The 2018 International Conference on Signal Processing and Machine Learning
(SPML 2018)

November 28-30, 2018

Shanghai, China

Supported by

Indexed by

Table of Contents

Conference Venue

Crowne Plaza Shanghai

（上海银星皇冠假日酒店）

Add: 400 Pan Yu Road, Shanghai, China

（上海 长宁区 番禺路 400 号）

A 10-minute drive from Huahai Road, Crowne Plaza Shanghai offers modern rooms directly next to the Shanghai Arts Film Centre. It boasts a day-spa and an indoor heated swimming pool.

The Shanghai Crowne Plaza is a 10-minute walk from Metro Line 10 Jiaotong University and a 5-minute drive from Xu Jia Hui Shopping District. The hotel is 3.1 miles from Jingan Temple and 4.3 miles from Xintiandi.

The well-equipped rooms are modern and large. They provide cable and satellite TV, work desks and tea and coffee making facilities.

Guests can relax at the outdoor terrace of the Charlie Chaplin themed bar, or enjoy grilled steak and Japanese dishes at the Circles Café. A buffet spread of Asian and Western food is available.

Changning is a great choice for travelers interested in food, culturally diverse food and nightlife.

Nearest Subway Station Shanghai Jiao Tong University Station No 10, No 11.

Conference Introductions

Welcome to 2018 SPML Shanghai 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: 978-1-4503-6605-2), 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.spml.net/ and spml.contact@gmail.com

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 15 Minutes of Presentation and 5 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 29, 2018.

Dress code

Please wear formal clothes or national representative of clothing.

Keynote Speakers Introductions

Keynote Speaker I

Prof. Chin-Chen Chang
Feng Chia University, Taiwan

Prof. Chin-Chen 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 II

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 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 III

Prof. Li Jianjun
Hangzhou Dianzi University, China

Prof. Jianjun Li received the B.S. degree in electrical engineering from Xi'an University of Electronic Science and Technology, China in 1990 and the M.S. degree from University of Western Ontario, Canada and Ph.D degree from University of Windsor, Canada separately. He is now working in Hangzhou Dianzi University as a chair professor. His research interests include artificial intelligence, computer vision, video coding, transcoding, image processing algorithms and implementation.

Invited Speaker

Angel Montesdeoca
IBM Watson

Angel Montesdeoca is the former CEO & Founder of Leaders Working, an EdTech company acquired by Bloomberg.

Following Leaders Working's acquisition, Angel worked in Venture Capital, investing and scaling SaaS, NextGen commerce, and AI companies before heading west to build and take to market products at Facebook and Google.

Today, Angel works at IBM Watson where he leverages AI technology to develop products that will deliver empathy at scale.

Schedule for Conference

Day 1	**November 28, 2018 (Wednesday)** 10:00~17:00 **Venue: Lobby of Crowne Plaza Shanghai** 上海银星皇冠假日酒店大堂 Participants Onsite Registration & Conference Materials Collection
Day 2	**November 29, 2018 (Thursday)** 8:45~17:00 Arrival Registration, Keynote Speech, Conference Presentation
	Morning Conference **Venue: Ruby Room, 2nd floor, Crowne Plaza Shanghai** 上海银星皇冠假日酒店 2 楼 宝石厅
	Opening Remarks 8:45~8:50 Prof. Chin-Chen Chang Feng Chia University in Taiwan
	Keynote Speech I 8:50~9:35 **Title: "Information Hiding Technology：Current Research and Future Trend "** (Prof. Chin-Chen, Chang Feng Chia University, Taiwan)
	Keynote Speech II 9:35~10:20 **Title: "From Bayes Error To Bayes Boundary"** (Prof. Shigeru Katagiri, Doshisha University, Japan)
	Coffee Break & Group Photo Taking 10:20~10:40
	Keynote Speech III 10:40~11:25 **Title: " "** (Prof. Li Jianjun, Hangzhou Dianzi University, China)
	Invited Speech 11:25~12:00 **Title:** "How AI can Help us Develop Meaningful Conversations " (Angel Montesdeoca, IBM Watson)
	Lunch 12:10~13:30 **Venue: Opal Room 1, 1st floor, Crowne Plaza Shanghai** 上海银星皇冠假日酒店 3 楼 碧玉 1 厅

	Afternoon Conference **Venue: Ruby Room, 2nd floor, Crowne Plaza Shanghai** 上海银星皇冠假日酒店 **2** 楼 宝石厅	
	Session 1:13:30~15:10 **Venue: Ruby Room I** Topic: "Computer vision & image processing" Session Chair: Prof. Kazunori Iwata	**Session 2:**13:30~15:10 **Venue: Ruby Room II** Topic: "Machine learning and algorithms" Session Chair: Prof. Li Jianjun
	Coffee Break 15:10~15:40	
	Session 3: 15:40~17:40 **Venue: Ruby Room I** Topic: "Image processing and application" Session Chair: Prof. Shigeru Katagiri	**Session 4:** 15:40~17:00 **Venue: Ruby Room II** Topic: "Signal analysis and processing" Session Chair: Prof. Chin-Chen Chang
	Poster 10:20~15:40 **Venue: Ruby Room**	
	Dinner 18:00-19:00 **Venue: Circles Café, 1st floor, Crowne Plaza Shanghai** 上海银星皇冠假日酒店 **1** 楼 星缘咖啡厅	
Day 3	**November 30th, 2018 (Firday)** 9:00~17:00 One Day Tour	

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

Note:

(1) The registration can also be done at any time during the conference.

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

(3) 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 29, 2018.

(4) One day tour does not include meals, and participants need to take care of themselves.

Registration Guide

Afternoon, November 28, 2018 (Wednesday)

Time: 10:00~17:00

Venue: Lobby of Crowne Plaza Shanghai

(上海银星皇冠假日酒店大堂**)**

Registration Steps

1. Arrive at the Lobby of Crowne Plaza Shanghai;

2. Inform the conference staff of your paperID;

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.

Morning Session

Morning, November 29, 2018 (Thursday)

Time: 8:45~12:00

Venue: Ruby Room,2nd Floor, Crowne Plaza Shanghai

(上海银星皇冠假日酒店2楼 宝石厅)

Opening Remarks (8:45~8:50)

Addressed by **Prof. Chin-Chen Chang**, Feng Chia University in Taiwan

Keynote Speech I (8:50~9:35)
Information Hiding Technology：Current Research and Future Trend
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.

Keynote Speech II (9:35~10:20)
From Bayes Error To Bayes Boundary
Prof. Shigeru Katagiri
Doshisha University, Japan

Abstract—In real-life situations, the ultimate goal of pattern classifier training is to achieve a classifier status that identifies Bayes error, in other words, the minimum classification error probability, for a given set of pattern samples that are represented in a preset feature space. Based on this understanding, many classifier-training methods, including the Minimum Classification Error (MCE) training and the Support Vector Machine training, have been studied to aim at Bayes error; the advancement of the methods has undoubtedly increased classifier performances. Regardless of the improvement in classifier training, achieving Bayes error remains a critically difficult research issue whose root cause is sample finiteness. Although Bayes error is naturally defined over an infinite number of samples, real-life training must be done using a finite number of samples. To fill the gap between the ideal situation where an infinite

number of samples is available and a real-life situation where only a finite number of samples is accessible, many solution approaches have been studied in parallel with the research on training methods, including such re-sampling schemes as Cross Validation, Information Criteria (IC), and Regularization. However, the approaches are still insufficient for closely approximating the Bayes error condition: re-sampling schemes are often unsuited for large-scale datasets, the IC-based methods are not directly linked to classification, and Regularization is often affected by the samples used for training/validation. As cited above, the difficulty underlying Bayes error estimation comes from sample finiteness. The question here is whether it is possible to develop a desirable classifier by another method instead of Bayes error estimation. One long goal of classifier training has been to accurately estimate Bayes error. However, since classifier performance is essentially determined by the class boundary drawn by the classifier, the training goal must originally be the realization of the Bayes boundary, which corresponds to the Bayes error. Since the Bayes error is defined over an infinite number of samples, its estimation requires information about the distribution of those infinite samples. However, if Bayes error estimation were not a goal, the information of infinite samples would become less necessary or even unnecessary. Such goal resetting might lead to groundbreaking training methods and allow more effective estimations of the Bayes boundary. Based on the above, in this talk, we first summarize the key research issues in discriminative-training-based Bayes error estimation and discuss the difficulty caused by sample finiteness, especially using the MCE training method, whose loss is consistent with Bayes error. Next we discuss the possibility of a new classifier-training concept for directly estimating the Bayes boundary instead by Bayes error. Then we introduce its implementation that focuses on classification uncertainty, which is the necessary and sufficient condition for the Bayes boundary.

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 & Group Photo Taking   10:20~10:40

Keynote Speech III (10:40~11:25)

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Prof. Jianjun Li

Hangzhou Dianzi University, China

Abstract—Stegan

Invited Speech   (11:25~12:00)

How AI can Help us Develop Meaningful Conversations

Angel Montesdeoca

IBM Watson

Abstract—Artificial Intelligence allows us transform work and decision making in healthcare, transportation, retail, insurance, education and more. At IBM, we extract deep insights from both large and small data sets, structured and unstructured to empower smarter business. Using Watson, companies like Morgan Stanley, Volkswagen, and H&R Block can identify 35 different emotions on any given topic, deploy the world's most powerful search engine, leverage pre-trained conversation in domain areas of banking, telecommunications, insurance and energy & utilities. But this is only the beginning of Watson's power. Woodside Energy used Watson to turn workers' stories into data. Watson analyzed millions of documents and put 30 years of practical engineer experience at the fingertips of Woodside employees. Watson then extracted, exposed, and organized this information to help safety analysts find safety improvements in the workplace of their engineers.

Taken altogether, our AI products unlock data because in this era of AI, long standing enterprises that have years of accumulated business and consumer knowledge will differentiate themselves with Watson and win.

Lunch   12:10~13:30
Venue: Opal Room 1, 3rd Floor, Crowne Plaza Shanghai
(上海银星皇冠假日酒店3楼 碧玉1厅)

Oral Presentation Abstracts

Session 1- Computer 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, November 29, 2018 (Thursday)

Time: 13:30~15:10

Venue: "Ruby Room I"

Session Chair: Prof. Kazunori Iwata

SP0014 Presentation 1 (13:30~13:50)
Optimality Analysis of Boundary-Uncertainty-Based Classifier Model Parameter Status Selection Method

David Ha[1], Hideyuki Watanabe[2], Emilie Delattre[3], Yuya Tomotoshi[1], Shigeru Katagiri[1] and Miho Ohsaki[1]
1.Doshisha University, Japan; 2. Advanced Telecommunications Research Institute International, Japan; 3. University of Mons, Belgium

Abstract—We proposed a novel method that selects an optimal classifier model's parameter status through the uncertainty measure evaluation of the estimated class boundaries instead of an estimation of the classification error probability. A key feature of our method is its potential to perform a classifier parameter status selection without a separate validation sample set that can be easily applied to any reasonable type of classifier model, unlike traditional approaches that often need a validation sample set or are sometimes less practical. In this paper, we first summarize our method and its experimental evaluation results and introduce the mathematical formalization for the posterior probability estimation procedure adopted in it. Then we show the convergence property of the estimation procedure and finally demonstrate our method's optimality in a practical situation where only a finite number of training samples are available.

SP0012 Presentation 2 (13:50~14:10)
Brain Function Networks Reveal Movement-related EEG Potentials Associated with Exercise-induced Fatigue

Jiahui Wang, Kun Yang and Jianhai Zhang
College of Computer Science, Hangzhou Dianzi University, China

Abstract—The present research was aimed to find out EEG potentials related to movement in exercise-induced fatigue task using brain function network analysis. EEG signals from 32 electrode sites of 20 subjects(10 adults (5 females and 5 males) and 10 children (6 females and 4 males) were recorded. We

applied network topologies extracted from brain function networks constructed by phase synchronization to identify movement-related electrode sites.

We first found that there were significant differences on the global network topologies of subjects of different ages and genders, and the difference between subjects of different ages was greater, so adults and children in the subjects were separated to discuss potential selection related to movement. The following finding illustrated that local network topologies of some electrode sites correlated significantly with the degree of fatigue, we thought and selected such electrode sites to be movement-related. Results showed that 17 potentials in adults, 6 most relevant potentials as important potentials(CP5,C3,AF4,CZ,PZ,C4),and 4 potentials(F4,F8,F3,FC5) in children were selected as movement-related EEG potentials associated with exercise-induced fatigue in rotating the forearm repetitively task. We demonstrated that the credibility of our selections by observing the classification accuracy of local network topologies of non-fatigue state and fatigue state in our selected electrode sites was higher than that of local network topologies of non-fatigue state and fatigue state in our unselected electrode sites, which suggested that our selected movement-related electrode sites were more able to detect non-fatigue state and fatigue state.

SP0020 Presentation 3 (14:10~14:30)

Binocular Vision and Convolutional Neural Network Based Object Detection and Distance Measurement

Zekun Luo, Xia Wu, Qingquan Zou and Xiao Xiao
School of Electronics and Information Engineering, Tongji University, Shanghai, China

Abstract—Autonomous vehicles are widely accepted as one of the most potential technologies in alleviating traffic problems. In most existing autonomous vehicles for object detection and distance measurement, compared with radar or LIDAR which obviously increases the cost, camera combined with Convolutional Neural Network (CNN) has advantage in accuracy and low cost. However, most object detection methods applied on camera cannot perform distance measurement. In this paper, we simultaneously carry out real-time object detection and distance measurement (DDM) in one system by utilizing CNN on a binocular camera. Firstly, a binocular camera is used to acquire disparity maps. Secondly, a set of high-quality region proposals is generated by those disparity maps and the number of region proposals is reduced. Thirdly, CNN is utilized to classify those region proposals and get the bounding box of detected objects. Consequently, those reduced region proposals generated by disparity maps lead to improved computational efficiency. Finally, the object distance is measured by the disparity map and the bounding box. The experiment results show that the proposed method can achieve an accuracy of 87.2% on KITTI dataset and an accuracy of 68% in the real environment for object detection. The average relative error of the distance measurement is 0.85% within 10 meters in real environment. The operation time of the whole DDM system is less than 80 ms.

SP0033 Presentation 4 (14:30~14:50)

Dynamic weighted histogram equalization techniques using for Cancer prediction and recognition in medical imaging

Rashid Abbasi[1], Lixiang Xu[2], Zheng Wang[3], Gohar Rehman Chughtai[4], Farhan Amin[5] and Bin Luo[1]

1.Anhui University, China; 2.Hefei University of Science and Technology, China; 3.Northwestern Polytechnical University, China; 4.Chongqing University, China; 5.Youngman University, Korea;

Abstract—Contrast-enhancement is very essential and ideal to produce a maximum contrast of many computer-vision and image-processing applications with minimum brightness error. Moreover, there is no mechanism to control the brightness error, contrast in conventional histogram equalization and mean shift problem that is usually occurs when the histogram equalization based contrast enhancement methods has used. The purpose of this research is to devise an intelligently robust framework based on the image data that is collected during several phases of Ultrasound (US) cancer image by automating the real-time image enhancement, segmentation, classification and progression the widely spreading of cancer disease at initial stages moreover, we have proposed a new methodology of contrast optimization that overcomes the mean shift problem. The data is collected and preprocessed, while image segmentation techniques has used to partition and extract the concerned object from the enhanced image.

SP0042 Presentation 5 (14:50~15:10)

Densely-Connected Deep Learning System for Assessment of Skeletal Maturity

Shuqiang Wang[1] , Xiang Yu Wang[1] and Yong Hu[2]

1. Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China; 2.The University of Hong Kong, Hong Kong

Abstract—Assessment of skeletal maturity plays an essential role in the clinical management of the adolescent disease. This task is very challenging when using machine learning method due to the limited data and large anatomical variations among different subjects. In this paper, we propose a deep learning pipeline to automatically assess the distal radius and ulna (DRU) maturity from left hand radiographs. The model we proposed acquires two convincing advantages: first, our model preserves the maximum information flow and has a much faster convergence rate. Second, our model avoids overfitting even if training with limited data. The proposed method achieves 83.33% and 90.31% for radius and ulna classification respectively.

Session 2- Machine learning and algorithms

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 29, 2018 (Thursday)

Time: 13:30~15:10

Venue: "Ruby Room II"

Session Chair: Prof. Li Jianjun

SP0017 Presentation 6 (13:30~13:50)

Machine Learning-Based Charging Network Operation Service Platform Reservation Charging Service System

Su Shu, Yan Hui, Ding Ning and Peijun Li

State Grid Electric Vehicle Service Company, China

Abstract—This paper proposes a machine learning-based electric vehicle (EV) reserved charging service system, which takes into consideration the impacts from both the power system and transportation system. The proposed framework of charging network operation service platform links the power system with transportation system through the charging navigation of massive EVs. The "reserved charging + consumption" integrated service model would be great significant for dealing with large-scale integration of electric vehicles. It applies the concept of charging time window to optimization of EV charging prediction for the reserved charging service system, and designs a dynamic dispatching model based on sliding time axis to make charging process of users get rid of constraints of queuing time and charging service fee period。

SP0019 Presentation 7 (13:50~14:10)

A Comparative Analysis of Hyperopt as Against Other Approaches for Hyper-Parameter Optimization of XGBoost

Sayan Putatunda and Kiran Rama

VMware Software India pvt. Ltd. India

Abstract—The impact of Hyper-Parameter optimization on the performance of a machine learning algorithm has been proved both theoretically and empirically by many studies reported in the literature. It is a tedious and a time-consuming task if one goes for Manual Search. Some of the common approaches to address this include Grid search and Random search. Another alternative is performing the Bayesian optimization using the Hyperopt library in Python. In this paper, we tune the hyperparameters of XGBoost algorithm on six real world datasets using Hyperopt, Random search and Grid Search. We then compare

the performances of each of these three techniques for hyperparameter optimization using both accuracy and time taken. We find that the Hyperopt performs better than the Grid search and Random search approaches taking into account both accuracy and time. We conclude that Bayesian optimization using Hyperopt is the most efficient technique for hyperparameter optimization.

SP0006 Presentation 8 (14:10~14:30)

Deep Exercise Recommendation Model

Tuanji Gong and Xuanxia Yao
University of Science and Technology Beijing

Abstract—In online education scenario, recommending exercises for students is an attractive research topic. In this paper, we propose a new hybrid recommendation model that combines deep collaborative filtering (DeepCF) component with wide linear component. The former incorporates stacked denoising auto-encoder(SDAE) into matrix factorization and the latter is general linear component. In DeepCF component, we employ SDAE to learn low dimension latent feature of a student's feature and an item's feature and use matrix factorization method to predict the rating that a student rates an item. In wide linear model, we incorporate some meta properties of an item, such as difficulty, type and knowledge components(KCs). The two components are combined by linear approach. We use negative sampling method to generate the training dataset. An item is corrupted by Gaussian noise and is feed into the SDAE net ,which consists of encoder and decoder with multiple layers. We use tightly couple model to combine SDAE model and collaborative filter model. Experimental results show that the proposed model achieves a 10% relative improvement in AUC metric compared to the traditional collaborative filter method.

SP0013 Presentation 9 (14:30~14:50)

An online Transfer Learning algorithm with adaptive cost

Mimi Wu, Yuhong Zhang and Xuegang Hu
Hefei University of Technology, China

Abstract—Online transfer learning aims to attack an online learning task on a target domain by transferring knowledge from some source domains, which has received more attentions. And most online transfer learning methods adapt the classifier according to its accuracy on new coming data. However, in real-world applications, such as anomaly detection and credit card fraud detection, the cost may be more important than the accuracy. Moreover, the cost usually changes in these online data, which challenges state-of-art-methods. Therefore, this paper introduces the cost of misclassification into transfer-learning of classifier, and proposes a novel online transfer learning algorithm with adaptive cost (OLAC). Firstly, we introduce the label distribution into traditional Hinge Loss Function to compute the cost of classification adaptively. Secondly, we transfer learn the classifier according to its performance on new coming data, which including both accuracy and cost. Extensive experimental results show that our method can achieve higher accuracy and less classification lost, especially for the samples with higher costs.

SP0050 Presentation 10 (14:50~15:10)
Detecting Blind Cross-Site Attacks Using Machine Learning
Fehmi Jaafar, Gurpreet Kaur and Yasir Malik
Concordia University of Edmonton, Canada

Abstract—Cross-site scripting (XSS) is a scripting attack targeting web applications by injecting malicious scripts into web pages. Among the three types of cross-site scripting attacks (reflected, stored and DOM-based XSS), the stored XSS attack is considered to have the devastating impact on web applications as the script injected by an attacker is likely to be stored in a log file or in the database. Blind XSS is a subset of stored XSS, where an attacker blindly deploys malicious payloads in a web page that are stored in a persistent manner on target servers such as in "comment field" is still challenging to detect. Most of the XSS detection techniques used to detect the XSS vulnerabilities are inadequate to detect the blind XSS attack. Thus, we present in this paper an approach to detect the blind XSS attack by using a support vector machine (SVM) learning algorithm. Moreover, the experiment evaluation determines the results by using the confusion matrix in theform of graphical representation.

Coffee Break   15:10~15:40

Session 3- Image processing and application

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 29, 2018 (Thursday)

Time: 15:40~17:40

Venue: "Ruby Room I"

Session Chair: Prof. Shigeru Katagiri

SP0043 Presentation 11 (15:40~16:00)
An Improved Hashing Method for Image Retrieval Based on Deep Neural Networks
Qiu Chen[1], Weidong Wang[2] and Feifei Lee[2]
1.Kogakuin University, Japan; 2. University of Shanghai for Science and Technology, China

Abstract—Hashing algorithm projects the vector of features onto the binary space that generate the binary codes to reduce calculating time. Thus Hashing Algorithm is widely used to improve retrieval efficiency in traditional image retrieval methods based on Deep neural networks (DNNs). In this paper, we extract the feature vectors whose elements between 0 and 1 by DNNs and linear scaling method, then we define the mean of each column vector of the matrix consisted of these feature vectors as threshold to create corresponding hashing codes after two-stages binarization. Since threshold brings major effect to the preservation of the similarity between images, during this process, the two-stages binarization play two important roles: 1) optimizing thresholds; 2) optimizing hash codes. The promising experimental results on public available Cifar-10 database show that the proposed approach achieve higher precision compared with the state-of-the-art hashing algorithms.

SP0016 Presentation 12 (16:00~16:20)
A Shape Matching Method Considering Computational Feasibility
Hiroki Yamamoto, Kazunori Iwata, Nobuo Suematsu and Kazushi Mimura
Hiroshima City University, Japan

Abstract—Regarding shape matching, we present a novel method of finding correspondence between shapes, that is applicable to existing local descriptors and somewhat enhances these. In our method, we find the correspondence of a focusing point of shape, considering that of neighboring points to it. This plays a vital role of avoiding the risk of failing to notice more appropriate correspondence. However, considering that of neighboring points causes another problem on computational feasibility because there is a considerable increase in the number of possible correspondences searched in matching shapes. We

therefore manage this problem using an efficient approximation for reducing the number of possible correspondences. Conducting numerical analysis in shape retrieval, we show that our method is useful to obtain a better correspondence than the conventional method.

SP0009 Presentation 13 (16:20~16:40)

VMD entropy method and its application in Early Fault Diagnosis of Bearing

Hang Jin, Jianhui Lin, Xieqi Chen and Tao Deng

Southwest Jiaotong University, China

Abstract—This paper proposes an early faults diagnosis method for bearings based on Variational Mode Decomposition (VMD) and Entropy Theory to inspect the working state of the key components of the high-speed train axle box. Firstly, the box vibration signal is decomposed into detailed signals at different scales by using VMD(Band-Limited Intrinsic Mode Function，BIMF),Then the three kinds of entropy is extracted from BIMF and composed into VMD entropy, Finally the VMD entropy is input into SVM for training to determine the fault type. Based on this method, this paper is going to take research on the vibration signals of high-speed train axle box under three typical working conditions of normal bearing, cage failure and roller failure. It is concluded that the best VMD parameters of fault identification for high-speed train axle box can effectively improve the recognition rate of entropy in early bearing fault diagnosis by comparing it with EMD entropy. The analysis results show that for a high-speed train running under 200 km/h, the recognition rates under three different working conditions can reach 98.75%、100%、98.75% respectively, which proved the validity of VMD entropy for early bearing fault identification of high-speed train.

SP0021 Presentation 14 (16:40~17:00)

Implementation of Irregular Meshes for the Sparse Representation of Multidimensional Signals

Sergey Vishnyakov, Yulia Vishnyakova and Elizaveta Sokolova

Moscow Power Engineering Institute, Russia

Abstract—The paper is dedicated to development of effective tools of multidimensional digital signal processing on irregular meshes. ANN-based method of irregular mesh generation for intra-frame video coding is developed. The method described is based on artificial neural network implementation. Different architectures and types of artificial neural networks are compared. The training and testing sequences generation problem is discussed. The aim of the irregular mesh coverage of the two-dimensional signal (frame) is to decrease computational cost for the further motion detection between frames. The benefit of the artificial neural network usage is the relatively high low computational cost of the mesh generation in comparison with analogous. The implementation of the irregular meshes for the correlation analysis between signals is discussed. Examples of the utilization of the irregular mesh-based FIR filtering for the open-boundary problem numerical solution are presented. Generalized results obtained may be used for pattern recognition, data compression, multidimensional look-up table interpolation.

SP0031 Presentation 15 (17:00~17:20)

Location-based fingerprint downhole mobile node localization algorithm

Hengjun Zhu[1], Guanyu Wang[1] and Liang Zhang[2]

1, Qiqihar University, China; 2. Heilongjiang Communications Polytechnic, China

Abstract—Aiming at the problem that the wireless signal in coal mine is vulnerable to interference and the positioning accuracy of the node is low when moving, a positioning algorithm based on location fingerprint downhole mobile node is proposed. Firstly, based on the location fingerprint algorithm, the reference points with higher similarity are grouped, and KNN localization is performed respectively, and the position with large error is eliminated by the Grubbs criterion. Secondly, by generating a reasonable particle distribution and setting the particle collection method, the unscented particle filtering algorithm is improved, and the estimated position and state estimation are merged. The experimental results show that the algorithm of grouping KNN screening and improved unscented particle filtering algorithm improves the stability of the system and the positioning accuracy of the mobile node, and reduces the computational complexity of the algorithm.

SP0038 Presentation 16 (17:20~17:40)

Deep Activation Feature Maps for Visual Object Tracking

Yang Li, Zhuang Miao and Jiabao Wang

Army Engineering University of PLA, China

Abstract—Video object tracking is an important task with a broad range of applications. In this paper, we propose a novel visual tracking algorithm based on deep activation feature maps in correlation filter framework. Deep activation feature maps are generated from convolution neural network feature maps, which can discover the important part of the tracking target and overcome shape deformation and heavy occlusion. In addition, the scale variation is calculated by another correlation filter with histogram of oriented gradient (HoG) features. Moreover, we integrate the final tracking result in each frame based on the appearance model and scale model to further boost the overall tracking performance. We validate the effectiveness of our approach on a challenging benchmark, where the proposed method illustrates outstanding performance compared to the state-ofthe-art tracking algorithms.

Session 4- Signal analysis and 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, November 29, 2018 (Thursday)

Time: 15:40~17:00

Venue: "Ruby Room II"

Session Chair: Prof. Chin-Chen Chang

SP0035 Presentation 17 (15:40~16:00)
Target-depth estimation for active towed array sonar in shallow sea base on matched field processing
Jun Wang and Fuchen Liu
Science and Technology on Sonar Laboratory, Hangzhou Applied Acoustics Research Institute, China

Abstract—Target depth estimation can facilitate classification of surface ships or water-column targets thus reducing the false rates in active surveillance systems. Active sonar mainly determines the distance of the target by measuring the roundtrip time of the transmitted signal to the received echo, but it can't determine the depth of the target. For the long distance sound field, the echo is regarded as a point source sound field emitted from the reflector, the distance-depth space is divided into grids, and the sound field at each grid point is calculated according to the parameters of the ocean environment, and then matched with the received echoes, the best match point is the distance and depth of the target. In the active matched field depth-estimation algorithm, the pulse signal generated by the active sonar is sent to the transmitter to generate sound wave, at the same time, it is sent to the emission model to calculate the copy field of the hypothetical target point, and then the reflected sound field of the hypothetical target is calculated through the reflection model, finally, calculate the total copy vector at the receiving hydrophone array. The active matched field processor matches the received echo signal with the calculated total copy vector and outputs an ambiguity surface, it can be seen that the active matched field processing makes full use of the ocean environment. Since the active sonar has estimated the distance of the target according to the arrival time of the echo, the matched field depth estimation is to search for the target depth in a small range.When the SNR of target echo is relatively high, the low-frequency active towed array sonar has good depth estimation capability.

SP0008 Presentation 18 (16:00~16:20)

Research on the Signal Denoising Method of Acoustic Emission in Fused Silica Grinding

Lian Zhou, Qiancai Wei, Nan Zheng, Qinghua Zhang, Jian Wang and Qiao Xu

Research Center of Laser Fusion, China Academy of Engineering Physics, China

Abstract—The ultra-precision grinding process of brittle and hard fused silica is very complex. In order to monitor the grinding process accurately, it's necessary to denoise the acoustic emission (AE) signals generated in this process and extract useful parameters which can characterize the cutting procedures of abrasive grain. Firstly, according to the characteristics of AE signal when single diamond grain scratching, the AE signal with white Gaussian noise during grinding process was simulated. Then the simulated AE signal was denoised by wavelet threshold denoising method, empirical mode decomposition (EMD) denoising method and compound denoising method. Taking the signal to noise ratio (SNR) and the mean square error (RMSE) as the evaluation parameters, the optimal way was compound denoising method, empirical mode decomposition firstly and then wavelet threshold de-noising method. The SNR was better than 10dB, and the RMSE was less than 0.5. At the end, the AE signal of grinding was denoised by the optimal method, and the cutting process of the abrasive particles can be observed accurately. With the signal peak number and energy as key parameters, the accurate monitoring of the grinding process of fused silica material was realized.

SP0028 Presentation 19 (16:20~16:40)

A Cascade Method for Two kinds of Errors Calibration

Mengyu Ni[1], Song Xiao[2] and Chen Hui[3]

1.Wuhan Early Warning Academy, China; 2.Early Warning Academy Wuhan China; 3.Key Research Lab, Radar Academy, Wuhan 430010, China;

Abstract—Based on instrumental sensors, a cascade calibration method of the near-field source is proposed. The method can not only uses multiple independent near-field signals operating at different times and at different locations calibrate the gain and phase errors and position errors, but also locate the near-field source at the same time. At the single signal, reconstructing the virtual array and steering vector transformation are taken. Compared to the joint estimation of multidimensional parameters, the method can be estimated in real time and less affected by error variations, only one-dimensional spectral search is needed, and there is no loss of aperture in constructing the virtual array. Simultaneously, simulation experiments show the performance of the proposed algorithm in this paper.

SP0040 Presentation 20 (16:40~17:00)

Speech Emotion Classification using Raw Audio Input and Transcriptions

Gabriel Lima and Jinyeong Bak

Korea Advanced Institute of Science and Technology, South Korea

Abstract—As new gadgets that interact with the user through voice become accessible, the importance of not only the content of the speech increases, but also the significance of the way the user has spoken. Even though many techniques have been developed to indicate emotion on speech, none of them can fully grasp the real emotion of the speaker. This paper presents a neural network model capable of

predicting emotions in conversations by analyzing transcriptions and raw audio waveforms, focusing on feature extraction using convolutional layers and feature combination. The model achieves an accuracy of over 71% across four classes: Anger, Happiness, Neutrality and Sadness. We also analyze the effect of audio and textual features on the classification task, by interpreting attention scores and parts of speech. This paper explores the use of raw audio waveforms, that in the best of our knowledge, have not yet been used deeply in the emotion classification task, achieving close to state of art results.

Dinner   18:00-19:00
Venue: Circles Café, 1st Floor, Crowne Plaza Shanghai
(上海银星皇冠假日酒店1楼 星缘咖啡厅)

Poster Presentation Abstracts

Poster session

November 29, 2018 (Thursday)

Time: 10:20~15:40

Venue: "Ruby Room "

SP0001 Presentation 1
Feature selection by maximizing part mutual information
Wanfu Gao, Liang Hu and Ping Zhang
College of Computer Science and Technology, Jilin University, China

Abstract—Feature selection is an important preprocessing stage in signal processing and machine learning. Feature selection methods choose the most informative feature subset for classification. Mutual information and conditional mutual information are used extensively in feature selection methods. However, mutual information suffers from an overestimation problem, with conditional mutual information suffering from a problem of underestimation. To address the issues of overestimation and underestimation, we introduce a new measure named part mutual information that could accurately quantify direct association among variables. The proposed method selects the maximal value of cumulative summation of the part mutual information between candidate features and class labels when each selected feature is known. To evaluate the classification performance of the proposed method, our method is compared with four state-of the-art feature selection methods on twelve real-world data sets. Extensive studies demonstrate that our method outperforms the four compared methods in terms of average classification accuracy and the highest classification accuracy.

SP0005 Presentation 2
Pedestrian Detection in Fish-eye Images using Deep Learning: Combine Faster R-CNN with an effective Cutting Method
Zhenzhen Kong,   Hongli Lin,   Weisheng Wang, Kang Liang and Jun Chen
Hunan University, Changsha, China

Abstract—With the development of artificial intelligence, pedestrian detection has become an important research topic in the field of intelligent video surveillance. Fish-eye camera is a useful tool for video monitoring. However, due to the edge distortion of the fish-eye image, which puts higher requirements and challenges on the pedestrian detection technology of fish-eye images. In this paper, an effective method is proposed by rotating cutting to address the problem, a fish-eye image is divided into an edge portion and a center portion. The effectiveness and performance of our method is verified by the traditional pedestrian detection method HOG+SVM and the Faster R-CNN based on convolutional neural network. The experimental results demonstrate the efficacy of the proposed approach, and Faster R-CNN achieves better performance than traditional method.

SP1001 Presentation 3

Improvement Research and Application of Text Recognition Algorithm Based on CRNN

Lei Chen and Shaobin Li

Communication University of China,China

Abstract—This paper is based on CRNN model to recognize the text in the images of football matches scene, and two improvements are proposed. Considering the edge feature of text is strong, this paper adds MFM layers into CRNN model aiming to enhance the contrast. In order to solve the problem of losing details of image static features in the process of getting contextual features, this paper fuses up these two kinds of features. The training and testing experiments carried out on public dataset and manual dataset respectively verify the validity of the improvements, and the recognition accurate rate is higher than original model.

SP0018 Presentation 4

A Comparative Study on Detection Accuracy of Cloud-Based Emotion Recognition Services

Osamah Al Omair and Shihong Huang

Florida Atlantic University, United States

Abstract—The ability of software systems adapting to human's input is a key element in the symbiosis of human-system co-adaptation, where human and software-based systems work together in a close partnership to achieve synergetic goals. This seamless integration will eliminate the barriers between human and machine. A critical requirement for co-adaptive systems is software system's ability to recognize human emotion, in which the system can detect and interpret users' emotions and adapt accordingly. There are numerous solutions that provide the technologies for emotion recognition. However, selecting an appropriate solution for a given task within a specific application domain can be challenging. The vast variation between these solutions makes the selecting task even more difficult. This paper compares cloud-based emotion recognition services offered by Amazon, Google, and Microsoft. The focus of this paper is to measure the detection accuracy of these services. Accuracy is calculated based on the highest confidence rating returned by each service, each of which supports a different set of emotions. All three services have been tested with the same dataset. This paper concludes with findings and recommendations based on our comparative analysis among these services.

SP0024 Presentation 5

Lip Reading using Simple Dynamic Features and a Novel ROI for Feature Extraction

Abhilash Jain and Rathna G N

Indian Institute of Science, Bangalore, India

Abstract—Deaf or hard-of-hearing people mostly rely on lip-reading to understand speech. They demonstrate the ability of humans to understand speech from visual cues only. Automatic lip reading systems work in a similar fashion – by obtaining speech or text from just the visual information, like a video of a person's face. In this paper, an automatic lip reading system for spoken digit recognition is presented. The system uses simple dynamic features by creating difference images between consecutive

frames of the video input. Using this technique, word recognition rates of 83.79% and 65.58% are achieved in speaker-dependent and speaker-independent testing scenarios, respectively. A novel, extended region-of-interest (ROI) which includes lower jaw and neck region is also introduced. Most lip-reading algorithms use only the mouth/lip region for relevant feature extraction. Over simple mouth as the ROI, the proposed ROI improves the performance by 4% in speaker-dependent tests and by 11% in speaker-independent tests

SP0041 Presentation 6
Comprehensive error calibration algorithm based on non-uniform dual circular array

Jiajia Zhang, Hui Chen and Mengyu Ni
Early Warning Academy, China

Abstract—In this paper, a comprehensive error calibration method is proposed for non-uniform dual circular arrays in the presence of gain-phase errors, position errors and mutual coupling errors. By rotating the platform, only one auxiliary calibration source is used to construct three time-sharing calibration sources. According to the orthogonality principle of signal subspace and noise subspace, the cost function is constructed, and the coefficients of gain-phase errors, position errors and mutual coupling errors are obtained through iteration. When the mutual coupling error is estimated, the algorithm makes full use of the structural characteristics of the non-uniform dual circular array. The algorithm does not require any additional auxiliary array element, the principle is simple and easy to implement. Simulation results show that the proposed algorithm can effectively calibrate the comprehensive error of non-uniform dual circular array.

SP0044 Presentation 7
Expressway Crash Prediction based on Traffic Big Data

Hailang Meng, Xinhong Wang and Xuesong Wang
Tongji University, China

Abstract—With the development of society, the number of vehicles increases rapidly. The vehicle plays an important role in people's life, however the problem of traffic safety caused by vehicles has also become increasingly prominent. In China, the high crash rate and casualty rate on expressways have always troubled traffic management department. So crash prediction on expressway becomes vital. Conventionally, crash prediction is based on traffic flow data. These data do not contain all the necessary factors. In this paper, we perform the prediction using real-world data, including historical accident data, road geometry data, vehicle speed data, and weather data. And machine learning is an available tool to analyze these data. We treat the crash prediction problem as a binary classification problem. For classification, sample imbalanced is a great challenge in practice. Modifying sample weights is applied to handle this challenge. Three machine learning classification techniques, namely Random Forest (RF), Gradient Boosting Decision Tree (GBDT) and Xgboost, are considered to carry out the crash prediction task respectively. The best recall and precision rate of these models are respectively 0.764253 and 0.01062. The proposed method can be integrated into urban traffic control systems toward police dispatch and crash prevention.

SP0045 Presentation 8

Unsupervised Depth Estimation from Monocular Video based on Relative Motion

Cao Hui[1], Wang Chao[1], Wang Ping[1], Zou Qingquan[2] and Xiao Xiao[2]

1.Tongji University, China; 2.SAIC Motor Corporation Limited, China

Abstract—In this paper, we present an unsupervised learning based approach to conduct depth estimation for monocular camera video images. Our system is formed by two convolutional neural networks (CNNs). A Depth-net is applied to estimate the depth information of objects in the target frame, and a Pose-net tends to estimate the relative motion of the camera from multiple adjacent video frames. Different from most previous works, which normally assume that all objects captured by the images are static so that a frame-level camera pose is generated by the Pose-net, we take into account of the motions of all objects and require the Pose-net to estimate the pixel-level relative pose. The outputs of the two networks are then combined to formulate a synthetic view loss function, through which the two CNNs are optimized to provide accurate depth estimation. Experimental test results show that our method can provide better performance than most conventional approaches.

SP0049 Presentation 9

Arabic Topic Detection Using Discriminative Multi nominal Naïve Bayes and Frequency Transforms

Ahmed Alsanad

King Saud University, Saudi Arabia

Abstract—Arabic topic detection (ATD) has become an attractive research field. It is used in many applications, such as Arabic documents classification, web search, social media, security, and so on. ATD uses machine learning algorithms to classify Arabic documents based on its Arabic text contents. Arabic text classification is not easy task. The Arabic words have unlimited variation in the meaning, in addition to the complexity and ambiguity of the Arabic language nature. There are some works have been proposed for Arabic text classification in recent years. However, these previous works need some improvements to be more accurate and efficient. Therefore, this paper proposes an effective approach for Arabic text classification and topic detection using discriminative multi nominal naïve Bayes (DMNB) classifier and frequency transform. The proposed approach includes three main steps: Arabic text preprocessing, Arabic text feature extraction and normalization, and Arabic text classification. A dataset of 1500 Arabic documents collected from Arabic articles corpus in 5 different topics is used to evaluate the proposed approach. The experimental results of 10-folds cross-validation show that the proposed approach performs competitively better than the state-of-the-art approaches .

One Day Visit

November 30, 2018 (Friday) 9:00~17:00

(Tip: The following places are for references, and the final schedule should be adjusted to the actual notice.)

(9:00am) Assemble
(9:00-12:00pm) Morning Visit

Visit Shanghai Oriental Pearl TV Tower

Shanghai Oriental Pearl TV Tower (Chinese: 东方明珠电视塔), with a height of 468 meters high is the 4th highest in Asia and the 6th highest tower in the world. Construction commenced on July 30th, 1991 and was completed on October 1st, 1994. It faces the Bund across the Huangpu River. Built with eleven steel spheres in various sizes hanging from the blue sky to the green grassland, the body of the tower creates an admirable image, which is described in an ancient Chinese verse as: large and small pearls dropping on a plate of jade.

The Oriental Pearl Science Fantasy World is located in the 1st sphere. A revolving restaurant is 267 meters off the ground, making it the 2nd highest dining area in Asia.

Visit The City God Temple

The City God Temple or Temple of the City Gods(Chinese: 城隍庙), officially the City Temple of Shanghai, is a folk temple located in the old city of Shanghai. It commemorates the elevation of Shanghai to municipal status and is the site of the veneration of three Chinese figureshonored as the city gods of the town. It is also known by some locals as the "Old City God Temple", in reference to a later "New City God Temple" which no longer exists.

In Chinese, "Chenghuangmiao" is also used as the name of the commercial district near the temple. This is generally known in English as Yu Garden, after a nearby Chinese garden. The district is now incorporated under the name Yuyuan Tourist Mart.

(12:00-14:00) Lunch time
(14:00-17:00) Afternoon visit

Visit The Bund

The Bund(Chinese: 外滩), which extends from Jinling Road in the south to the Waibaidu Bridge in the north, is a 1.5-kilometer-long boulevard on the western bank of the Huangpu River. walking along Zhongshan Road, not only can visitors enjoy the scenery of Huangpu River but have a glimpse of the development of Lujiazui district on the other side. The architecture along the Bund is unanimously honored as a "World Architectural Fair", including all kinds of tall buildings like the Gothic style, Baroque style, Roman style, Classical style, Renaissance style and the combination of Chinese and Western style. It is a romantic place for lovers.

Visit Tianzifang

Tianzifang (Chinese: 田子坊) is a touristic arts and crafts enclave that has developed from a renovated traditional residential area in the French Concession area of Shanghai.[1] It is now home to boutique shops, bars and restaurants.Visit Little India

(17:00) Back to Hotel

Note

Note