute of Technology, Wuhan, China

Add: LiuFang Campus, No.206, Guanggu 1st road,
Donghu New & High Technology Development Zone, Wuhan, Hubei Province, China

Wuhan Institute of Technology, originally named as Hubei Petrochemical Institute was under the administration of Hubei Province when it was established in June 1972. It was renamed to Wuhan Institute of Chemical Technology (WICT) and was put under the administration of the former Ministry of Chemical Industry of the Central Government in March 1980 with the permission of the former Ministry of Education. As a result of the readjustment of the management system for colleges in July 1998, WICT has been put under the joint administration of central and local authorities with the stress on the latter. The university was renamed as Wuhan Institute of Technology (WIT) with the approval of the Ministry of Education and Hubei Provincial Government in February 2006. In November the same year, WIT received the national evaluation launched by the Ministry of Education of China, on undergraduate teaching quality and WIT won an A, the top grade of the evaluation. After 37 years' endeavor, the university has become a multi-disciplinary university with its own characteristics, fine teaching environment, and advanced research level.

Registration Guide

October 18, 2019 (Friday)

Time: 10:00~17:00

Venue: School of Computer Science & Engineering,

Liufang Campus, Wuhan Institute of Technology, Wuhan, China

Registration Steps

1. Arrive at Wuhan Institute of Technology, Liufang Campus;
2. Inform the conference staff of your paper ID;
3. Sign your name on the Participants list;
4. Sign your name on Lunch & Dinner requirement list;
5. Check your conference kits: (1 conference program, 1 lunch coupon, 1 dinner coupon, 1 receipt, 1 name card, 1 flash disk (papers collection), 1 laptop bag);
6. Finish registration.

Tips: Please arrive at the conference to upload or copy Slides (PPT) into the laptop room 10 minutes before the session begins.

Note:

(1) The organizer doesn't provide accommodation, and we suggest you make an early reservation.

(2) One Best Presentation will be selected from each presentation session, and the Certificate for Best Presentation will be awarded at the end of each session on October 19, 2019.

(3) One day tour includes lunch but does not include attractions tickets, and participants need to take care of themselves.

* One regular registration can cover one participant.

*The organizers cannot accept liability for personal injuries, or for loss or damage of property belonging to meeting participants, either during, or as a result of the meeting. Please take care of all your belongings.

*Along with your registration, you will receive your name badge, which must be worn when attending all official conference sessions and activities. Participants without a badge will not be allowed to enter the venue building. Please don't lend your name badge to others.

Presentation Instructions

Instructions for Oral Presentations

Devices Provided by the Conference Organizer:

Laptop Computer (MS Windows Operating System with MS PowerPoint and Adobe Acrobat Reader)
Digital Projectors and Screen
Laser Sticks

Materials Provided by the Presenters:

PowerPoint or PDF Files (Files should be copied to the Conference laptop at the beginning of each Session.)

Duration of each Presentation (Tentatively):

Regular Oral Presentation: about 12 Minutes of Presentation and 3 Minutes of Question and Answer

Instructions for Poster Presentation

Materials Provided by the Conference Organizer:

The place to put poster

Materials Provided by the Presenters:

Home-made Posters
Maximum poster size is A1
Load Capacity: Holds up to 0.5 kg

Best Presentation Award

One Best Presentation will be selected from each presentation session, and the Certificate for Best Presentation will be awarded at the end of each session on October 19, 2019.

Dress code

Please wear formal clothes or national representative of clothing.

Schedule for Conference

1/F, School of Computer Science & Engineering, October 18 (10:00-17:00)	
Arrival and Registration	
Wendu Lecture Hall, School of Computer Science & Engineering, October 19 (9:00-12:10)	
Opening Remark (9:00-9:10) Host: Prof. Yuntao Wu, Wuhan Institute of Technology, Wuhan Speaker: Prof. Yanduo Zhang, Wuhan Institute of Technology, Wuhan	
Keynote Speech I (9:10-9:50) **Title: Dynamics Control of Autonomous Vehicles** Prof. Bo-Chiuan Chen, National Taipei University of Technology, Taiwan	
Keynote Speech II (9:50-10:30) **Title: A Steganographic Algorithm Based on (7,4) Hamming Cod** Prof. Chin-Chen Chang, Feng Chia University, Taiwan	
Coffee Break & Group Photo (10:30-10:50)	
Keynote Speech III (10:50-11:30) **Title: An enhanced artificial bee colony algorithm for the static public bike repositioning problem** Prof. Wai Yuen Szeto, The University of Hong Kong, Hong Kong	
Keynote Speech IV (11:30-12:10) **Title: EEG Big Data Analysis** Prof. Dan Chen, Wuhan University, Wuhan	
Lunch (12:20-13:20)	
Wendu Lecture Hall, School of Computer Science & Engineering, October 19 (13:30-18:45)	
Session 1 (13:30-16:15) **Machine vision and image processing** Session Chair: Prof. Wai Yuen Szeto	
Coffee Break (16:15-16:30)	
Session 2 (16:30-18:45) **Data analysis and intelligent computing** Session Chair: Prof. Tao Lu	**Session 3 (16:30-18:30)** **Robot Control and Vehicle Engineering** Session Chair: Prof. Bo-Chiuan Chen
Poster session (10:30-16:30) Session Chair: Prof. Chin-Chen Chang	
Dinner (19:00-20:00)	
October 20 (9:00-17:00)	
One-Day Visit & Tour	

Morning Session

Morning, October 19, 2019 (Saturday)

Time: 9:00~12:10

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Opening Remarks (9:00~9:10)

Addressed by Prof. Yanduo Zhang from Wuhan Institute of Technology in Wuhan

Keynote Speech I (9:10~9:50)

Title: Dynamics Control of Autonomous Vehicles

Prof. Bo-Chiuan Chen
National Taipei University of Technology, Taiwan

Abstract— Integrated Vehicle Dynamics Control with X-by-wire technologies can enable the path following capabilities of Autonomous Vehicles. The main driving tasks can be separated into longitudinal and lateral dynamics controls. Throttle-by-wire and brake-by-wire technologies are required to satisfy the acceleration and deceleration commands of the longitudinal dynamics control. Steer-by-wire technologies are required to satisfy the steering commands of the lateral dynamics control. Fault detection and diagnostics are required to identify the possible failures of sensors or actuators, such that the fault-tolerant control can reconfigure or restructure the vehicle dynamics control to reduce the deterioration of the path following performance.

Keynote Speech II (9:50~10:30)

Title: A Steganographic Algorithm Based on (7,4) Hamming Code

Prof. Chin-Chen Chang
Feng Chia University, Taiwan

Abstract— Diverse data hiding schemes have been proposed in recent decades. Among them, data hiding schemes in the compressed domain have attracted more attention since the compressed image format is one of the most frequently transmitted formats over the Internet. Specifically, among various compression algorithms, Absolute Moment Block Truncation Coding (AMBTC) is a good choice due to its low complexity and acceptable distortion. In this talk, I will introduce a novel data hiding method using (7, 4) Hamming code to conceal secret data into AMBTC compressed bit-stream. Experimental results show that this scheme outperforms the other four existing BTC-based data hiding approaches in terms of embedding capacity, bit rate, and hiding efficiency.

Coffee Break &Group Photo Taking 10:30~10:50

Keynote Speech III (10:50~11:30)

Title: An enhanced artificial bee colony algorithm for the static public bike repositioning problem

Prof. Wai Yuen Szeto
The University of Hong Kong, Hong Kong

Abstract— A bike repositioning problem (BRP) that simultaneously considers total demand dissatisfaction and service time is investigated. Given the conditions of each bike station before the repositioning, the problem aims to determine the routes of the repositioning vehicles that minimize the service time while the total demand dissatisfaction should be kept below an overall tolerable limit. This paper proposes two service times to be minimized: the total service time of the fleet and the maximum route duration. To reduce the computation time to solve the loading and unloading sub-problem of the BRP, this paper proposes and examines a novel set of loading and unloading strategies and further proves them to be optimal strategies for a given route. This set of strategies is then embedded into an enhanced artificial bee colony (ABC) algorithm to solve the BRP. To improve the effectiveness of the solution process, an enhanced version is proposed to improve the solution quality of the original version. The performance of the modified heuristic was evaluated and compared with the original heuristic and the Genetic Algorithm (GA). The computational results show that the enhanced heuristic outperforms both the original ABC algorithm and the GA with similar computation time. These results, therefore, demonstrate that the modified heuristic can be an alternative to solve the BRP. The numerical studies demonstrate that an increase in fleet size may not lead to a lower service time. The studies also illustrate the trade-offs between each objective with the tolerance of total demand dissatisfaction, the trade-off between the two service time objectives, and the effect of fleet size. This paper, therefore, discusses the practical implications of the trade-offs and provide suggestions about similar repositioning operations.

Keynote Speech IV (11:30~12:10)

Title: EEG Big Data Analysis

Prof. Dan Chen
Wuhan University, Wuhan

Abstract— Aiming at the core scientific problems in the analysis of EEG big data at the four levels of neural oscillation model decomposition, synchronization measurement, dimensionality reduction expression and brain source reconstruction, an efficient analysis and calculation method "from one dimension to higher dimension" of EEG neural oscillation was proposed. A multi-scale adaptive decomposition method for EEG oscillation model was proposed to realize quantitative analysis of EEG oscillation characteristics. The global synchronization measurement method of multi-dimensional EEG was proposed to reveal the synchronization pattern of multi-brain interval neural oscillations under the condition of strong noise and lack of prior knowledge. A high dimensional EEG high-performance factorial analysis method was established to achieve accurate acquisition of potential features of EEG big data. This paper proposed an accurate reconstruction method of multi-scale brain source activity to realize accurate localization of multi-scale related lesion activity and accurate reconstruction of brain depth source activity. The series of work promotes the monitoring of typical brain abnormalities from the "qualitative" to the "quantitative" design stage, and realizes the efficient monitoring, high-precision identification and classification of autism, epilepsy and depression (sleep disorders).

Lunch 12:20~13:20

Oral Presentation Abstracts

Session 1- Machine vision and image processing (13:30-16:15)

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Afternoon, October 19, 2019 (Saturday)

Time: 13:30-16:15

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Wai Yuen Szeto

BC0006 Presentation 1 (13:30~13:45)

Res-RNN Network and Its Application in Case Text Recognition

Jun Liu, **Zhuang Du** and Yang Liu
Wuhan Institute of Technology, China

Abstract—To solve the problem of poor feature extraction ability of traditional text recognition methods, this paper proposes a Res-RNN network for feature extraction based on residual error. Combined with residual characteristics, this network not only improves the depth of the network, but also ensures that there will be no degradation of the network, and strengthens the network's ability to extract Chinese character features. In the residual module, 1×1 convolution kernel is used to replace 3×3 convolution kernel, effectively reducing the parameters. Combined with feature maps of different scales, the feature information of Chinese characters at different levels is effectively utilized. According to the characteristics of Chinese characters, the vertical sensing field of the feature map is adjusted to retain more vertical fine-grained feature information, thus effectively improving the representational ability of the network. Experiments on actual Chinese medical record text image data set show that the accuracy of the proposed model is 4% higher than that of CRNN.

Session 1- Machine vision and image processing

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Afternoon, October 19, 2019 (Saturday)

Time: 13:30-16:15

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Wai Yuen Szeto

BC0014 Presentation 2 (13:45~14:00)

One Intelligent Facial Blackheads Identification Method Based on Computer Vision Technology

Yanwen Jiang[1], **Hua Sun**[1], Gang Jin[1], Jiaping Chen[1] and Xuesheng Qian[2],
1 China-Norm Information Technology Co. Ltd., Shanghai, China; 2 Fudan University, Shanghai, China

Abstract—Blackheads are a subtype of acne. As a cosmetic problem, it seriously affects patient's facial appearance and psychological effects. So it has attracted more and more public attention in recent years. However due to the evaluation standards are not uniformed, the grade methods of existing acne still are lack of objective quantitative standard. Even for professionals with long training, there remains great variability among the evaluators. The experimental shows that the new intelligent method is similar to the results of professional dermatologists in terms of blackheads counting and has high efficiency advantages. What's more, it achieves the leap from qualitative to quantitative analysis in blackheads identification field.

Session 1- Machine vision and image processing

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Afternoon, October 19, 2019 (Saturday)

Time: 13:30-16:15

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Wai Yuen Szeto

BC0017 Presentation 3 (14:00~14:15)

The research of image mosaic techniques based on optimized SIFT algorithm

Ziyun Huang, Haihui Wang and Yanan Li,
Wuhan Institute of Technology, China

Abstract—Image mosaic refers to the process of stitching multiple images those have overlapping areas of small perspective and low resolution into a panoramic image with high resolution and wide perspective through the corresponding image registration and fusion algorithm. In the mosaic of panoramic images, the traditional SIFT algorithm has large amount of calculation that leads to mismatching and unsatisfactory splicing effect in the process of generating feature vectors and performing feature matching. To this end, this paper proposes an optimized SIFT algorithm. The optimization algorithm, at the first time, introduces the Laplacian operator in order to sharpen the edges of the image. Then, based on the SIFT algorithm, matching the feature points by bidirectional matching algorithm. Finally, in the part of image fusion, an algorithm of luminance weight fusion in HSI color space is proposed. Experiments show that compared with the traditional SIFT algorithm, the proposed optimization algorithm can effectively reduce the error matching and improve the matching accuracy of feature points. In the image fusion part, the phenomenon of ghost image and the sudden change of luminance during image mosaic is effectively eliminated, besides the fusion effect is optimized, and ends with a good image mosaic result.

Session 1- Machine vision and image processing

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Afternoon, October 19, 2019 (Saturday)

Time: 13:30-16:15

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Wai Yuen Szeto

BC0008 Presentation 4 (14:15~14:30)

Multi-Source Deep Residual Fusion Network for Depth Image Super-resolution

Xiaohui Hao, Tao Lu, Yanduo Zhang, Zhongyuan Wang and Hui Chen
Wuhan Institute of Technology, China

Abstract— Comparing with color images, depth images are often in lack of texture information in high quality. Depth image super-resolution provides an efficient solution to enhance the high frequency information of LR depth image. In this paper, we propose a novel multi-source residual fusion neural network named “MSRFN”, which fully uses the fruitful texture information of color images to guide the depth images reconstruction. Initially, color and depth images are used to extract residual features in two-branch network. Then, color residual and depth residual are fused by the fusion network. Finally, the high-resolution (HR) depth map is reconstructed by fusing multi-source high-frequency information. Experimental results on MPI Sintel and Middlebury public databases show that MSRFN outperforms some state-of-the-art approaches in subjective and objective measures.

Session 1- Machine vision and image processing

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Afternoon, October 19, 2019 (Saturday)

Time: 13:30-16:15

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Wai Yuen Szeto

BC0005 Presentation 5 (14:30~14:45)

DPGAN: PReLU Used in Deep Convolutional Generative Adversarial Networks

Fang Zuo and **Xiaofang Liu**,
Henan University, China

Abstract—This paper is directed against the image super resolution problem that is an extraordinary topic in the field of computer vision. We proposed a new model PReLU Used in Deep Convolutional Generative Adversarial Networks (DPGAN) which has designed a pre-training structure, and the generator and the discriminator are cross-optimized to form a stable network structure. In the proposed model, the activation function in the generator uses the PReLU[1] innovatively. The experimental results demonstrate that the images generated by the proposed model have higher resolution, which is compared with previously studied models.

Session 1- Machine vision and image processing

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Afternoon, October 19, 2019 (Saturday)

Time: 13:30-16:15

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Wai Yuen Szeto

BC0018 Presentation 6 (14:45~15:00)

Medical Image Text Area Detection Based on Feature Reuse Convolutional Neural Network

Yang Liu, Jun Liu and Siqi Sun
Wuhan Institute of Technology, China

Abstract—In order to solve the problem of medical image text being missed and misdetected under the CTPN model, a new convolutional neural network DVNet based on the fusion of VGG convolutional neural network and DenseNet dense network was proposed. DVNet takes the first two layers of VGG network for deep feature extraction, and then connects DenseNet dense modules. Using the idea of feature reuse, the features of the front convolutional layer and the features of the back convolutional layer are output together. During post-processing, NMS is used to filter out redundant text boxes. In the medical text data set provided, three different networks, VGG, DenseNet and DVNet, were used to detect the text. The experimental results showed that the precision rate of DVNet were improved by 2%-3% compared with VGG and DenseNet.

Session 1- Machine vision and image processing

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Afternoon, October 19, 2019 (Saturday)

Time: 13:30-16:15

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Wai Yuen Szeto

BC0025 Presentation 7 (15:00~15:15)

Data-driven face hallucination by inverse degradation neural network

Ruobo Xu, Jiaming Wang and Tao Lu
Wuhan Institute of Technology, China

Abstract—Face hallucination refers to the technology that inferring its potential corresponding high-resolution (HR) image from the input low-resolution (LR) facial image. At present, most face hallucination algorithms improve reconstruction performance by optimizing models. However, the common approach will out of operation when meeting more complex problem, etc, the input image contains degraded pixels (noise), their reconstruction performance will drop sharply. In order to solve the problem, we propose an inverse degradation neural network (IDNN), which can mine the essential features of the images under data-driven. In this network, we design different network structures in different task stages. Firstly, the more accurated face structure is generated by the denoising network in the LR space. But the details from the face image is lacked in this stage. In order to further enhance the face image details, we utilize the reconstruction network to restore the missing details. The experimental results on FEI face database show that IDNN outperforms some state-of-the-art approaches in subjective and objective measures.

Session 1- Machine vision and image processing

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Afternoon, October 19, 2019 (Saturday)

Time: 13:30-16:15

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Wai Yuen Szeto

RS0014 Presentation 8 (15:15~15:30)

A Traffic Sign Recognition Model with only 140 KB

Dawei Luo, Jianjun Fang and Dengfeng Yao

Beijing Union University, China

Abstract— In order to design a traffic sign recognition model with low computational complexity and small computational complexity, this paper uses 1x1 convolutional layer for channel adjustment, 3x3 group convolution for feature extraction, and sets the number of convolution kernels for each layer according to the number of classifications. In this way, a 30MB model becomes a model with only 140KB. And we tested it on the BelgiumTS Dataset. The experimental test results show that after the model size is compressed to 1/220 of the original, top1 is not reduced, but it is increased by 0.8731%, and top5 is increased by 0.5%. Experiments prove that the compression strategy is effective. And the experiment also explored the relationship between the number of convolution kernels and the number of classifications.

Session 1- Machine vision and image processing

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Afternoon, October 19, 2019 (Saturday)

Time: 13:30-16:15

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Wai Yuen Szeto

BC0026 Presentation 9 (15:30~15:45)

Research on 3D Reconstruction of Face Based on Binocular Stereo Vision

ZiWei Wang, Haihui Wang and Junjie Li
Wuhan Institute of Technology, China

Abstract—People usually perceive things from a three-dimensional real world, requiring the computer to automatically reconstruct the corresponding three-dimensional shape model using twodimensional human face images. The three-dimensional face reconstruction based on binocular vision is to use SIFT algorithm
for feature point matching and disparity calculation to obtain three-dimensional coordinates. The three-dimensional coordinates are applied directly to the face deformation model, which overcomes the traditional method of finding two-dimensional and its coordinates, convert the relationship, the disadvantage of low precision, thus reconstruct a three-dimensional face model with a strong sense of reality. The experimental results show that the algorithm can be stably matched under illumination, blur, noise, near and far, and the experimental error of Zhang zheng you's calibration method is controlled within 0.4 pixel, and accuracy to meet the general application requirements. The three-dimensional reconstruction of the indoor scene can also learn from the method of this paper when the angle of view changes greatly.

Session 1- Machine vision and image processing

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Afternoon, October 19, 2019 (Saturday)

Time: 13:30-16:15

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Wai Yuen Szeto

RS0015 Presentation 10 (15:45~16:00)

Chinese Character CAPTCHA Recognition Based on Convolutional Neural Network

Xiangyun Zhang, Jin Zhang and Shuiping Zhang
Wuhan Institute of Technology, China

Abstract— The goal of this paper is to achieve effective recognition of Chinese character CAPTCHA, we propose a convolutional neural network model with reference to LeNet-5, the number of convolution kernels is increased to enable more efficient extraction of features, while adding dropout layers to prevent overfitting and adding normalized layers to prevent gradient explosions. The model takes the grayscale, binarization, and segmented CAPTCHA pictures as input, and outputs the vector of 3,500 dimensions which indicate the probability of each Chinese character. After training, the model can achieve a recognition rate of 99.6%. The experiment also compares the model with existing model, the results show that the model can identify Chinese character CAPTCHA more effectively.

Session 1- Machine vision and image processing

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Afternoon, October 19, 2019 (Saturday)

Time: 13:30-16:15

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Wai Yuen Szeto

RS0016 Presentation 11 (16:00~16:15)

Research on Visual and Inertia Fusion Odometry based on PROSAC Mismatch Culling Algorithm

Lingxing Deng, Xun Li and Yanduo Zhang
Wuhan Institute of Technology, China

Abstract— A method based on Progressive Sampling Consensus(PROSAC) combining Monocular visual and inertial navigation is proposed for localization , which focuses on solving the problem of self-positioning of low-cost devices in an unknown environment. This paper used the PROSAC algorithm, and the Inertial Measurement Unit (IMU) to calculate the relative motion distance of the camera by pre-integration to assist the positioning. the PROSAC mismatch culling algorithm is added to the visual inertial navigation odometry and compared its performance with traditional methods-VIORB, VINS in the EuRoC data sets. Proving the effectiveness of the method. The average error is 0.069m, which is 11.1% and 7.7% lower than the two algorithms.

Coffee Break 16:15~16:30

Session 2- Data analysis and intelligent computing (16:30-18:45)

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Afternoon, October 19, 2019 (Saturday)

Time: 16:30-18:45

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Tao Lu

BC0002 Presentation 12 (16:30~16:45)

Stock index prediction method based on dynamic weighted ensemble learning

You Datao, Yao Xiangyu, Geng Xudong, Fang Xuyang and Qu Shenming
Henan University, China

Abstract—In the era of big data, the requirement of mass storage and fast access of data makes solid state disk(SSD) based on NAND flash be widely adopted. However, increasing flash memory capacity imposes huge SRAM consumption for logical-physical translation table in a page-level flash translation layer(FTL). Existing schemes selectively cache the on-demand address mappings to quicken the address translation, while keeping all address mappings in flash memory. But the page-level caching mechanism causes a certain degree of cache pollution. In this paper, we manage page-level address translation information at hybrid-level mapping scheme and use two-level buffer mechanism for map groups to decrease SRAM consumption while reducing the cache pollution. What's more, an efficient replacement policy is designed. We can increase the cache hit ratio and reduce the write backs of evicted dirty entries and decrease garbage collection operations by these means. The performance and lifetime of the flash memory is improved. Experimental results show that the proposed scheme increases cache hit ratio by up to 55% and decreases the average response time by up to 39% compared with the exising FTL strategies.

Session 2- Data analysis and intelligent computing

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Afternoon, October 19, 2019 (Saturday)

Time: 16:30-18:45

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Tao Lu

BC0020 Presentation 13 (16:45~17:00)

Text Representation Method Combining Multi-level Semantic Features

Yue Chai, Tongzhou Zhao, Yiqi Jiang, Peidong Gao and Xuan Li
Wuhan Institute of Technology, China

Abstract—The text vector representation transforms text from unstructured to structured, from high dimensional to low dimensional, and from sparse to dense, which is the basic task of text analysis. The senLDA model obtains the multinomial distribution of topics on the document based on the sentence, but due to the lack of semantic information for words, there is incomplete coverage of the high-value information and thus affects the effect of text representation. Aiming at this problem, a method that combines senLDA with Word2Vec's word-level features is proposed, which fuses three-level semantic features of words, sentences and documents to realize the text representation. F1 value of three datasets were increased by 11.41%, 17.88%, 17.63% respectively compared to the senLDA method, and increased by 4.65%, 7.73%, 8.62% respectively compared to Word2Vec.

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Time: 16:30-18:45

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Tao Lu

BC0007 Presentation 14 (17:00~17:15)

Parallel Sentimental Analysis Based on Nectar Research Cloud and AURIN

Zhenwei Wang, Mingdong Zhu, Haitao Wang and Wen-Chi Yang
Henan Institute of Technology, China

Abstract—Social networks produce huge amount of complicated and heuristic data, from which the emotion of the owner to particular topics are reflected. Thus, the data can be the source of emotional statistics to analyze the comments related to different topics. In the proposed system, we collected political twitters as the experimental data. The system built a comprehensive structure for data harvesting, NLP, feature selection, machine learning, data mining, database, Restful style API and front-end data visualization, which can be circulated on a cloud system called Nectar research cloud. Besides, the system uses a parallel method to processing data chunk on a super computer called Spartan and discusses the choke point of multiple-core when dealing with the parallel computing. As for data model, Australian Urban Research Infrastructure Network (AURIN), for harvesting some training and test data set is also illustrated in this paper.

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Afternoon, October 19, 2019 (Saturday)

Time: 16:30-18:45

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Tao Lu

BC0021 Presentation 15 (17:15~17:30)

Entity relationship extraction method Based on dependency syntax analysis and rules

Xiaolin Li and **Jiaying Fan**
Wuhan Institute of Technology, China

Abstract—With the advent of the Internet era, the content of network information has soared, and information extraction has received attention. Entity relationship extraction has received more and more attention as an important sub-task of information extraction. Most of the current methods of entity relationship extraction require manual labeling, but the quality of labeling cannot be guaranteed and the evaluation criteria cannot be unified. Therefore, this paper proposes an entity relationship extraction method based on the combination of dependency syntax analysis and rules. The method does not need to manually label the input text, and judges the sentence components in the text and the relationship between the components through the output of the dependency parsing analysis, and forms a semantic triplet representing the entity relationship in combination with the rules and outputs. The experimental results show that the proposed method has better effect and saves labor cost. The average accuracy rate in the experimental corpus reaches 63.04%, and the average output time of the triples is reduced.

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Afternoon, October 19, 2019 (Saturday)

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Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Tao Lu

BC0010 Presentation 16 (17:30~17:45)

MRClose: A parallel algorithm for closed frequent itemset mining based on MapReduce

Xiao Wen[1] and **Hu Juan[2]**

1 HOHAI University, Nanjing, Jiangsu, China

2 HOHAI University WenTian College, China

Abstract—Frequent itemset mining is one of the most important tasks of data mining, while closed frequent itemset is a lossless compression of frequent itemset with many advantages such as high efficiency, no redundancy and so on. In the era of big data, closed frequent itemset mining algorithms which are running on a single computer can't adapt to the demand of huge amounts of dataset, so the parallel algorithm is needed. This paper analyzes three key issues in closed frequent itemset mining including search space partition, pruning strategy and strategy of global closed itemset checking, proposed a parallel algorithm for mining closed frequent itemset named MRClose which is based on MapReduce. Experiments show that MRClose algorithm has achieved good results in both performance and result compression.

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Afternoon, October 19, 2019 (Saturday)

Time: 16:30-18:45

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Tao Lu

BC0022 Presentation 17 (17:45~18:00)

Chinese Word Segmentation Based on Maximum Entropy

Xiaolin Li, **Zerong Hu** and Tao Lu,
Wuhan Institute of Technology, China

Abstract—Chinese word segmentation has received extensive attention in recent years. The word segmentation method based on character-based tagging improves the performance of word segmentation greatly. This method transforms the word segmentation problem into a sequence labeling problem, which has become the main word segmentation method. In order to further study the word segmentation performance of this method, we use the maximum entropy sequence labeling model in this paper. We used two different word position sets and three feature templates to compare the experimental results. We have done further research on the unknown words and segmentation ambiguity in the word segmentation results. First we combined N-Gram with cohesion and degree of freedom to solve the problem of unknown words. Then the maximum entropy model is used to train the new participle to eliminate the ambiguity. The closed test was conducted on the Bakeoff 2005 corpus of the international Chinese word segmentation evaluation. Experiments show that the six-tag position combined with the corresponding feature templates can achieve better word segmentation performance. After adding unknown words and disambiguation processing, the word segmentation performance of some data sets can be further improved to optimal results of Bakeoff 2005.

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Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Tao Lu

BC0011 Presentation 18 (18:00~18:15)

An Integrated Classification Model for Massive Short Texts With few words

Xuetao Tang, Xuegang Hu, Yi Zhu and Peipei Li
Hefei University of Technology, China

Abstract—The excellent performance of short texts classification has emerged in the past few years. However, massive short texts with few words like invoice data are different with traditional short texts like tweets in its no contextual and less semantic information, which hinders the application of conventional classification algorithms. To address these problems, we propose an integrated classification model for massive short texts with few words. More specifically, the word embedding model is introduced to train the word vectors of massive short texts with few words to form the feature space, and then the vector representation of each instance in texts is trained based on sentence embedding. With this integrated model, higher level representations are learned from massive short texts with few words. It can boost the performance of the base subsequent classifiers such as K-Nearest Neighbor. Extensive experiments conducted on dataset including 16 million real data demonstrate the superior classification performance of our proposed model compared with all competing state-of-the-art models.

Session 2- Data analysis and intelligent computing

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Afternoon, October 19, 2019 (Saturday)

Time: 16:30-18:45

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Tao Lu

BC0012 Presentation 19 (18:15~18:30)

Prediction of lysine succinylation sites by SVR and weighted down-sampling

Wang Kai, Liang Ping and HU Jun Sheng,
Wuhan Institute of Technology, China

Abstract—Succinylation is a post-translational modification (PTM), which changes the chemical structure of lysine and results in significant changes in the structure and function of proteins. Lysine succinylation plays an important role in coordinating various biological processes, and it is also associated with some diseases. Accurately identifying the lysine succinylation sites in proteins is of significant importance for basic research and drug development. Lysine succinylation sites prediction is a typical imbalanced and fragmentary learning problem. Directly applyingthe traditional machine learning approach for this task is not suitable . To circumvent this problem, based on extracting the features of protein sequences by sliding window and mirror- effect，weighted under-sampling is developed to make samples complete and balanced. Finally based on SVR prediction model and the corresponding suitable threshold ，comparing with several state-of-art related methods, the effectiveness of the proposed method was validated by the experimental results.

Session 2- Data analysis and intelligent computing

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Afternoon, October 19, 2019 (Saturday)

Time: 16:30-18:45

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Tao Lu

BC0027 Presentation 20 (18:30~18:45)

Improving Flash Translation Layer Performance by Using Log Block Mapping Scheme and Two-level Buffer for Address Translation Information

Yinxia Xu
Wuhan Institute of Technology, China

Abstract— In the era of big data, the requirement of mass storage and fast access of data makes solid state disk(SSD) based on NAND flash be widely adopted. However, increasing flash memory capacity imposes huge SRAM consumption for logical-physical translation table in a page-level flash translation layer(FTL). Existing schemes selectively cache the on-demand address mappings to quicken the address translation, while keeping all address mappings in flash memory. But the page-level caching mechanism causes a certain degree of cache pollution. In this paper, we manage page-level address translation information at hybrid-level mapping scheme and use two-level buffer mechanism for map groups to decrease SRAM consumption while reducing the cache pollution. What's more, an efficient replacement policy is designed. We can increase the cache hit ratio and reduce the write backs of evicted dirty entries and decrease garbage collection operations by these means. The performance and lifetime of the flash memory is improved. Experimental results show that the proposed scheme increases cache hit ratio by up to 55% and decreases the average response time by up to 39% compared with the exising FTL strategies.

Session 3- Robot Control and Vehicle Engineering (16:30-18:30)

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Afternoon, October 19, 2019 (Saturday)

Time: 16:30-18:30

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Bo-Chiuan Chen

RS0006 Presentation 21 (16:30~16:45)

Mobile Robot Path Planning Based on Improved Reinforcement Learning Optimization

Yanshu Jing, Yukun Chen, Minghai Jiao, Jie Huang, Bowen Niu and Wenbo Zheng
Northeastern University, China

Abstract— The constant parameter is usually set in adaptive function with traditional mobile robot path planning problem. Q-learning, a type of reinforcement learning, has gained increasing popularity in autonomous mobile robot path recently. In order to effectively solve mobile robot path planning problem in obstacle avoidance environment, a path planning model and search algorithm based on improved reinforcement learning are proposed. The incentive model of reinforcement learning mechanism is introduced with search selection strategy, modifying dynamic reward function parameter setting. The group intelligent search iterative process of global position selection and local position selection is exploited to combine particle behavior with reinforcement learning algorithm, dynamically adjusting the empirical parameter of the reward function by strengthening the data training experiment of Q-learning. to determine the constant parameters for simulation experiment, once the distance between the robot and the obstacle is less than a certain thresholds value, the 0-1 random number is used to randomly adjust the moving direction, avoiding the occurrence of mobile robot path matching deadlock. The study case shows that the proposed algorithm is proved to be better efficient and effective, thereby improving the search intensity and accuracy of the mobile robot path planning problem. And the experimental simulation shows that the proposed model and algorithm effectively solve mobile robot path planning problem that the parameter selection and the actual scene cannot be adapted in real time in traditional path planning problem.

Session 3- Robot Control and Vehicle Engineering

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Afternoon, October 19, 2019 (Saturday)

Time: 16:30-18:30

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Bo-Chiuan Chen

RS0009 Presentation 22 (16:45~17:00)

An Improved A* Path Planning Algorithm for Indoor Intelligent Robot

Shiqun Qian, Yajie Ma and Doudou Hong

Wuhan University of Science and Technology, China

Abstract— In this paper, we introduce an improved A* path planning algorithm for indoor intelligent robot. Aiming at the problem of intelligent robot car path planning in complex indoor environment with obstacles such as wall. Firstly, the indoor environment is divided into grids and we can get the connected topology. The connectivity between grids is characterized by adjacency matrices. Then we study the influence of different heuristic functions on the efficiency of path planning algorithm. Based on the traditional A* algorithm, the direction factor is introduced. Moreover we also consider the impact of distance and direction on search efficiency. Finally, the algorithm is simulated by Matlab. The experimental results show that compared with the traditional A* algorithm, the proposed algorithm has a significant improvement in path search efficiency.

Session 3- Robot Control and Vehicle Engineering

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Afternoon, October 19, 2019 (Saturday)

Time: 16:30-18:30

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Bo-Chiuan Chen

RS0010 Presentation 23 (17:00~17:15)

Real-time Estimation of Queue Length Based on Fused Data Using Connected Vehicle Technology and a Detector

Wenqiang Jin, Xi Zhang and Kaijiong Zhang
Shanghai Jiao Tong University, China

Abstract— This paper proposes an algorithm about real-time estimation of queue length using the data from both connected vehicle (CV) and a detector at an isolated intersection. None of the penetration ratio, signal timing plan or traffic volume is needed as input in this model and the resolution reaches second level, depending on the sampling rate of devices. By the data of stopped CVs, the minimum existing queue length and queue propagation speed can be calculated. Then the unknown ordinary vehicles of the queue is estimated by the detector or propagation speed. The detector gives a data supplementation, which makes the results more accurate especially when the penetration ratio is low. To make the results more robust and accurate, the upper bound of the queue length is estimated using the data of moving CVs and car following model. The algorithm is also suitable for queue length estimation with overflow. It makes an acceptable result of queue length estimation with only 10% CVs when there is no overflow. With the overflow, 30% CVs are needed. The estimation algorithm is verified by the simulation in VISSIM. The relationship between estimation accuracy and market penetration ratio, traffic volume is also analyzed.

Session 3- Robot Control and Vehicle Engineering

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Afternoon, October 19, 2019 (Saturday)

Time: 16:30-18:30

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Bo-Chiuan Chen

RS0013 Presentation 24 (17:15~17:30)

Research of PM2.5 Real-Time Prediction Model in Spark Cluster Environment

Lizhi Liu, Jingwei He, Bei Peng, Min Yang and Chenyue Zhang
Wuhan Institute of Technology, China

Abstract— Big data technologies provide new ideas and means for statistical prediction of environmental air quality. In this paper, how to construct PM2.5 real-time prediction model for monitoring stations by using R language in Spark clusters is studied. Real-time data of monitoring stations stored in traditional relational database are converted into target dataset which can be put into cluster and processed by R language. The correlation analysis of pollutants and meteorological parameters that affecting the PM2.5 is carried out, so that to determine the input variables of multiple linear regression for constructing PM2.5 real-time prediction model. In spark cluster environment, Sparklyr and MLib packages are used by R language to construct prediction models for monitoring stations, each model is evaluated by four aspects such as residual analysis, significance detection, decision coefficient and test set prediction to justify its effectiveness. The experiment result shows that the model can be used to predict PM2.5 real-time value accurately.

Session 3- Robot Control and Vehicle Engineering

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Afternoon, October 19, 2019 (Saturday)

Time: 16:30-18:30

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Bo-Chiuan Chen

RS0011 Presentation 25 (17:30~17:45)

Research on Energy-Regeneration Simulation of an Electromechanical Active-Suspension System

Qing-Hua Lin, Zhi-Cheng Wu and Yuzhuang Zhao
Beijing Institute of Technology, China

Abstract— Active suspension have not been used widely due to its magnificent energy consuming. A kind of electromechanical energy-regenerative suspension is proposed in this paper. Suspension dynamic equations are modeled by MATLAB/Simulink. In order to get an optimal performance of suspension, several indices are discussed in this paper with three control curve on a motor MAP diagram. The results indicated that optimal control strategy depends on subjective object; In terms of energy recovery, performance contour curve is the best choice. If the objective is the balance of all indices, middle torque curve is the ideal choose.

Session 3- Robot Control and Vehicle Engineering

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Afternoon, October 19, 2019 (Saturday)

Time: 16:30-18:30

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Bo-Chiuan Chen

BC0023 Presentation 26 (17:45~18:00)

Detection of Train Bottom Parts Based on XIoU

Zhimeng Xin, Tongwei Lu and Xiuhua Li
Wuhan Institute of Technology, China

Abstract—Due to the complexity, diversity, or even small size of train bottom parts, the current object detection algorithm cannot identify it accurately. We propose a new method to solve the above problem. This method changes the computational way of loss based on Darknet-yolov3 for specific train bottom parts and improves the situation that the object detection network has low accuracy in detecting. IoU(Intersection over Union) can be directly used as a regression loss. However, IoU has a plateau making it infeasible to optimize in the case of nonoverlapping bounding boxes. We put forward XIoU to calculate the loss function. XIoU calculates the case when IoU is equal to zero and increases the amount of prediction sample for regression loss. The test set used the No.2 camera pictures provided by railway administration. Compared with Mobile-Net, Yolov3 and Yolov3-giou, the experimental results showed that the training results of XIoU were 10% higher than Mobile-Net and Yolov3 on mAP, and 0.2% higher than Yolov3-giou.

Session 3- Robot Control and Vehicle Engineering

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Afternoon, October 19, 2019 (Saturday)

Time: 16:30-18:30

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Bo-Chiuan Chen

RS3001 Presentation 27 (18:00~18:15)

Fast traffic accident identification method based on SSD

Haiyang Jiang, Yuning Wang and Yong Yang
Wuhan University of technology, China

Abstract— Traditional traffic accident identification methods always have the problems of complex detection process, poor detection performance and poor real-time performance. This paper builds a new type of traffic accident identification method based on target detection algorithm SSD. We collected and simulated traffic accident data sets in different scenarios and compared the detection performance of different target detection algorithms, aiming at the problems of traffic accident detection existing in the original SSD, the idea of multi-feature fusion and adaptive default box selection algorithm are proposed to improve it. Finally, we tested on the collected data, the improved SSD-A traffic accident detection accuracy can reach 97%, and the FPS can reach 32

Session 3- Robot Control and Vehicle Engineering

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Afternoon, October 19, 2019 (Saturday)

Time: 16:30-18:30

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

Session Chair: Prof. Bo-Chiuan Chen

BC0024 Presentation 28 (18:15~18:30)

Research on Dynamic Decision-making of Post-disaster Rescue Based on GCC Framework

Longlong Xu, Wei Liu and Jingzhi Guo
Wuhan Institute of Technology, China

Abstract—Collective adaptive systems (CAS) have been attracting increasing attention in the field of artificial intelligence (AI), in which collaboration of agents plays a key role. These systems aim to accomplish a certain goal though collaborating between a variety of agents with different tasks, which adapt to changes of environment to be of adaptability. To solve the issue of collaboration of agents in an uncertain and highly dynamic environment, our research team had proposed a Goal-Capability-Commitment (GCC) based mediation for multi-agent collaboration, which generates the collaboration planning driven by capability based on global context states in real-time dynamic environment. As a case study for the application of GCC model, this paper adopts GCC to model the RoboCup Rescue Simulation System (RCRSS). As the result of modelling, the GCC domain model is applied to RCRSS where an efficiently quantitative evaluation is provided.

Dinner 19:00-20:00

Poster session

October 19, 2019 (Saturday)

Time: 10:10-16:30

Venue: Wendu Lecture Hall, School of Computer Science & Engineering

RS0005 Poster 1

Multi-sensor fusion quadrotor attitude and altitude estimation

Lei Zhang, Yajie Ma, Yi Yu and Guoqing Liu
Wuhan University of Science and Technology, China

Abstract— Attitude and altitude estimation are one of the core issues in quadrotor aircraft research, and attitude and height are mainly measured by sensors such as gyroscopes, acceleration, and barometers[1]. In view of the zero drift, noise interference and information delay of these sensors, two filters are designed, which are balance filtering of the gyroscope and acceleration data meter for horizontal attitude calculation, and accelerometer and barometer data for Karl. Man filtering performs a high degree of estimation. Finally, the algorithm is implemented on the physical experiment platform. The attitude data obtained by the balance filtering algorithm and the height data obtained by the Kalman filter algorithm are compared with the attitude and height obtained by the single sensor data, and the reliability of the algorithm is verified.

RS0018 Poster 2

Yolov3-spp: a high-precision vehicle detection network

Yang Zhang and Dengfeng Yao
Beijing Union University, China

Abstract— In order to improve the accuracy of vehicle detection, this paper USES yolov3-spp network as the main body and forms a yolov3-spp network.Yolov3-spp network has 53 convolution layers from the 0 layer to the 74 layer, and the rest are res layers, which serve as the main network structure for feature extraction. Then there is the SPP layer, which is the feature interaction layer of yolo network from 76 to 106, divided into three scales: small and large. When tested on UA-DETRAC data set, compared with ordinary yolo3, map value increased, recall value increased significantly, loss decreased significantly, and avg iuo improved. Experiments show that the method is effective. The prospect of combining yolov3 with other modules is also discussed.

BC0009 Poster 3

Research on Gaussian-wavelet-type Activation Function of Neural Network Hidden Layer Based on Monte Carlo Method

JiaWei Ji, Ziqiang Zhang and Ding Kun, Ruixiao Zhang and ZhiXin Ma
Lanzhou University, China

Abstract—Artificial neural networks have developed rapidly in recent years and have been applied in the fields of image recognition, natural language processing, and pattern recognition. The activation function, as an integral part of the neural network, plays a huge role in the neural network. The appropriateness of the activation function determines the accuracy of the neural network results. In this paper, a Monte Carlo method combined with the Gaussian-wavelet-type activation function to design a neural network and apply it to the image classification of convolutional neural networks. The Gaussian-wavelet-type activation function and the Monte Carlo method are combined to select the most suitable activation function to ensure the stability of the whole training and improve the accuracy of the classification results on the data set.

One Day Visit (October 20, 9:00~17:00)

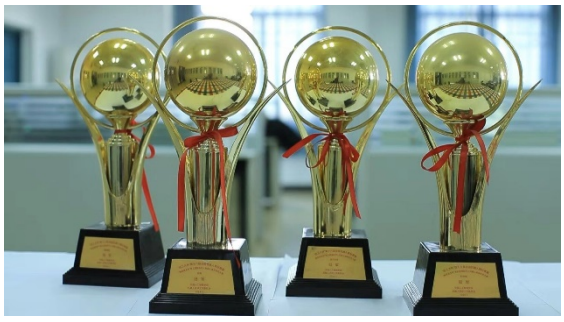
October 20, 2019 (Sunday) 9:00~17:00

The exact tour route will be adjusted according to the situation on October 20, 2019

1. Morning (9:30-11:30)

Lab & University Visit

Hubei Provincial Key Laboratory of Intelligent Robot was approved to build in December 2008. The supporting institution is Wuhan University of engineering, and the subject "pattern recognition and intelligent system" is the key subject of Hubei province. The director of the academic committee of the laboratory is academician Youlun Xiong, and the director of the laboratory is Professor Yanduo Zhang, vice President of Wuhan University of technology. The main research content of this laboratory focuses on the theory and application of intelligent system, image processing and pattern recognition, intelligent information processing and detection technology, big data and knowledge discovery, intelligent optimization calculation and visualization, etc. At present, many research results have been achieved.



2. Lunch (11: 30-12:30)

3. Half Day Tour

Yellow Crane Tower (黄鹤楼) is a traditional Chinese tower located in Wuhan. The current structure was built in 1981, but the tower has existed in various forms since not later than AD 223. The current Yellow Crane Tower is 51.4 m (169 ft) high and covers an area of 3,219 m2 (34,650 sq ft).

The tower is also a sacred site of Taoism. Lü Dongbin is said to ascend to heaven from here. There is a small cave in the hill beneath the tower with Lü Dongbin stature. The cave is been called Lü Zu Dong, literately means cave of Lü Dongbin.

Note