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2019 2nd International Conference on Signal Processing and Machine Learning

2019 2nd International Conference on Signal Processing and Machine Learning (SPML 2019)

November 27-29, 2019

Hangzhou, China

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Welcome Message from Organizing Committee

It is our great pleasure to invite you to join our international conferences -2019 2nd International Conference on Signal Processing and Machine Learning (SPML 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 Hangzhou, China.

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 Signal Processing and Machine Learning.

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

2019.11

Table of Contents

Keynote Speakers Introductions

Keynote Speaker I

Prof. Shigeru Katagiri
Doshisha University, Japan

Prof. Shigeru Katagiri received a B. E. degree in electrical engineering and M. E. and Dr. Eng. degrees in information engineering from Tohoku University, Sendai, Japan, in 1977, 1979, and 1982, respectively.

From 1982 to 1986, he worked at Electrical Communication Laboratories, Nippon Telegraph and Telephone Public Corporation (currently NTT), Tokyo, Japan, where he was engaged in speech recognition research. From 1986 to 1998, he was with the Advanced Telecommunications Research Institute International (ATR), Kyoto, Japan. At ATR, he worked on various speech-related research issues that included speech recognition and spoken language acquisition. From 1999 to 2006, he worked with NTT Communication Science Laboratories (CS Labs), Kyoto, Japan, where he was engaged in a wide range of machine learning research, and he also served as several management functions that included Director of the NTT CS Labs. Since 2006, he has been with Doshisha University, and currently he is a Professor at the Graduate School of Science and Engineering. Dr. Katagiri has published more than 260 journal papers, conference papers, and book chapters. For his academic achievement, eight awards and titles have been presented; they include the 22nd Sato Paper Award of the Acoustical Society of Japan (ASJ), the 27th Sato Paper Award of the ASJ, the 1993 IEEE Signal Processing Society Senior Award, IEEE Fellow (2001), and NTT R&D Fellow (2002). Dr. Katagiri has continuously contributed to various IEEE functions that include the followings: Chair (1999-2000) of the Technical Committee on Neural Networks for Signal Processing, Associate Editor of the IEEE Transactions on Signal Processing (1994-1997), Member-at-Large of the IEEE Signal Processing Society Board-of-Governors (2003-2005), Member of the IEEE Flank Rosenblatt Award Committee (2004-2007), Chair of the IEEE James L. Flanagan Speech and Audio Processing Award Committe (2016-2017), Chair of the IEEE Kansai Section (2011-2012), Program Chair of the 1996 IEEE Workshop on Neural Networks for Signal Processing, and General Co-Chair of the 2011 IEEE Workshop on Machine Learning for Signal Processing. In addition to the IEEE services above, Dr. Katagiri also plays a key role in various academic functions, such as holding the positions of Action Editor of the Neural Networks (2000-2006), Associate Editor of the IEICE Transaction D-II (1997-2001), Chair of the ASJ Kansai Section (2005), and Member of the Science Council of Japan (2006-2014). His recent research focuses on training method development for pattern recognizers, specially such discriminative training methods as Minimum Classification Error training.

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. Yen-Wei Chen
Ritsumeikan University, Japan (full professor)
Zhejiang Lab, China (adjunct professor)
Zhejiang University, China (adjunct professor)

Prof. Yen-Wei Chen received the B.E. degree in 1985 from Kobe Univ., Kobe, Japan, the M.E. degree in 1987, and the D.E. degree in 1990, both from Osaka Univ., Osaka, Japan. He was a research fellow with the Institute for Laser Technology, Osaka, from 1991 to 1994. From Oct. 1994 to Mar. 2004, he was an associate Professor and a professor with the Department of Electrical and Electronic Engineering, Univ. of the Ryukyus, Okinawa, Japan. He is currently a professor with the college of Information Science and Engineering, Ritsumeikan University, Japan. He is also an adjunct professor with the College of Computer Science, Zhejiang University, China and Zhejiang Lab, China. He was a visiting professor with the Oxford University, Oxford, UK in 2003 and a visiting professor with Pennsylvania State University, USA in 2010.

His research interests include medical image analysis, computer vision and computational intelligence. He has published more than 300 research papers in a number of leading journals and leading conferences including IEEE Trans. Image Processing, IEEE Trans. SMC, Pattern Recognition. He has received many distinguished awards including ICPR2012 Best Scientific Paper Award, 2014 JAMIT Best Paper Award, Outstanding Chinese Oversea Scholar Fund of Chinese Academy of Science. He is/was a leader of numerous national and industrial research projects.

Keynote Speaker IV

Prof. Jianjun Li
Hangzhou Dianzi University, China

Professor Jianjun Li received the PhD degree in Electrical and Computer Engineering from Windsor University, Canada. He is now serving as a chair professor of School of Computer Science and Technology in Hangzhou Dianzi University. He is also the director of Institute of Graphic and Image. Before this, Dr.Li worked in National Audiology Center (NCA) of Canada from 2003 to 2005, Mitsubishi Electronics Research Laboratory (MERL) of U.S.A from 2005 to 2006, École polytechnique fédérale de Lausanne (EPFL) of Switzerland from 2006 to 2007 as a visting scholar. He worked in Ambroda Ltd. for video coding stream processing of U.S.A from 2007 to 2010 as a senior engineer. From 2010 to 2012, Dr.Li worked as an assistant professor in Bilkent University and Ankara University, Turkey. In the meantime, he worked for FP-7 (now Horizon 2020) 3D project as a research fellow.

Professor Li has worked in many different topics in computer vision, multimedia image processing, video coding and deep learning and published more than 50 papers in international conferences and journals and 2 books. He also has 3 contributions adopted by ISO/IEC Movie Picture Experts Group (MPEG) as a part of Reconfigurable Video Coding (RVC) standard. Dr.Li worked with International Institutes and Enterprises for more than 10 projects during his stay in abroad for more than 10 years. He now works on the National Science Foundation (NSFC) of China, National institutes and other Enterprises on more than 20 projects and holds 20 patents.

Professor Li is also the recipient of several awards, including the "Qianjiang" scholar and the chief scientist of the innovation team of Zhejiang province in "3D industry and technology application". Meanwhile, he is also a reviewer of many international journals and hold keynote speaker and committee member of many international conferences.

Conference Introductions

Welcome to 2019 SPML Hangzhou 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 in Signal Processing and Machine Learning.

Papers will be published in the following proceeding:

International Conference Proceedings Series by ACM (ISBN 978-1-4503-7221-3), 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 (CPCI).

Conference website and email：http://www.spml.net/ and spml.contact@gmail.com

Conference Venue

Hangzhou Shujiang Hotel

杭州曙江大酒店

Address: No.1, 2nd Avenue, Economic and Technological Development Zone, Hangzhou, Zhejiang Province, China

地址：杭州市经济技术开发区 **2** 号大街 **1** 号

Near the Hangzhou Dianzi University（Xia Sha Campus）

近杭州电子科技大学**(**下沙校区**)**

Hangzhou Dianzi University was founded in 1956 as the second public university in Zhejiang Province. It was formerly named Hangzhou Institute of Electrical Engineering and was renamed in 2004.Hangzhou Dianzi University is a non-profit public higher education institution located in the large city of Hangzhou (population range of 1,000,000-5,000,000 inhabitants), Zhejiang. Officially accredited and/or recognized by the Department of Education, Zhejiang Province, Hangzhou Dianzi University (HDU) is a large (uniRank enrollment range: 25,000-29,999 students) coeducational higher education institution. Hangzhou Dianzi University (HDU) offers courses and programs leading to officially recognized higher education degrees.

SPML 2019 &SPML 2019

Hangzhou Shujiang Hotel

Metro Line 1

How to get to the Conference Venue from Hangzhou Railway Station?

➢ The affordable way: **Metro Line 1 →walk**

Metro Line 1
地铁 1 号线
↓

Get off at Wenze Road Station（(Exit B)

文泽路站下车（B 出口）
↓

Walk to the Hangzhou Shujiang Hotel

步行至杭州曙江大酒店

How to get to the Conference Venue from Hangzhou International Airport?

Airport Bus --Grand New Century Hotel Station(下沙盛泰开元名都大酒店站)—Walk to the Hangzhou Shujiang Hotel(杭州曙江大酒店)

[The schedule of the airport bus is 8：20; 09：30; 11：00 ;12：30; 14：00; 15：30 18：00; 19：30]

Registration Guide

November 27, 2019 (Wednesday)

Time: 10:00-17:00

Venue: Hangzhou Shujiang Hotel 杭州曙江大酒店

Lobby

Registration Steps

1. Arrive at Hangzhou Shujiang Hotel

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);

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 November 28, 2019

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

(3) 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.

(4) 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 13 Minutes of Presentation and 2 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 **November 28, 2019.**

Dress code

Please wear formal clothes or national representative of clothing.

Schedule for Conference

Hangzhou Shujiang Hotel Lobby November 27 (10:00-17:00)
Arrival and Registration
Hangzhou Shujiang Hotel Tianshi Room（天时厅）on the second floor November 28 (9:00-12:30)
Opening Remark (9:00-9:10) Prof. Jianjun Li, Hangzhou Dianzi University, China
Keynote Speech I (9:10-9:55) **Title: To ride the tide or to stick with the basics?** Prof. Shigeru Katagiri, Doshisha University, Japan
Keynote Speech II (9:55-10:40) **Title: Borrowing from Nature to Conceal Information** Prof. Chin-Chen Chang, Feng Chia University, Taiwan
Coffee Break & Group Photo (10:40-11:00)
Keynote Speech III (11:00-11:45) **Title: Artificial Intelligence in Multi-Dimensional Medical Image Analysis** Prof. Yen-Wei Chen, Ritsumeikan University, Japan& Zhejiang Lab, China &Zhejiang University, China
Keynote Speech IV (11:45-12:30) **Title: Semantic Segmentation with a CNN Network** Prof. Jianjun Li, Hangzhou Dianzi University, China
Lunch (12:30-13:30) Hangzhou Shujiang Hotel
November 28 (13:30-18:45
Session 1 （13:30-15:45） Chair: Prof. Shigeru Katagiri& Prof. Yen-Wei Chen **Tianshi Room（天时厅）on the second floor**
Coffee Break (15:45-16:00)
Session 2 （16:00-18:45） Chair: Prof. Chin-Chen Chang& Prof. Jianjun Li **Tianshi Room（天时厅）on the second floor**
Dinner (18:45-19:45) Hangzhou Shujiang Hotel
November 29 (9:00-17:00)
One-Day Tour

Morning Session

Morning, November 28, 2019 (Thursday)

Time: 9:00-12:30

Venue: Tianshi Room（天时厅）on the second floor

Opening Remarks (9:00-9:10)

Addressed by Prof. Jianjun Li from Hangzhou Dianzi University, China

Keynote Speech I (9:10-9:55)

Title: To ride the tide or to stick with the basics?

Prof. Shigeru Katagiri

Doshisha University, Japan

Abstract—Every day, the term "AI" keeps turning up in articles and news reports. Originally, AI was simply one sub-area of information science and information technology. Moreover, AI itself encompasses various different disciplines. Methodologies that were called statistics or optimization about a decade ago are now being called AI. What methodology is actually adopted in such AI? AI has become harder for experts to understand, so it will get further way from people and eventually become an absolute black box.

The above situation, where the realities of methodology/technology are becoming less visible, also appears in the domain of research and development. That is probably the root of the problem. For example, in the present research and development of pattern recognition, deep neural network (DNN)-based technology occupies the spotlight, and it is thus harder for other technologies to attract attention. However, studies using DNN rarely discuss whether their approaches can achieve the ultimate goal of pattern recognition, i.e., Bayes error. Even if experimental comparisons are conducted with other technologies, these studies' proposals often lack a comparison based on the goal of obtaining the Bayes error. Therefore, it is not easy to appropriately evaluate the high recognition accuracies achieved by DNN.

Many people believe in AI. Many people use DNN. If you ride the big tide, you can easily move on. However, can you really reach the goal at the end of the tide? Taking pattern recognition research as an example, we discuss the importance of going back to or sticking with the basics of technology.

Morning Session

Morning, November 28, 2019 (Thursday)

Time: 9:00-12:30

Venue:　Tianshi Room（天时厅）on the second floor

Keynote Speech II (9:55-10:40)

Title: Borrowing from Nature to Conceal Information

Prof. Chin-Chen Chang

Feng Chia University, Taiwan

Abstract—Steganography is the science of secret message delivery using cover media. A digital image is a flexible medium used to carry a secret message because the slight modification of a cover image is hard to distinguish by human eyes. In this talk, I will introduce some novel steganographic methods based on different magic matrices. Among them, one method that uses a turtle shell magic matrix to guide cover pixels' modification in order to imply secret data is the newest and the most interesting one. Experimental results demonstrated that this method, in comparison with previous related works, outperforms in both visual quality of the stego image and embedding capacity. In addition, I will introduce some future research issues that derived from the steganographic method based on the magic matrix.

Coffee Break & roup Photo Taking 10:40   -11:00

Morning Session

Morning, November 28, 2019 (Thursday)

Time: 9:00-12:30

Venue:　Tianshi Room（天时厅）on the second floor

Keynote Speech III (11:00-11:45)

Title:　Artificial Intelligence in Multi-Dimensional Medical Image Analysis

Prof. Yen-Wei Chen

Ritsumeikan University, Japan& Zhejiang Lab, China &Zhejiang University, China

Abstract—Due to the rapid development of imaging technologies, we have obtained a large amount of biomedical images. In addition to 3-dimensional spatial information, the biomedical images have temporal information. Efficient representation of the multi-dimensional biomedical image is an important issue for biomedical image analysis. Sparse coding is one of machine learning methods and is widely used for efficient image representation and image recognition. The limitation of the conventional sparse coding is that a multi-dimensional data (e.g. an image or a video image) should be unfolded into a vector resulting in loss of spatial and spatial-temporal relationship of the data. In this keynote talk, I will talk about　anew tensor sparse coding method and its application to multi-dimensional medical image analysis, in which the multi-dimensional data can be treated as a tensor without unfolding.

Morning Session

Morning, November 28, 2019 (Thursday)

Time: 9:00-12:30

Venue: Tianshi Room（天时厅）on the second floor

Keynote Speech IV (11:45-12:30)

Title: Semantic Segmentation with a CNN Network

Prof. Jianjun Li
Hangzhou Dianzi University, China

Abstract—Recent semantic segmentation networks mainly focus on how to fuse multi-level features from classification networks to improve segmentation accuracy. Some researches evenly emphasize the correlation of pixels in a global region, such as conditional random field (CRF). However, the strong correlation feature of pixels in a limited region is less considered in the previous researches and the remedy ability of the correlation of local pixels in semantic segmentation is severely ignored. To deal with this problem, we introduce a hierarchical adjacency dependent network (HadNet), in which an adjacency dependency module (ADM) is constructed by calculating and utilizing the impact fact of the pixel in different directions to classify the pixel. We explored the correlation of adjacent pixels and feature coverage in different feature levels to improve the segmentation accuracy.

Lunch 12:30-13:30

Oral Presentation Abstracts

Session 1

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, November 28, 2019 (Thursday)

Venue: Tianshi Room（天时厅）on the second floor

Session Chair: Prof. Shigeru Katagiri& Prof. Yen-Wei Chen

SL3001 Presentation 1 (13:30-13:45)
Data Link Modeling and Simulation Based on DEVS
Dan Yang, **Yiyuan Chen**, Jiabin Yu, Heng Zhang and Jianjun Li
Hangzhou Dianzi University, China

Abstract—Although Convolutional Neural Networks are effective visual models that generate hierarchies of features, there still exist some shortcomings in the application of Deep Convolutional Neural Networks to semantic image segmentation. In this work, our algorithm incorporates multi-scale atrous convolution, attention model and Conditional Random Fields to tackle this problem. Firstly, our method replaces deconvolutional layers with atrous convolutional layers to avoid reducing feature resolution when the Deep Convolutional Neural Networks is employed in a fully convolutional fashion. Secondly, multi-scale architecture and attention model are used to extract the existence of features at multiple scales. Thirdly, we use Conditional Random Fields to prevent the built-in invariance of Deep Convolutional Neural Networks reducing localization accuracy. Moreover, our network completely integrates Conditional Random Fields modelling with Deep Convolutional Neural Networks, making it possible to train the deep network end-to-end. In this paper, our method is used to the matters of semantic image segmentation and is demonstrated the effectiveness of our model with experiments on PASCAL VOC 2012.

Oral Presentation Abstracts

Session 1

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Afternoon, November 28, 2019 (Thursday)

Venue: Tianshi Room（天时厅）on the second floor

Session Chair: Prof. Shigeru Katagiri& Prof. Yen-Wei Chen

SL0008 Presentation 2 (13:45-14:00)

An Attention-Enhanced Recurrent Graph Convolutional Network for Skeleton-Based Action Recognition

Xiaolu Ding, Kai Yang and Wai Chen

China Mobile Research Institute, China

Abstract—Dynamic movements of human skeleton have attracted more and more attention as a robust modality for action recognition. As not all temporal stages and skeleton joints are informative for action recognition, and the irrelevant information often brings noise which can degrade the detection performance, extracting discriminative temporal and spatial features becomes an important task. In this paper, we propose a novel end-to-end attention-enhanced recurrent graph convolutional network (AR-GCN) for skeleton-based action recognition. An attention-enhanced mechanism is employed in AR-GCN to pay different levels of attention to different temporal stages and spatial joints. This approach overcomes the information loss caused by only using keyframes and key joints. In particular, AR-GCN combines the graph convolutional network (GCN) with the bidirectional recurrent neural network (BRNN), which retains the irregular joints expressive power of the original GCN, while promoting its sequential modeling ability by introducing a recurrent network. Experimental results demonstrate the effectiveness of our proposed model on the widely used NTU and Kinetics datasets.

Oral Presentation Abstracts

Session 1

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, November 28, 2019 (Thursday)

Venue: Tianshi Room（天时厅）on the second floor

Session Chair: Prof. Shigeru Katagiri& Prof. Yen-Wei Chen

SL0009 Presentation 3 (14:00-14:15)

A Vision-based Human Action Recognition System for Moving Cameras by Deep Learning

Ming-Jen Chang, **Jih-Tang Hsieh**, Chiung-Yao Fang and Sei-Wang Chen

National Taiwan Normal University, Taiwan

Abstract—This study presents a vision-based human action recognition system using a deep learning technique. The system can recognize human actions successfully when the camera of the robots is moving toward the serviced person from various directions. Therefore, the proposed method is useful for the vision system of the indoor mobile robots.

The system uses three kinds of information to recognize the human actions, including color videos, optical flow videos, and depth videos. First, a Kinect 2.0 captures color videos and depth videos simultaneously using its RGB camera and depth sensor. Second, the histogram of oriented gradient (HOG) features is extracted from the color videos and a support vector machine (SVM) is used to detect the human region. Based on the detected human region, the frames of color video are cropped and the corresponding frame of the optical flow video can be obtained by Farnebäck method. The number of frames of these videos is then unified by a frame sampling technique. After frame sampling, these three kinds of videos are input into three modified 3D convolutional neural networks (3D CNN) respectively. The modified 3D CNNs can extract the spatial and temporal features of human actions and recognize them respectively. Finally, these recognition results are integrated to output the final recognition result of human actions.

The proposed system can recognize 13 kinds of human actions, including drink (sit), drink (stand), eat (sit), eat (stand), read, sit down, stand up, use computer, walk (horizontal), walk (straight), play with phone/tablet, walk apart from each other, and walk towards each other. The average human action recognition rate of 369 testing human action videos was 96.4%, indicating that the proposed system is robust and efficient.

Oral Presentation Abstracts

Session 1

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Afternoon, November 28, 2019 (Thursday)

Venue: Tianshi Room（天时厅）on the second floor

Session Chair: Prof. Shigeru Katagiri& Prof. Yen-Wei Chen

SL0018 Presentation 4 (14:15-14:30)

Method for removing motion blur from images of harmful biological organisms in power places based on improved CycleGAN

Dongyang Ye, Shangping Zhong, Jiahao Zhuang and Li Chen

Fuzhou University, China

Abstract—Nowadays, the automatic detection of harmful organisms in power places has attracted attention due to the extensive unattended way of power places. However, surveillance pictures are prone to motion blurring and harmful organisms cannot be effectively detected due to their frequent and fast movements in power places. On the basis of the improved Cycle-Consistent Adversarial Networks (CycleGAN) model, we propose a method for removing motion blur from the images of harmful biological organisms in power places. This method does not require paired blurred and real sharp images for training, which is consistent with actual requirements. In addition, our method improves the classical CycleGAN model by combining cycle consistency and perceptual loss to enhance the detail authenticity of image texture restoration and improve the detection accuracy. The model uses Wasserstein GAN with gradient penalty (WGAN-GP) as a loss function to train the depth model. Given the existence of the GAN itself, the entire real image distribution space is difficult to fill with the generated image distribution space. Experimental results show that the proposed method effectively improves the detection accuracy of harmful organisms in power places.

Oral Presentation Abstracts

Session 1

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.

Venue: Tianshi Room（天时厅）on the second floor

Session Chair: Prof. Shigeru Katagiri& Prof. Yen-Wei Chen

SL0019 Presentation 5 (14:30-14:45)

A Stereo Matching with Reconstruction Network for Low-light Stereo Vision

Tang Rui, Zhang Geng and Liu Xuebin

Chinese Academy of Sciences Xi'an, China

Abstract—To solve the problem existing in the stereo matching of low-light images, this paper proposes a stereo matching with reconstruction network based on pyramid stereo matching network(PSMNet) and reconstruction module. In view of the characteristics of the low-light image with severe and complex noise, the image reconstruction module is added into the traditional stereo matching network for automatic denoising. In this process, the image reconstruction module assists the stereo matching module in model training, so as to reduce the influence of noise on stereo matching and obtain more accurate results. The proposed method has been evaluated and achieves good performance on the Middlebury dataset which is preprocessed. In addition, a low-light binocular platform is built to get the true low-light image and test our network in night environment, results show the disparity maps are more accurate compared to previous methods.

Oral Presentation Abstracts

Session 1

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Afternoon, November 28, 2019 (Thursday)

Venue: Tianshi Room（天时厅）on the second floor

Session Chair: Prof. Shigeru Katagiri& Prof. Yen-Wei Chen

SL5001 Presentation 6 (14:45-15:00)
The development and trend of ECG diagnosis assisted by artificial intelligence

Tongnan Xia, Mengyao Shu, Hongtao Fan, Lei Ma and Yaojie Sun
Fudan University, China

Abstract—Due to the low accuracy and efficiency of traditional manual and existing automated interpretation of ECG，misdiagnosis and missed diagnosis are easy to occur. Studies have shown that, artificial intelligence technology is the direction of ECG diagnosis in the future. The wide application of artificial intelligence in ECG diagnostic system will effectively promote the rapid development of electrocardiography and improve the level of clinical prevention, early warning and treatment as well as prognosis evaluation. Based on the research situation of our research group, we summarized and introduced the research progress of using artificial intelligence technology to assist ECG diagnosis at home and abroad in this paper.

Oral Presentation Abstracts

Session 1

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Afternoon, November 28, 2019 (Thursday)

Venue: Tianshi Room（天时厅）on the second floor

Session Chair: Prof. Shigeru Katagiri& Prof. Yen-Wei Chen

SL0006 Presentation 7 (15:00-15:15)
Discrete Sidelobe Clutter Determination Method Based on Filtering Response Loss
He Wen, Chongdi Duan, Weiwei Wang and Yu Li
China academy of space technology Xi'an, China

Abstract—For air moving target detection with space-based radar (SBR), discrete sidelobe clutter is generally caused by strong scattering points at the sidelobe direction in the observation scene, which is difficult to discern from moving targets as a result of its strong power and special Doppler feature. To solve the above problem, the discrete clutter determination method based on filtering response loss is proposed. Firstly, the power of the potential target is calculated after clutter suppression, and then the power loss of the potential target is obtained by giving comparison to the initial power. Finally, in accordance with the criterion that power loss of discrete sidelobe clutter is high while that of the moving target is low after clutter suppression, with which the discrete sidelobe clutter can be identified based on the adaptive threshold. Simulation results with the real measured data show the feasibility and effectiveness of the proposed method.

Oral Presentation Abstracts

Session 1

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Afternoon, November 28, 2019 (Thursday)

Venue: Tianshi Room（天时厅）on the second floor

Session Chair: Prof. Shigeru Katagiri& Prof. Yen-Wei Chen

SL0016 Presentation 8 (15:15-15:30)

Multi-Task Learning Based End-to-End Speaker Recognition

Yuxuan Pan[1,2], Wei-Qiang Zhang[1] and **Gui-Xin Shi[1]**

1. Tsinghua University, China; 2. Sun Yat-sen University, China

Abstract—Recently, there has been an increasing interest in End-to-End speaker recognition that directly take raw speech waveform as input without any hand-crafted features such as FBANK and MFCC. SincNet is a recently developed novel convolutional neural network (CNN) architecture in which the filters in the first convolutional layer are set to band-pass filters (sinc functions). Experiments show that SincNet achieves a significant decrease in frame error rate (FER) than traditional CNNs and DNNs.

In this paper we demonstrate how to improve the performance of SincNet using Multi-Task learning (MTL). In the proposed Sinc-Net architecture, besides the main task (speaker recognition), a phoneme recognition task is employed as an auxiliary task. The network uses sinc layers and convolutional layers as shared layers to improve the extensiveness of the network, and the outputs of shared layers are fed into two different sets of full-connected layers for classification. Our experiments, conducted on TIMIT corpora, show that the proposed architecture SincNet-MTL performs better than standard SincNet architecture in both classification error rates (CER) and convergence rate.

Oral Presentation Abstracts

Session 1

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, November 28, 2019 (Thursday)

Venue: Tianshi Room（天时厅）on the second floor

Session Chair: Prof. Shigeru Katagiri& Prof. Yen-Wei Chen

SL0001 Presentation 9 (15:30-15:45)

Multi-scale Fusion and Channel Weighted CNN for Acoustic Scene Classification

Liping Yang[1], Xinxing Chen[1], Lianjie Tao[1] and Xiaohua Gu[2]

1. Chongqing University, China; 2. Chongqing University of Science and Technology, China

Abstract—Ensemble semantic features are useful for acoustic scene classification. In this paper, we proposed a multi-scale fusion and channel weighted CNN framework. The framework consists of two stages: the multi-scale feature fusion and channel weighting stages. The multi-scale feature fusion stage extracts hierarchy semantic feature maps using a CNN with simplified Xception architecture and then integrates multi-scale semantic features through a top-down pathway. The channel weighting stage squeezes feature maps into a channel descriptor and then transform it into channel weighting factors to reinforce the importance of each channel for acoustic scene classification. Experimental results on DCASE2018 acoustic scene classification subtask A and subtask B demonstrate the performances of the proposed

Coffee Break 15:45-16:00

Oral Presentation Abstracts

Session 2

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Afternoon, November 28, 2019 (Thursday)

Venue: Tianshi Room（天时厅）on the second floor

Session Chair: Prof. Chin-Chen Chang& Prof. Jianjun Li

SL0017 Presentation 10 (16:00-16:15)
Minimum Classification Error Training with Speech Synthesis-Based Regularization for Speech Recognition
Naoto Umezaki[1], Takumi Okubo[1], Hideyuki Watanabe[2], Shigeru Katagiri[1] and Miho Ohsaki[1]
1. Doshisha University, Japan; 2. Advanced Telecommunications Research Institute International, Japan

Abstract—To increase the utility of Regularization, which is a common framework for avoiding the underestimation of ideal Bayes error, for speech recognizer training, we propose a new classifier training concept that incorporates a regularization term that represents the speech synthesis ability of classifier parameters. To implement our new concept, we first introduce a speech recognizer that embeds Line Spectral Pairs-Conjugate Structure-Algebraic Code Excited Linear Prediction (LSP-CS-ACELP) in a Multi-Prototype State-Transition-Model (MP-STM) classifier, define a regularization term that represents the speech synthesis ability by the distance between a training sample and its nearest MP-STM word model, and formalize a new Minimum Classification Error (MCE) training method for jointly minimizing a conventional smooth classification error count loss and the newly defined regularization term. We evaluated the proposed training method in an isolated-word, closed-vocabulary, and speaker-independent speech recognition task whose Bayes error is estimated to be about 20% and found that our method successfully produced an estimate of Bayes error (about 18.4%) with a single training run over a training dataset without such data resampling as Cross-Validation or the assumptions of sample distribution. Moreover, we investigated the quality of the synthesized speech using LSP parameters derived from the trained prototypes and found that the quality of the Bayes error estimation is clearly supported by the speech synthesis ability preserved in the training.

Oral Presentation Abstracts

Session 2

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Afternoon, November 28, 2019 (Thursday)

Venue: Tianshi Room（天时厅）on the second floor

Session Chair: Prof. Chin-Chen Chang& Prof. Jianjun Li

SL0007 Presentation 11 (16:15-16:30)
Deep Neural Network-Based Scale Feature Model for BVI Detection and Principal Component Extraction

Lu Wang, Xiaorui Liu, Xiaoqing Hu, Luyang Guan, Zhifei Chen and Ming Bao
Institute of Acoustics, Chinese Academy of Sciences, China

Abstract—In this paper, a hybrid scheme combing aerodynamic and acoustic analysis based on the deep neural network (DNN) is proposed to achieve a better understanding of the blade-vortex-interaction (BVI) signal, including the detection and principle component extraction of the BVI signal. First, the DNN-based scale feature model (DNN-SFM) is constructed to describe the end-to-end relationship between the aero-acoustic parameters of the BVI signal and the optimal wavelet scale feature based on the MZ-discrete wavelet transform. According to the DNN-SFM, then, two novel methods are proposed for the BVI signal detection and principal component extraction, which effectively reduce the time complexity and improve the robustness of these algorithms. Finally, the extensive experiments on simulated and realistic data verify the effectiveness of our methods.

Oral Presentation Abstracts

Session 2

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Afternoon, November 28, 2019 (Thursday)

Venue: Tianshi Room（天时厅）on the second floor

Session Chair: Prof. Chin-Chen Chang& Prof. Jianjun Li

SL0014 Presentation 12 (16:30-16:45)

Automated detection of sewer pipe defects based on Cost-sensitive Convolutional Neural Network

Yuhan Chen, Shangping Zhong, Kaizhi Chen, Shoulong Chen and Song Zheng,

Fuzhou University, China

Abstract—Regular inspection and repair of drainage pipes is an important part of urban construction. Currently, many classification methods have been used for defect diagnosis using images inside pipelines. How-ever, most of these classification models train the classifier with the goal of maximizing accuracy without considering the unequal error classification cost in defect diagnosis. In this study, the authors analyze the characteristics of sewer pipeline defect detection and design an automated detection framework based on the cost-sensitive deep convolutional neural network (CNN). The method makes the CNN network cost sensitive by introducing learning theories at the structural and loss levels of the network. To mini-mize misclassification costs, the authors propose a new auxiliary loss function Cost-Mean Loss, which allows the model to obtain the original parameters of the network to maximize the accuracy and improve the performance of the model by minimizing total misclas-sification costs in the learning process. Theoretical analysis shows that the new auxiliary loss function can be applied to the classifica-tion task to optimize the expected value of misclassification costs. The inspection images collected from multiple drainage pipes were used to train and test the network. Results show that after the cost-sensitive strategy was added, the defect detection rate decreased from 2.1% to 0.45%. Moreover, the model with Cost-Mean Loss has better performance than the original model.

Oral Presentation Abstracts

Session 2

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Afternoon, November 28, 2019 (Thursday)

Venue: Tianshi Room（天时厅）on the second floor

Session Chair: Prof. Chin-Chen Chang& Prof. Jianjun Li

SL0015 Presentation 13 (16:45-17:00)

Maximum Bayes Boundary-Ness Training for Pattern Classification

Masahiro Senda[1], David Ha[1], Hideyuki Watanabe[2], Shigeru Katagiri[1] and Miho Ohsaki[1]

1. Doshisha University, Japan; 2. Advanced Telecommunications Research Institute International, Japan

Abstract—The ultimate goal of pattern classifier parameter training is to achieve its optimal status (value) that produces Bayes error or a corresponding Bayes boundary. To realize this goal without unrealistically long training repetitions and strict parameter assumptions, the Bayes Boundary-ness-based Selection (BBS) method was recently proposed and its effectiveness was clearly demonstrated. However, the BBS method remains cumbersome because it consists of two stages: the first generates many candidate sets of trained parameters by carefully controlling the training hyperparameters so that those candidate sets can include the optimal target parameter set; the second stage selects an optimal set from candidate sets. To resolve the BBS method's burden, we propose a new one-stage training method that directly optimizes a given classifier parameter set by maximizing its Bayes boundary-ness or increasing its accuracy during Bayes error estimation. We experimentally evaluate our proposed method in terms of its accuracy of Bayes error estimation over four synthetic or real-life datasets. Our experimental results clearly show that it successfully overcomes the drawbacks of the preceding BBS method and directly creates optimal classifier parameter status without generating too many candidate parameter sets.

Oral Presentation Abstracts

Session 2

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Afternoon, November 28, 2019 (Thursday)

Venue: Tianshi Room（天时厅）on the second floor

Session Chair: Prof. Chin-Chen Chang& Prof. Jianjun Li

SL0020 Presentation 14 (17:00-17:15)

A Small-Footprint End-to-End KWS System in Low Resources

Gui-Xin Shi[1], Wei-Qiang Zhang[1], Hao Wu[1] and Yao Liu[2]

1. Tsinghua University, China; 2. China General Technology Research Institute, China

Abstract—In this paper, we propose an efficient end-to-end architecture, based on Connectionist Temporal Classification (CTC), for low-resource small-footprint keyword spotting (KWS) system. For a low-resource KWS system, it is difficult for the network to thoroughly learn the features of keywords. The intuition behind our new model is that a priori information of the keyword is available. In contrast to conventional KWS system, we modify the label set by adding the preset keyword(s) to the original label set to enhance the learning performance and optimize the final detection task of the system. In addition, CTC is applied to address the sequential alignment problem. We employ GRU as the encoding layer in our system because the dataset small. Experiments using the WSJ0 dataset show that the proposed KWS system is significantly more accurate than the baseline system. Compared to the character-level-only KWS system, the proposed system can improve the performance obviously. Furthermore, the improved system works well in terms of low resource condition, especially for long words.

Oral Presentation Abstracts

Session 2

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Afternoon, November 28, 2019 (Thursday)

Venue: Tianshi Room（天时厅）on the second floor

Session Chair: Prof. Chin-Chen Chang& Prof. Jianjun Li

SL5002 Presentation 15 (17:15-17:30)
Learning How to Avoiding Obstacles For End-to-End Driving with Conditional Imitation Learning
Enwei Zhang, Hongtu Zhou, Yongchao Ding, Junqiao Zhao and Chen Ye
Tongji University, China

Abstract—Obstacle avoiding is one of the most complex tasks for autonomous driving systems, which was also ignored by many cutting-edge end-to-end learning-based methods. The difficulties stem from the integrated process of detection and interpretation of environment and obstacles and generation of proper behaviors. We make the use of CARLA, a simulator for autonomous driving research, and collect massive human drivers' reactions to obstacles on road subjecting to given driving commands, i.e. follow, go straight, turn left and turn right for about 6 hours. A behavior-Cloning neural network architecture is proposed with the modified loss that enlarge the effects of errors for steer, which indicates the benefit to high an accuracy. We found the data augmentation of the image is crucial to the training of the proposed network. And a reasonable limit allows avoiding unexpected stop. The experiments demonstrate 3 obstacle avoidance cases: for the same type as the training dataset, other automobile and two-wheeled vehicles. Finally, the CARLA benchmark is also tested.

Oral Presentation Abstracts

Session 2

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Afternoon, November 28, 2019 (Thursday)

Venue: Tianshi Room（天时厅）on the second floor

Session Chair: Prof. Chin-Chen Chang& Prof. Jianjun Li

SL0003 Presentation 16 (17:30-17:45)

Multi-source Radar Data Fusion via Support Vector Regression

Zhanchun Gao and **Yu Xiang**

Beijing University of Posts and Telecommunications, China

Abstract—Since the measurement error of surveillance sensors such as radar differs each other in the detection of the same target, it's necessary to fuse the multi-source radar data to estimate the true location of target and reduce the measurement error of radar. The key is to establish nonlinear regression model since the uncertainty of measurement error. In this paper, the Support Vector Regression(SVR) methodology was adopted to estimate the true location of target based upon the measurement results of multi-source radar. We uniquely identify a region by a sequence of radar id which means a target can be detected in this area by radars with id listed in the sequence. Different regression model was established in different region which are independent of each other. Since the coordinate system used by radar data and ADSB data is different, we mapped all the data into the same two-dimensional Cartesian coordinate system. In the same region, two regression models were established to estimate the values of aircraft on the x-axis and the y-axis. After we predict the x and y coordinates of the target, we convert the coordinates back to the WGS84 format.

Oral Presentation Abstracts

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Afternoon, November 28, 2019 (Thursday)

Venue: Tianshi Room（天时厅）on the second floor

Session Chair: Prof. Chin-Chen Chang& Prof. Jianjun Li

SL5004 Presentation 17 (17:45-18:00)
Implement AI Service into VR Training

Joshua Suttor, Julian Marin, Evan Verbus and **Meng Su**
Penn State University, United States

Abstract—In this paper, we described the implementation of using a collection of AI services in IBM Watson to facilitate user interaction in a virtual reality space for training simulations. The project aims to increase the efficiency of training employees in an organization, by creating an immersive 3D VR environment tailored to a specific profession. Current training methods usually require an expert of the field to be hired in order to personally train these employees. The main goal of the project is to create a standard training environment which can be used and tailored by companies to train these employees without adding an additional cost.

Oral Presentation Abstracts

Session 2

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Afternoon, November 28, 2019 (Thursday)

Venue: Tianshi Room（天时厅）on the second floor

Session Chair: Prof. Chin-Chen Chang& Prof. Jianjun Li

SL0005 Presentation 18 (18:00-18:15)
Multi-Scale Deep Convolutional Nets with Attention Model and Conditional Random Fields for Semantic Image Segmentation
Ming Liu, Caiming Zhang and Zhao Zhang
Central China Normal University, China

Abstract—Although Convolutional Neural Networks are effective visual models that generate hierarchies of features, there still exist some shortcomings in the application of Deep Convolutional Neural Networks to semantic image segmentation. In this work, our algorithm incorporates multi-scale atrous convolution, attention model and Conditional Random Fields to tackle this problem. Firstly, our method replaces deconvolutional layers with atrous convolutional layers to avoid reducing feature resolution when the Deep Convolutional Neural Networks is employed in a fully convolutional fashion. Secondly, multi-scale architecture and attention model are used to extract the existence of features at multiple scales. Thirdly, we use Conditional Random Fields to prevent the built-in invariance of Deep Convolutional Neural Networks reducing localization accuracy. Moreover, our network completely integrates Conditional Random Fields modelling with Deep Convolutional Neural Networks, making it possible to train the deep network end-to-end. In this paper, our method is used to the matters of semantic image segmentation and is demonstrated the effectiveness of our model with experiments on PASCAL VOC 2012.

Oral Presentation Abstracts

Session 2

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Afternoon, November 28, 2019 (Thursday)

Venue: Tianshi Room（天时厅）on the second floor

Session Chair: Prof. Chin-Chen Chang& Prof. Jianjun Li

SL5003-A Presentation 19 (18:15-18:30)

Application of Data Mining Technique in Predicting Methane-Air Mixture Explosion in Underground Coal Mines

Samira Namazi, Ljiljana Brankovic, Behdad Moghtaderi and Jafar Zanganeh

The University of Newcastle, Australia

Abstract—Fugitive methane emission from underground coal mines significantly contributes to the global warming and thus capturing and eliminating it can greatly assist with reducing the climate change. Application of thermal oxidiser can substantially reduce the methane emission by converting it to CO_2 and water vapour. However, due to the oxidiser high operation temperature (1000 °C) they may introduce the risk of fire and explosion to the mine. In order to improve the level of safety and lower the explosion risk in underground coal mines, a thorough understanding of the methane explosion characteristics is essential. The methane fire and explosion experiments under conditions pertinent to underground coal mine are expensive, risky and necessitate significant effort, and thus requires enormous preparation and safety procedures consideration.

In this paper we summarise the most important applications of data mining to predict the methane explosion properties for a typical underground coal mines. Additionally, we also present our preliminary results on data obtained in extensive experiments which were a part of the ventilation air methane abatement project carried out at the University of Newcastle, Australia, during the period 2013 - 2018. The data sets include methane explosion properties such as pressure rise and flame propagation velocity, as a function of other variables such as methane concentration and quantity. In total 30 data sets, with over 2 million data points in each, are being investigated in this study.

The primarily results corresponding to the methane explosion prediction indicated that the explosion pressure and pressure wave velocity increase as the methane concentration increase. Flame front velocity presented a similar progressively pattern but in a much slower rate. A strong correlation between the initial ignition energy and explosion pressure rise and pressure wave velocity was acquired. The predicted results indicated the explosion pressure and pressure wave velocity significantly accelerate as the ignition energy increases. Overall, the predicted results were observed to be in a good agreement with the experimental findings. As our future work, we will obtain more relationships between methane concentration, ignition energy, pressure and flame velocity, and develop a software tool that would benefit both researchers and

coal mining industry in anticipating the methane explosion characteristics and its consequences without the need to perform any experimental work. In addition, the software tool would assist the mine safety professionals to determine and employ the suitable prevention methodology and countermeasures to eliminate the risk of methane explosion and its devastating consequences.

Oral Presentation Abstracts

Session 2

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Afternoon, November 28, 2019 (Thursday)

Venue: Tianshi Room（天时厅）on the second floor

Session Chair: Prof. Chin-Chen Chang& Prof. Jianjun Li

SL5007 Presentation 20 (18:30-18:45)
Entrepreneurship and Role of AI
Anupam Sharma
Thapar University, India

Abstract—The focus on promotion of entrepreneurial activities has been always crucial for economic development of the successful nation. Entrepreneurs are the leaders who innovate and invent ideas that give stimulus to economic growth activities. In the modern era, entrepreneurship is a key determinant of sustainable growth. Literature explains different types of entrepreneurs that are dominant in explaining the economic growth. This study investigates several inhibitors of entrepreneurship in the perpetual economy of India. Study further explores the different motivators of entrepreneurship and examines the impact of those entrepreneurial motivators on economic growth and employment. A focus group interview was conducted with entrepreneurs in 2017. Nowadays advancement of technology and Artificial Intelligence (AI) has touched every sphere of our life. This paper tries to focus on the impact made by AI in entrepreneurial activities. In general, factors that enrich entrepreneurship include encouraging social entrepreneurship, improving institutional environment and supports from international organizations. For growth of the country practical implications has been identified, such as improving institutional development, creating supportive business environment with e-commerce, and promoting social entrepreneurship, security.

Dinner 18:45-19:45

One Day Visit

November 29, 2019 (Friday) 9:00-17:00

1. (9:00 am) Assemble at Hangzhou Dianzi University

2. (9:00-17:00 pm) Visit West Lake

West Lake is located in the western area of Hangzhou City. It is surrounded by mountains on three sides, with an area of around 6.5 square kilometers. The circumference is around 15 kilometers. West Lake is not only famous for its picturesque landscape, it is also associated with many scholars and national heroes. In addition, many ancient buildings in surrounding areas are among the most cherished national treasures of China, with significant artistic value.

There are numerous temples, pagodas, gardens, and artificial islands within the lake. West Lake has influenced poets and painters throughout Chinese history for its natural beauty and historic relics, and it has also been among the most important sources of inspiration for Chinese garden designers. It was made a UNESCO World Heritage Site in 2011, described as having "influenced garden design in the rest of China as well as Japan and Korea over the centuries" and reflecting "an idealized fusion between humans and nature".

Over the centuries, the beauty and culture of West Lake has attracted numerous literati, who left behind works of literature and poetry to describe the lake. For example, Dream in West Lake and The Enchiridion of Lake and Mountain recorded a lot about West Lake and ancient Hangzhou historic anecdotes. Poets such as Bai Juyi, Su Shi, Xu Zhimo and Hu Shih also wrote countless poems about West Lake. The Chinese legend Legend of the White Snake is also set in West Lake in Hangzhou and has been adapted into films and television series over the years.

Note

Note