Greetings!

Welcome to the September issue of the APSIPA Newsletter.

Since its launch in 2012, APSIPA Newsletter attempts to provide members with the latest news about our community, such as the APSIPA conference, APSIPA Transactions update, Friend Labs news, Board of Governors election information, distinguished lectures, etc. We also invited renowned researchers in signal and information area to share with us their research works and insight in the field. We hope you enjoy our previous issues.

As suggested by Prof. Chung-Nan Lee (APSIPA VP-Technical activities), technical committee (TC) chairs can disseminate information about their TCs to members through the newsletters. In this issue, we have the pleasure to have two TC chairs volunteer to be the guest editors. They are Prof. Mingyi He (Northwestern Polytechnical University, China) and Prof. Dong Wang (Tsinghua University, China). They will tell us about "Signal and Information Processing Theory and Methods (SIPTM)" TC and "Speech, Language and Audio (SLA)" TC.

APSIPA ASC 2019 is the 11th annual conference organized by APSIPA. It will be held in Lanzhou, China from 18 to 21 November 2019. Prof. Dong Wang will give us updated news regarding APSIPA ASC 2019 including tutorials, Autoware hands-on workshop, overview sessions and industrial forum. The winter school is a satellite event of APSIPA ASC 2019. Its theme is "Speech technologies and AI". You can find more information about the winter school on this issue.

Enjoy reading this issue!

Mingyi He, Dong Wang and Bonnie Law
Guest editors and EiC

Signal and Information Processing Theory and Methods (SIPTM) TC

Prof. Mingyi He

Northwestern Polytechnical University (China)

http://teacher.nwpu.edu.cn/hemingyi.html

【Signal and Information】

Information is the state of things and the way they change. Obviously, as the information of the state of motion and the way of state change, it needs to be expressed in a certain form. Signal is the form used to express information and the carrier used to carry information. Such as data, tables, text, voice, image, video, multimedia and so on. The relationship between signal and information is like the relationship between "external form" and "internal content".

【Signal and Information Processing-SIP】

Signals or information need to be processed before they can be easily applied; only after deep processing can useful knowledge be extracted and intelligent strategies for solving problems be formed. Therefore, signal and information processing (SIP) is a particularly important part of the information process and a particularly important part of information science and technology. The content of signal and information processing covers a very wide range, ranging from simple conventional computing to complex cognitive and decision-making (i.e. intelligent processing), from theory to application, signal and information processing is ubiquitous, all the time.

Since the signal is the carrier and expression of the information, there are two different levels of information processing: one is to process the signal to achieve the purpose of processing the information itself, the other is only to process the signal (such as amplification, band selection, denoising, etc.). The former is a deep processing, touching the information itself, is the real meaning of "information processing". The latter is a shallow processing, only changing the signal and (in principle) will not affect the information itself, so called "signal processing". Signal processing can be likened to "waveform" based processing (including amplification, enhancement, denoising, restoration, etc.), and information processing is likened to "content" based processing, such as feature mining, speech classification, image recognition, emotional understanding and so on.

Signal processing focuses on windowing, filtering, correlation, convolution, denoising and parameter calculation of the signals as information's carriers (rather than information itself) in time, space, frequency, wavelength, etc. Its main purpose is to enhance the interesting part of signals or weaken the other parts of signals. Information processing usually refers to processing the acquired information itself to make it more convenient for application. Signal processing mainly touches the carrier and the appearance of the information (signal), while information processing not only touches the signal, but also touches the information itself.

In summary, it can be considered that the processing of signal itself is signal processing, while the processing of information content (to obtain knowledge) is information processing. In fact, in most cases, we have to deal with both waveform and content. This is the concept of signal and information processing. There are also many views that since the processing of information is also realized through signal processing. More broadly, generalized signal processing is signal and information processing.

【SIP Theory and Methods】

Signal and information processing can be divided into theory and practice (application), but also into theory, method, design, implementation and application. The theory and method lay stress on its foundation and guidance to technologies. According to its theory and technical methods, signal and information processing can be divided into two levels: conventional processing and intelligent processing.

Conventional processing mainly refers to the aforementioned signal processing, that is shallow processing. It mainly includes signal modeling, amplification, enhancement, restoration, detection, filtering, correlation, denoising, various transforms (Fourier transform, wavelet transform, etc.), calculation of parameters such as entropy, feature selection, estimation, coding, compression and so on. Intelligent processing is often a "deep processing", such as feature mining, recognition, classification, fusion, learning, reasoning, understanding and so on. It emphasizes that the purpose of processing is to obtain new information, knowledge and intelligent strategies from signals. Intelligent processing includes logical reasoning method, neural learning method, evolutionary method, knowledge mining method and other machine learning methods.

In recent years, with the technological breakthrough of machine/ deep learning methods, the processing of big-data through deep learning has made unprecedented progress in intelligent signal and information processing methods, which has triggered a new wave of artificial intelligence. Intelligent Signal and Information Processing is the theme of the 2019 APSIPA Annual Summit and Conference. However, the theory of intelligent processing based on machine/deep learning needs to be established urgently. This provides new opportunities and challenges for SIP theory and methods researches.

【SIPTM Technical Committee】

Signal and Information Processing Theory and Methods (SIPTM) technical committee is one of the technical committees of APSIPA. The fields of interest include the fundamentals of signal processing including theory and methods. You may find more information about SIPTM TC at http://www.apsipa.org/TC/SIPTM.html. It is established to promote and guide the advancement of the field of signal and information processing in theory and methods. Our SIPTM technical committee has obvious intersection with other technical committees. SIPTM technical committee undertakes the tasks in calling for regular papers, organizing special sessions, reviewing the papers, nominating and electing new members, organizing academic workshops and seminars. In 2019, we jointly solicited regular papers and four invited special sessions and handed their reviews, organize the special issue on Hyperspectral and Multiview Image Processing for APSIPA Transactions on Signal and Information Processing.

SIP theory and methods have been well applied in industries. To promote the combination of theoretical methods and industrial applications, the industry forum on intelligent SIP in Industry is organized. Panelists are carefully selected and invited from Baidu, SeneTime, SmartEarth, and Microsoft Asia. A five local Friend laboratories (from Tsinghua University, Peking University, Beijing University of Technology, Sun Yat-sen university and Northwestern Polytechnical University) are invited to share their developments in SIP research, education, etc. In addition, committee members participated in a number of academic activities, such as the committee chair was invited to address a keynote speech on "Intelligent Vision" at 2019 international conference on Image, Video Processing and Artificial Intelligence. At APSIPA ASC 2019 to be held in Lanzhou, November 2019, we will evaluate and select some new members.

I would like to thank all members for the great contributions and other technical committee for their supports.

【SIPTM Technical Committee: Members and Chairs】

Current Members:

Kazunori Hayashi—Kyoto University (Japan)   Yih-Fang Huang—University of Notre Dame (USA)

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Sinuk Kang—Wankong University (Korea)   Yohei Kawaguchi—Hitachi Corporation (Japan)

Yuichi Tanaka—Tokyo Univ. of Agriculture and Tech (Japan)

Shunsuke Yamaki—Tohoku University (Japan)   Byung Cheol Song—Inha University (Korea)

Shoji Makino—University of Tsukuba (Japan)   David Junhui Hou—City Univ of Hong Kong (HK)

Eliathamby Ambikairajah—Univ of New South Wales (Australia)

### Past-Chairs

Anthony Kuh   University of Hawaii (USA)
Akira Hirabayashi   Ritsumeikan University (Japan)
Kazushi Ikeda   Nara Institute of Science and Tech (Japan)

Chair

Mingyi He, Northwestern Polytechnical University (China)

Professor Mingyi He, Chair of SIPTM technical committee, was addressing keynote speech at the 2019 International Conference on Image, video processing and artificial Intelligence in Shanghai (VIPAI), Aug 2019.
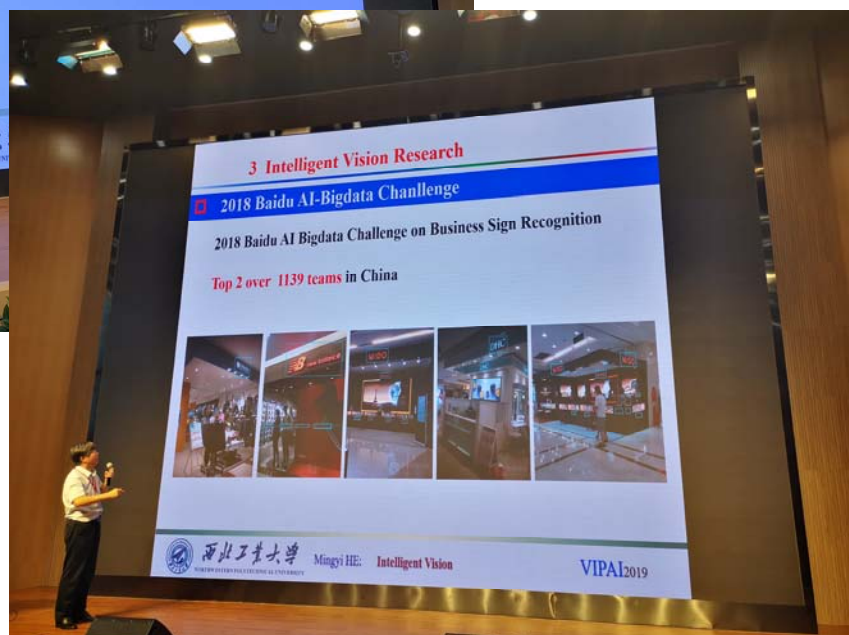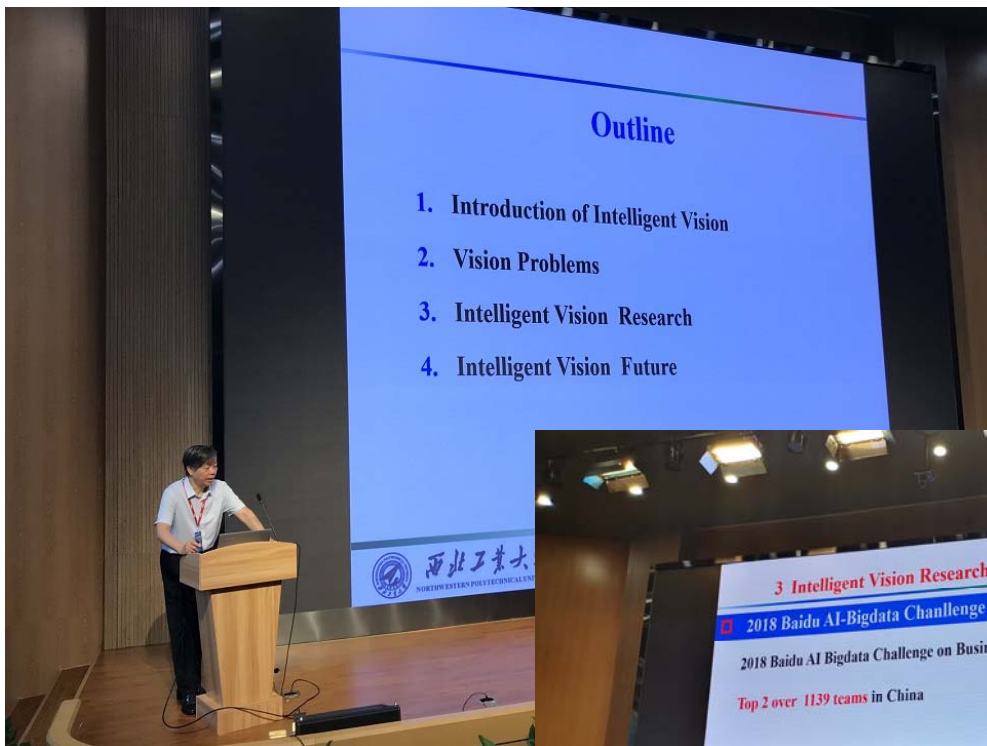
Speech, Language and Audio (SLA) TC

Prof. Dong Wang

Tsinghua University (China)

http://wangd.cslt.org/

Speech, Language and Audio (SLA) is one of the technical committees of APSIPA. It is established to promote advancement and exchange of the research fields of speech, language and audio in the Asia-Pacific region. The fields of interest include Speech analysis, synthesis, coding, recognition and understanding, Speaker recognition, Spoken language processing, Audio coding, Audio retrieval, Source separation, Microphone array, Active noise control and Music processing. You may find more information about SLA TC at http://www.apsipa.org/TC/SLA.html. Below you will find a sharing from Hui Bu (AISHELL Foundation) about a large scale open-source Mandarin speech corpus and some of our activities related to distinguished lectures.

(1) DL Lecture delivered by Prof. Dong Wang at DA-IICT, India. July 07. The DL title was "Deep Feature Learning and Normalization for Speaker Recognition".
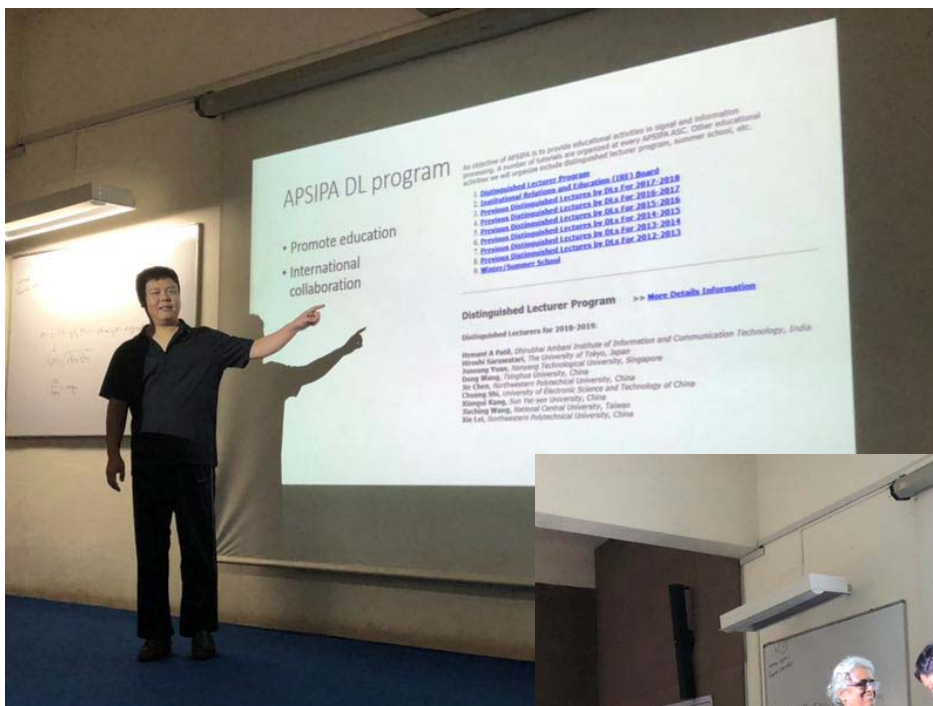
(2) DL Lecture delivered by Prof. Hemant A. Patil on the S4P summer school at DA-IICT, India. The DL title was "**Generative Adversarial Networks (GANs) for Speaker Recognition**" .

(3) DL Lecture delivered to the LIS (library and information service) staffs by Prof. Chia-Ping Chen. The DL title was "Speech Recognition".

AISHELL-2: A LARGE SCALE OPEN-SOURCE MANDARIN SPEECH CORPUS

Hui Bu, AISHELL Foundation

Beijing Shell Shell Technology Co. Ltd, Beijing, China

buhui@aishelldata.com; aishell.foundation@gmail.com

In this paper, we introduce AISHELL-2, a large scale open-source mandarin speech corpus developed by Beijing AIShell company. This corpus involves 1000 hours speech signals accompanied with transcriptions. By far, it is the largest open-source Mandarin speech database and has been used by hundreds of research institutes. Before AISHELL-1, AIShell had released AISHELL-1, a Mandarin speech corpus containing 178 hours, which is the second open-source Mandarin speech corpus after THCHS-30. AISHELL-2 is the following-up release of AISHELL-1, with much more speakers and larger volume of data. We will present the data profile, the associated Kaldi recipe for speech recognition, and the baseline performance.

I. Data Profile

A. Recording condition
The speech signals of AISHELL-2 were recorded by an iOS device, and the distance between speakers and the device is 20 cm. The sampling rate is 16k Hz, and the precision of the samples is 16 bits. 1347 speakers were recorded in a studio, while the rest were recorded in a living room with slight reverberation.

B. Speech Content
The content of the recording covers 8 major topics: (1) voice commands such as IoT device control, (2) places of interest, (3) entertainment, (4) finance, (5) technology, (6) sports, (7) English words and spellings, (8) other sentences randomly selected. The speakers read the text prompts of words/sentences shown on the screen of a laptop, and the total number of prompts is around half a million.

C. Speaker Information
There are 1991 speakers participated in the recording, including 845 male and 1146 female. The age of the speakers ranges from 11 to 40. All the speakers spoke in standard Mandarin, though some speakers possessed slight accent. The origin of the speakers is diverse: 1293 speakers were from North China and 678 speakers from South China, with the rest of 20 speakers from other areas. Each speaker contributed approximately half an hour of speech, covering 500 prompts. The first 7 prompts of all the speakers were extracted from high frequency online queries.

D. Development Set and Evaluation Set
The AISHELL-2 were originally designed for training acoustic models for speech recognition. To facilitate evaluation of the trained models, we also presented a development for parameter tuning and an evaluation set for testing. The development set contains 2500 utterances from 5 speakers and the evaluation set contains 5000 utterances from 10 speakers.

[1] http://www.openslr.org/33/

E. How to Download

AISHELL-2 is free for academic usage. The users need send an email to aishell.foundation@gmail.com for a free license. For commercial usage, a commercial license is required. Please contact aishell.foundation@gmail.com.

II. Speech Recognition Baseline

A ASR recipe has been published in the main branch of the Kaldi toolkit. To facilitate data processing, we provided an open-source Chinese dictionary called DaCiDian. This dictionary contains the pronunciation of 516k Chinse words in the form of PinYin. Associated with a PinYin to Phone mapping table, pronunciations in phones can be obtained. We employed an open-source toolkit called Jieba to perform word segmentation for the transcriptions of the speech database, as well as the text used for language model training.

The acoustic training contains two stages. Firstly, a GMM-HMM with LDA-MLLT features are trained, and this model is used to generate forced alignment for the training utterances; secondly, the alignment is used to train a DNN-HMM model. The architecture is TDNN with chain objective.

The language model is a tri-gram model trained on the 5.7 million-word transcripts of the training speech in AISHELL-2. The Kneser-Ney smoothing is applied. The resulting LM contains 516k unigrams, 1,498k bigrams and 9,32k trigrams. The character error rate (CER) on the evaluate set is 19.78% and 8.81% with the GMM-HMM model and the DNN-HMM model, respectively.

III. ABOUT AISHELL

AIShell is a high technology enterprises focusing on data and technology service for speech AI. AIShell has provided data service for more than 100 partners including Baidu, Tencent, NIO, Alibaba, TOSHIBA, Lenovo, etc. The sectors cover smart home, smart moto, mart robot. AIShell is a sincere advocator for open-data movement, and has published a large volume of free speech data including AISHELL-1 and AISHELL-2. Our belief is that with data open and exchange, more people will gain chance to participate the research, development and marketing for AI technologies, which will foster more exciting future for our human beings.

[2] https://github.com/kaldi-asr/kaldi/tree/master/egs/aishell2

[3] https://github.com/aishell-foundation/DaCiDian

[4] https://github.com/fxsjy/jieba

News about APSIPA ASC 2019

Prof. Dong Wang

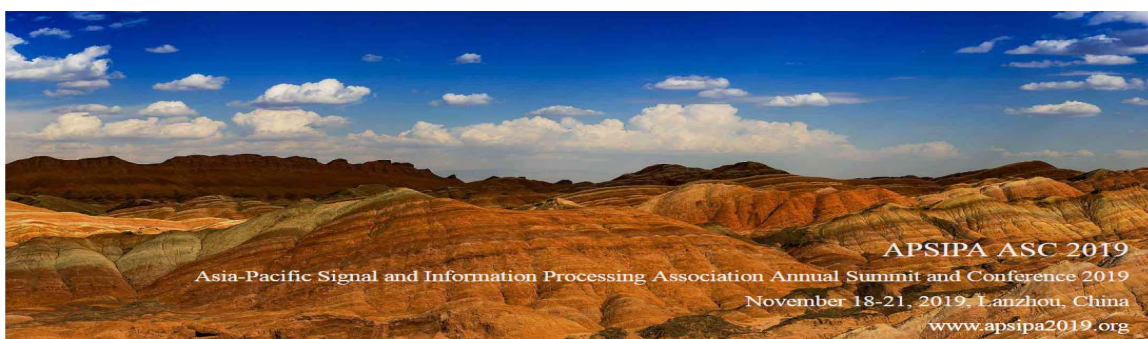Tsinghua University (China)

http://wangd.cslt.org/

APSIPA ASC 2019 (www.apsipa2019.org) is the 11th annual conference organized by Asia-Pacific Signal and Information Processing Association (APSIPA). It will be held on November 18-21, 2019 in Lanzhou, China. The conference venue is Gansu International Conference Center. More information can be found at: http://www.apsipa2019.org/.

Updated about tutorials

Tutorial will be held on the first day of APSIPA ASC 2019 (November 18, 2019) (http://www.apsipa2019.org/TutorialsPanels.html)

- Tensor Component Analysis
    Prof. Yipeng Liu
    School of Information and Communication Engineering, University of Electronic Science and Technology of China (UESTC).

- Speech Enhancement based on Deep Learning and Intelligibility Evaluation
    Dr. Yu Tsao
    Research Center for Information Technology Innovation (CITI), Academia Sinica, Taiwan.
    Dr. Fei Chen
    Department of Electrical and Electronic Engineering, Southern University of Science and Technology.

- Fundamental and Progress of Deep Learning based Statistical Parametric Speech Synthesis
    Prof. Zhenhua Ling
    National Engineering Laboratory of Speech and Language Information Processing, University of Science and Technology of China.

- Few-Shot Learning, Adversarial Learning, and Their Applications
    Prof. Jen-Tzung Chien and Prof. Zhanyu Ma

- Fundamental and Progress of Immersive Visual Media Communications
    Prof. Yo-Sung Ho

- Signal Enhancement for Consumer Products
    Dr. Akihiko Sugiyama (a.k.a. Ken Sugiyama)

Autoware Hands-on Workshop

Prof. Alexander Carballo from Nagoya University, Japan and Prof. Qingguo Zhou from Lanzhou University, China will organize an Autoware Hands-on Workshop in the Tutorial day of APSIPA ASC 2019. The goal of this workshop is to introduce Autoware to the APSIPA community. This full-day workshop will be dedicated explain all the elements of Autoware, including how to bring it on a computer and a demonstration on a real vehicle. Please visit http://www.apsipa2019.org/AutowareWorkshop.html for more information.

Overview sessions

The overview session co-chairs have invited 12 talks, each covering a particular topic and summarizing the speech. The list of the invited speakers is as below:

- Jianquan Liu, NEC Japan
- Jiwu Huang, Sun Yat-Sen University
- Kazushi Ikeda, NAIST
- Chung-Hsien Wu, National Cheng Kung University
- Seishi Takamura, NTT Corporation
- Hsin-Min Wang, Academia Sinica
- Ming Hang, NCTU
- Homer Chen, NTU
- Sanghoon Lee, Yonsei University
- Chang-su Kim, Korea University
- Mau Luen Tham, Amjad Iqbal, and Yoong Choon Chang, Universiti Tunku Abdul Rahaman (UTAR)
- Ying Loong Lee and Donghong Qin, Universiti Tunku Abdul Rahman (UTAR)

Industrial Forum

- Advanced Speech Technology of Interaction for Intelligent Speaker
    Dr. Lei Jia, Baidu
- Industrialized Computer Vision for Smart City
    Dr. Junjie Yan, SenseTime
- Digital Twins for Smart City and Industry with Semantic Information
    Dr. Huang Dong, Smart Earth

Friend Labs Sessions

- Women in APSIPA (Chair: Yoshinobu Kajikawa)
- Machine Learning TC (Chair: Jen-Tzung)
- Friend Labs in China (Chair: Mingyi He)

Winter School at APSIPA ASC 2019

An important mission of APSIPA ASC is to promote the education on signal and information technologies in the local region, and attract more students to join this promising research area. Aligning on direction, Prof. Woon Seng Gan from NTU, Singapore, Prof. Dong Wang from Tsinghua Unviersity, China and Axu Hu from Northwest Minzu University, China will organize a winter school during the period of the APSIPA ASC this year in Lanzhou.

The winter school will be held on Nov. 17, 2019, one day before the tutorial day of APSIPA ASC 2019. It will be a one-day program, with the theme "Speech technologies and AI". The organizers will invite speakers from the education resource repository of APSIPA, especially new APSIPA distinguished lectures. The courses will be in two types: fundamental knowledge of speech technologies and cutting-edge research frontiers.

The winter school is free for all participants. However, for those who are not APSIPA members, they have to pay the coffee and lunch box ($12 in total). We recommend participants registering APSIPA membership first: the cost is roughly equal to the lunch box but you will enjoy both the free meal and the benefit of one-year membership.

The winter school has been supported by APSIPA HQ, under the APSIPA Activity Promotion Program. A $5,000 package will be allocated to support the event, mainly for coffee, lunch box, hotel for speakers and gifts for volunteers. The organizers also obtained support from the APSIPA ASC main conference, as well as industrial sponsors including SpeechOcean and ceaFos.

For more information including the final program and registration, please check the web page: http://www.apsipa2019.org/WinterSchool.html.

Latest Articles from APSIPA Transactions on Signal and Information Processing (ATSIP)

- **Spectral-spatial feature extraction and supervised classification by MF-KELM classifier on hyperspectral imagery**
  - Wenting Shang, Zebin Wu, Yang Xu, Yan Zhang, Zhihui Wei
  - DOI: https://doi.org/10.1017/ATSIP.2019.15
  - Published online: 20 September 2019, e22

- **Special issue on deep learning based detection and recognition for perceptual tasks with applications**
  - Li-Wei Kang
  - DOI: https://doi.org/10.1017/ATSIP.2019.13
  - Published online: 29 July 2019, e21

- **Deep-learning-based macro-pixel synthesis and lossless coding of light field images**
  - Ionut Schiopu, Adrian Munteanu
  - DOI: https://doi.org/10.1017/ATSIP.2019.14
  - Published online: 17 July 2019, e20

- **Evaluating word embedding models: methods and experimental results**
  - Bin Wang, Angela Wang, Fenxiao Chen, Yuncheng Wang, C.-C. Jay Kuo
  - DOI: https://doi.org/10.1017/ATSIP.2019.12
  - Published online: 8 July 2019, e19

- **Recent advances in video coding beyond the HEVC standard**
  - Xiaozhong Xu, Shan Liu
  - DOI: https://doi.org/10.1017/ATSIP.2019.11
  - Published online: 15 June 2019, e18

- **An overview of channel coding for 5G NR cellular communications**
  - Jung Hyun Bae, Ahmed Abotabl, Hsien-Ping Lin, Kee-Bong Song, Jungwon Lee
  - DOI: https://doi.org/10.1017/ATSIP.2019.10
  - Published online: 24 June 2019, e17

- **A deep learning-based method for vehicle license plate recognition in natural scene**
  - Jianzong Wang, Xinhui Liu, Aozhi Liu, Jing Xiao
  - DOI: https://doi.org/10.1017/ATSIP.2019.8
  - Published online: 20 June 2019, e16

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- **An overview of channel coding for 5G NR cellular communications**
  - Jung Hyun Bae, Ahmed Abotabl, Hsien-Ping Lin, Kee-Bong Song, Jungwon Lee
  - DOI: https://doi.org/10.1017/ATSIP.2019.10
  - Published online: 24 June 2019, e17

- **A tutorial survey of architectures, algorithms and applications for deep learning**
  - Li Deng
  - DOI: https://doi.org/10.1017/atsip.2013.9
  - Published online: 22 January 2014, e2

- **Use cases and challenges in telecom big data analytics**
  - Chung-Min Chen
  - DOI: https://doi.org/10.1017/ATSIP.2016.20
  - Published online: 12 December 2016, e19

Most Cited Articles from ATSIP

https://www.cambridge.org/core/journals/apsipa-transactions-on-signal-and-information-processing/most-cited

- **A tutorial survey of architectures, algorithms and applications for deep learning**
  - Li Deng
  - DOI: https://doi.org/10.1017/atsip.2013.9
  - Published online: 22 January 2014, e2

- **An overview on video forensics**
  - Simone Milani, Marco Fontani, Paolo Bestagini, Mauro Barni, Alessandro Piva, Marco Tagliasacchi, Stefano Tubaro
  - DOI: https://doi.org/10.1017/ATSIP.2012.2
  - Published online: 28 August 2012, e2

- **Recent advances on active noise control: open issues and innovative applications**
  - Yoshinobu Kajikawa, Woon-Seng Gan, Sen M. Kuo
  - DOI: https://doi.org/10.1017/ATSIP.2012.4
  - Published online: 28 August 2012, e3

APSIPA Membership

Membership Benefits:

- Links to highly qualified people within the organization to develop research, technology, teaching, and career
- Discount fee on APSIPA conferences
- Reduced subscription fee for APSIPA journals
- Access to information about the international activities in signal and information processing such as conferences, continuing education, short courses, seminars, distinguished lecture series, student internships, scholarships, job listings, publication venues, and mentorships

To motivate APSIPA members to participate in APSIPA conferences, the registration for the 11th APSIPA conference implies an automatic renewal of APSIPA membership up to the end of December 2020.

You may join as:

- Student Membership: Student members are those who are enrolled full time in universities, institutes, or any accredited degree
- Full Membership: Full members are individuals interested in being part of the APSIPA mission to excel signal and information processing field. They are eligible to vote, hold positions in APSIPA association, and contribute to serve as editorial board and program committee members in APSIPA journals and conferences
- **Life Membership**: Full members may choose to subscribe as life members pending on paying the discount fee of life membership. Early-bird registration fee is available for life members at all times when registering for APSIPA ASC

Type of membership	Fees in US$	Fees in HK$
Student Membership	10 (per annual)	78 (per annual)
Full Membership	30 (per annual)	234 (per annual)
Life Membership	300 (a one-off fee)	2340 (a one-off fee)

Act Today! Join us at: http://www.apsipa.org/reg.asp

Summary of Links

- APSIPA ASC 2019: http://www.apsipa2019.org

- APSIPA Winter School 2019: http://www.apsipa2019.org/WinterSchool.html

- APSIPA Transaction on Signal and Information Processing: http://journals.cambridge.org/sip

- Paper Submission to APSIPA Transaction on Signal and Information Processing:
  http://mc.manuscriptcentral.com/apsipa

- APSIPA Industrial Activities: http://www.apsipa.org/industrial.htm

- APSIPA Friend's Lab: http://www.apsipa.org/friendlab/FriendLabs.htm.

- APSIPA Membership Registration/Renewal: http://www.apsipa.org/reg.asp

- APSIPA Magazine: http://www.apsipa.org/doc/magazine/apsipa_magazine2018.pdf

- APSIPA Photo Gallery: http://www.apsipa.org/photo/photo.htm

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Department of Electronic and Information Engineering,
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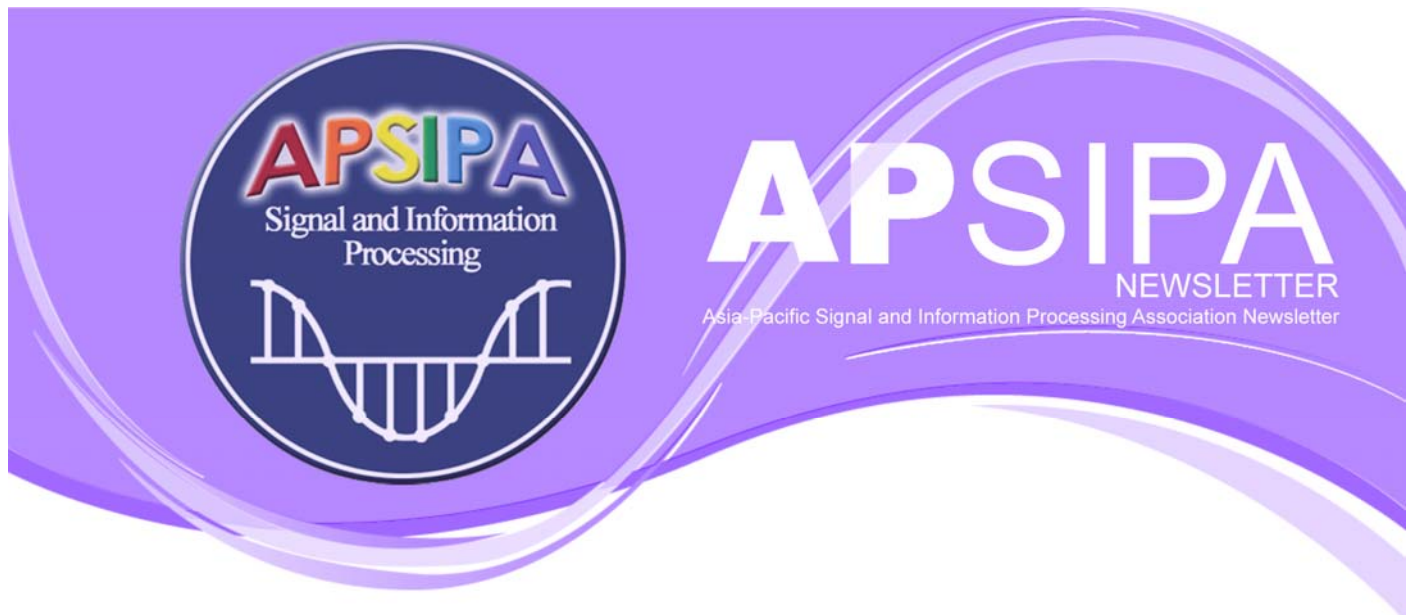Hung Hom, Kowloon, Hong Kong.

Officers:

Director: Wan-Chi Siu, email: enwcsiu@polyu.edu.hk
Manager: Kin-Man Lam, Kenneth,
email: enkmlam@polyu.edu.hk
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