

2023

2-Day IEEE Workshop on Deep Learning

Date: Monday-Tuesday, 3-4 April 2023 (Face to Face & Virtual Workshop)

Place: Conference Hall 03 (Rm.117), 1st Floor, Building 1E, HK Science Park, Pak Shek Kok, NT

Monday, 3 April 2023, 9:00 a.m. Program Schedule

Session 1: Monday, 3 April 2023, 9:00 a.m. - 12:30 p.m.

Session Chair: Prof. H. Anthony Chan, PhD, FIEEE

Opening Speech: Dr. Paulina Y. Chan, PhD, DIC, MBA, SrMIEEE, Immediate Past-Chair, IEEE Hong Kong Section (3min.)

1. Keynote Speech: Toward Interpretable, Reliable, and Sustainable AI
Prof. C.-C. Jay Kuo, PhD, Fellow of AAAS, ACM, IEEE, NAI, and SPIE and an Academician of Academia Sinica,

William M. Hogue Professor, Distinguished Professor of Electrical and Computer Engineering and Computer Science, and Director of the Media Communications Laboratory, University of Southern California

2: Supervised and Self-Supervised Contrastive Learning for Speaker Verification Across Languages

Invited Speaker: Prof. M.W. Mak, PhD, SrMIEEE,
Professor and Interim Head (EIE), Hong Kong Polytechnic University

Session 2: Monday, 3 April 2023, 2.00 p.m. - 5.30 p.m.

Session Chair: Dr. Paulina Chan, PhD, DIC, SrMIEEE

3. The Treasure of Latent space in Deep Learning for Super-Resolution and Other Applications

Prof. Wan-Chi Siu, PhD, DIC, Life-FIEEE, APSIPA Distinguished Lecturer
Emeritus Professor, Hong Kong Polytechnic University & Research Professor, CIHE

4. Exploring Diffusion-based Image Synthesis and its Recent Advances for Creativity

Dr. Chengze Li, PhD, MIEEE
Assistant Professor, Caritas Institute of Higher Education

Fee: Free Registration

In person attendance: In person attendance is highly recommended, since you can see all Demonstrations. A USB will also be provided, which contains program codes and demonstration materials.

On-line Attendance is also available especially for overseas attendees, but some on-site demonstrations may not be available.

For Limited Quota. Priority is given to members of sponsoring organizations.

Hence **make Early Registration.**

Tuesday, 4 April 2023, 9:00 a.m.

Session 3: Tuesday, 4 April 2023, 9:00 a.m. - 12:30 p.m.

Session Chair: Prof. Wan-Chi Siu, PhD, DIC, Life-FIEEE

5. Mapping Scalp to Intracranial EEG for Detection of Interictal Epileptiform Discharges.

Invited Speaker: Prof. Saeid Sanei, PhD, DIC, FBCS, SrMIEEE,
Professor, Nottingham Trent University & Academic Visitor Imperial College London, UK

6. CLIP and CLIPasso: Semantic Understanding and Object Sketching

Dr. Tina, Xueting Liu, PhD, SrMIEEE
Assistant Professor, Caritas Institute of Higher Education, Hong Kong

Workshop Organizers:

Prof. Wan-Chi Siu, PhD, DIC, Life-FIEEE, Advisor, IEEE Hong Kong Section

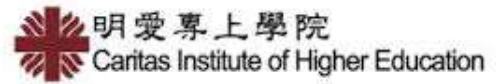
Prof. H. Anthony Chan, PhD, FIEEE, Dean, SCIS, Caritas Institute of Higher Education

Dr. Paulina Chan, PhD, DIC, SrMIEEE, Immediate-Past Chair, IEEE Hong Kong Section

Sponsors: IEEE HK Section/HKS Life Member Affinity Group, APSIPA/APSIPA Distinguished Lecturer Program, HK Science Park, HK Polytechnic University, Caritas Institute of Higher Education (CIHE), TeleEye Founders' Charity Foundation, UGC/IDS(R)11/19



- (i) [Click here](#) to Register
- (ii) [Click here](#) for Website
- (iii) Enquiry: Mr. Samy Arokiasamy : larokiasamy@cihe.edu.hk



IEEE HK Section
Lecture Series on
Continuing Education



2-Day IEEE Workshop on Deep Learning (2023)

Opening Speech

Monday, 3 April 2023, 9:00 a.m. - 9:03 a.m.

Dr. Paulina Yenbic Chan 陳彥碧博士, *PhD (Imperial), DIC, MBA(London U), SrMIEEE, IEEE Public Visibility Committee Chair, CCMI, CMgr(CMI UK); Immediate-Past Chair, IEEE Hong Kong Section*

Contact Number: +852 95271128 Email: paulinaue@aol.com

Continuing Education is an indispensable part of the professional life of an engineer. We have to constantly learn and acquire new knowledge in order to carry out our duties. I am particularly glad to introduce this IEEE Hong Kong Section Lecture Series on Continuing Education, which not only fulfills the actual need for updating the knowledge and skills of engineers in this fast technology development era but also supports the Government's ambition to make Hong Kong one of the smart cities in the world. Particular thanks are given to Caritas Institute of Higher Education and TeleEye Founders' Charity Foundation for their generous financial sponsorship and the Caritas Institute of Higher Education for taking the lead in organizing this event. We also want to thank the technical co-sponsorship provided by APSIPA (Asia-Pacific Signal and Information Processing Association), APSIPA Distinguished Lecturer Program, IEEE Hong Kong Life-Member Affinity Group and The Hong Kong Polytechnic University. This is only the start of our Continuing Education Program. We hope in the near future we can mount more of these programs in Deep Learning and other emerging areas. We sincerely hope to have your support.

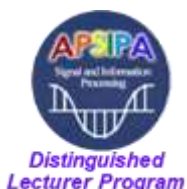


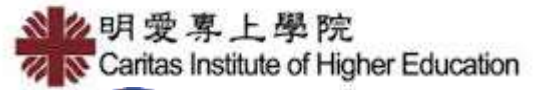
Speaker: Dr Paulina Chan is Immediate-Past Chair of IEEE Hong Kong Section, General Chair of IEEE TENCON 2022, the Founding Chair of Imperial Women in World DSP and she was Chair of IEEE Hong Kong WIE (2019). Dr Chan is also a Chartered Manager (CMgr), CMI Companion (CCMI), Trustee on the Board of Governors of the Chartered Management Institute (UK) and Chair of the CMI Regional Board in Hong Kong.

Paulina is Principal and CEO of Global Mutual Innovation Consortium- a think-tank of multidisciplinary professionals and start-ups in multiple countries focusing on the translation and applications of novel technologies in STEM and Tech-Biz Intelligence into products and services, such as mobile communications network, Artificial Intelligence and Big Data, Smart Cities and Smart Buildings, green energies, and forward-looking health-tech and ed-tech. Over the years, more than ten angel network collaborations and cloud funding entrepreneur ventures have been set up in various EU member states, Hong Kong, and China.

Dr Chan was in senior management in AT&T/Lucent Technologies in the US, Exxon/Mobil Corporation in New York, ICO Global Communications London and Beijing, and EU for Hungary.

As the Founding Champion of Imperial College London Mentoring Programme (2013-present), Dr Chan has contributed a lot of her time and energy to guide young scientists, technologists, engineers and managers-in-training to develop career paths and personal growth.





2-Day IEEE Workshop on Deep Learning (2023)

Keynote Speech

On the 2nd AI Wave: Toward Interpretable, Reliable, and Sustainable AI

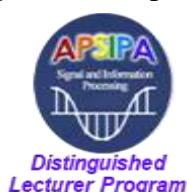
Monday, 3 April 2023, 9.03 – 10.33 a.m.

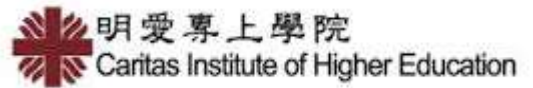
Keynote Speaker: Prof. C.-C. Jay Kuo, PhD, FIEEE

Abstract: Rapid advances in artificial intelligence (AI) in the last decade have been primarily attributed to the wide applications of deep learning (DL) technologies. A high-level overview of DL developments and their applications will be introduced in the first part of my talk. I will present one hot topic in recent years - “generative AI.” Examples include speech, audio, image, video, graphics, 3D model generation, and chatbots (e.g., ChatGPTs). I view all of these advances as the first AI wave. There are concerns with the first AI wave. DL solutions are a black box (i.e., not interpretable) and vulnerable to adversarial attacks (i.e., unreliable). Besides, the high carbon footprint yielded by large DL networks is a threat to our environment (i.e., not sustainable). Many researchers are looking for an alternative solution that is interpretable, reliable, and sustainable. This is expected to be the second AI wave. To this end, I have conducted research on green learning (GL) since 2015. GL was inspired by DL. The connection between DL and GL will be described in the second part of my talk. Low carbon footprints, small model sizes, low computational complexity, and mathematical transparency characterize GL. It offers energy-effective solutions in cloud centers and mobile/edge devices. It has three main modules: 1) unsupervised representation learning, 2) supervised feature learning, and 3) decision learning. GL has been successfully applied to a few applications. The third part of my talk will highlight the fundamental ideas of GL solution, its demonstrated examples, and its technical outlook.

Keynote Speaker:

Dr. C.-C. Jay Kuo received his Ph.D. from the Massachusetts Institute of Technology in 1987. He is now with the University of Southern California (USC) as William M. Hogue Professor, Distinguished Professor of Electrical and Computer Engineering and Computer Science, and Director of the Media Communications Laboratory. His research interests are in visual computing and communication. He is a Fellow of AAAS, ACM, IEEE, NAI, and SPIE and an Academician of Academia Sinica. Dr. Kuo has received a few awards for his research contributions, including the 2010 Electronic Imaging Scientist of the Year Award, the 2010-11 Fulbright-Nokia Distinguished Chair in Information and Communications Technologies, the 2019 IEEE Computer Society Edward J. McCluskey Technical Achievement Award, the 2019 IEEE Signal Processing Society Claude Shannon-Harry Nyquist Technical Achievement Award, the 72nd annual Technology and Engineering Emmy Award (2020), and the 2021 IEEE Circuits and Systems Society Charles A. Desoer Technical Achievement Award. Dr. Kuo was Editor-in-Chief for the IEEE Transactions on Information Forensics and Security (2012-2014) and the Journal of Visual Communication and Image Representation (1997-2011). He is currently the Editor-in-Chief for the APSIPA Trans. on Signal and Information Processing (2022-2023). He has guided 165 students to their Ph.D. degrees and supervised 31 postdoctoral research fellows.





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2-Day IEEE Workshop on Deep Learning (2023)

Supervised and Self-Supervised Contrastive Learning for Speaker Verification Across Languages

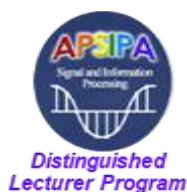
Monday, 3 April 2023, 11:00 a.m. - 12:30 p.m.

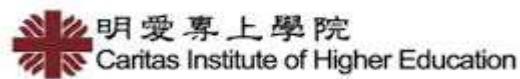
Invited Speaker: Prof. Man-Wai Mak, PhD, SrMIEEE

Abstract: DNN speaker embedding has demonstrated its robustness against noise and domain mismatch. The basic idea is to learn a compact speaker representation from the utterances of thousands of speakers by training a speaker embedding network. The representation is then used for speaker-related downstream tasks such as verification and diarization. This talk explains how contrastive learning can force the network to learn a speaker representation robust across languages. In particular, a supervised contrastive learning framework with a class-aware attention mechanism is introduced to alleviate the adverse effect of hard-negative samples in contrastive learning. The talk will also explain how to adapt a speaker embedding network from a source language to a target language without using the speaker labels of the target language. A cluster-guide self-supervised training strategy is introduced to achieve this goal.



Invited Speaker: Prof. Man-Wai MAK received a Ph.D. in electronic engineering from the University of Northumbria and joined the Department of Electronic and Information Engineering at The Hong Kong Polytechnic University in 1993. Currently, he is a Professor and Interim Head of the same department. Prof. Mak has authored over 200 articles in speaker recognition, machine learning, bioinformatics, and biomedical engineering. He also coauthored postgraduate textbooks "Biometric Authentication: A Machine Learning Approach," Prentice-Hall, 2005 and "Machine Learning for Speaker Recognition," Cambridge University Press, 2020. Prof. Mak has received three Faculty of Engineering Research Grant Achievement Awards and a Faculty Merit Award in Research and Scholarly Activities. He has served as a member of the IEEE Machine Learning for Signal Processing Technical Committee from 2005--2007 and as an associate editor of IEEE/ACM Transactions on Audio, Speech, and Language Processing. Prof. Mak is an Associate Editor of the Journal of Signal Processing Systems and IEEE Biometrics Compendium. He also served as a Technical Committee member of international conferences, including ICASSP and Interspeech, and gave a tutorial on machine learning for speaker recognition in Interspeech'2016. Prof. Mak's research interests include speaker recognition, machine learning, bioinformatics, and biomedical engineering.





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2-Day IEEE Workshop on Deep Learning (2023)

The Treasure of Latent Space in Deep Learning for Super-Resolution and other DSP Applications

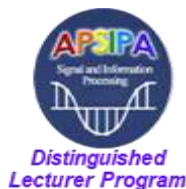
Monday, 3 April 2023, 2:00-3:30 p.m.

Speaker: Prof. Wan-Chi Siu, PhD, DIC, Life-FIEEE, APSIPA Distinguished Lecturer

Abstract: In this talk for Continuing Education, we start with an elaboration of the development of Generative Adversarial Networks (GAN), StyleGAN, Diffusion Model, etc. which apparently are image generation tools. However, these may be considered as tools for a 2nd revolution on resolving image to image processing and image manipulation problems with deep learning, which make use of the huge latent space and its induced image space. With various inversion techniques, we may convert these problems into an initial prior searching/retravel and then refinement approach. In this talk, we use more StyleGAN and super-resolution examples to illustrate the principle, while the next presentation will concentrate more on Diffusion Model and its manipulation power. **A demonstration package will be provided for those who are interested in the technology.**



Speaker: Prof. Wan-Chi Siu, PhD, DIC, Life-FIEEE, is Emeritus Professor (formerly Chair Professor, HoD(EIE) and Dean of Engineering Faculty) of Hong Kong Polytechnic University and Research Professor of Caritas Institute of Higher Education in Hong Kong. He is Life-Fellow of IEEE and was a PhD graduate (1984) of the Imperial College London, Vice President, Chair of Conference Board and core member of Board of Governors of the IEEE SP Society (2012-2014), and President (2017-2018) of APSIPA, and has been Guest Editor/Subject Editor/AE for IEEE Transactions on CAS, IP & CSVT, and Electronics Letters. He is an outstanding scholar with many awards, including Distinguished Presenter Award, the Best Teacher Award, the Best Faculty Researcher Award (twice) and IEEE Third Millennium Medal (2000). He was an APSIPA Distinguished Lecturer (2021-22), and an Advisor & Distinguished Scientist of the European research project SmartEN (offered by European Commissions). Prof. Siu has been Keynote Speaker and Invited Speaker of many conferences, published over 500 research papers (200 appeared in international journals such as IEEE Transactions on Image Processing) in DSP, transforms, fast algorithms, machine learning, deep learning, super-resolution imaging, 2D/3D video coding, object recognition and tracking, and organized IEEE society-sponsored flagship conferences as TPC Chair (ISCAS1997) and General Chair (ICASSP2003 and ICIP2010). He was an independent non-executive director (2000-2015) of a publicly-listed video surveillance company and chaired the First Engineering/IT Panel of the RAE(1992/93) in Hong Kong. Recently, he has been a member of the IEEE Educational Activities Board, the IEEE Fourier Award for Signal Processing Committee (2017-2020), the Hong Kong RGC Engineering-JRS Panel (2020-2023), Hong Kong ASTRI Tech Review Panel (2006-2022) and some other IEEE technical committees. He is one of the World's top 2% researchers in Computer Science.





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2-Day IEEE Workshop on Deep Learning (2023)

Exploring Diffusion-based Image Synthesis and its Recent Advances for Creativity

Monday, 3 April 2023, 4.00 – 5:30 p.m.

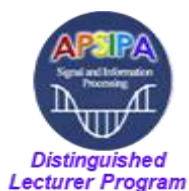
Speaker: Dr. Chengze Li, PhD, MIEEE

Abstract: In recent years, diffusion-based image synthesis has shown great potential in generating high-quality images and has been widely adopted in various fields. In this presentation, we will provide an introduction to the denoise diffusion models and then delve into the core idea of Stable Diffusion, which has proved to be highly effective in creative applications, such as text-conditioned image synthesis and multi-modal image editing.

Furthermore, we will discuss recent advances in diffusion-based image synthesis, including Low-Rank Adaptation and ControlNet. These advancements significantly reduce the training time and resources needed to develop a diffusion model, enabling everyone to customize their models and create unique visual content.

We will also explore various diffusion-based applications in other areas, such as voice, music, and motion human synthesis. Through this presentation, attendees will gain a deeper understanding of diffusion-based image synthesis and its potential for creativity. Moreover, we will provide hands-on tutorials and resources that attendees can access and experiment with on their own, allowing them to quickly implement and apply this technology in their own projects.

Speaker: Dr. Chengze Li currently is an assistant professor at the School of Computing and Information Sciences. The research focus of Chengze is computer graphics, computer vision, deep learning, and non-photorealistic techniques. With a PhD in Computer Science and Engineering, Chengze has a demonstrated track record of research excellence, including several successful research projects and numerous publications in top-tier conferences and journals. Chengze teaches courses in machine learning, computer vision, and natural language processing. Chengze has also served as a reviewer for various leading academic conferences and journals. Chengze's research interest lies in developing new techniques and algorithms for computer graphics and vision applications, with a particular focus on parsing, editing and stylization of cartoon, anime and other 2D non-realistic visual media.





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2-Day IEEE Workshop on Deep Learning (2023)

Symmetric-Asymmetric Autoencoder and GAN Structures for Mapping Scalp to Intracranial EEG for Detection of Interictal Epileptiform Discharges.

Tuesday, 4 April 2023, 9:00-10:30 a.m.

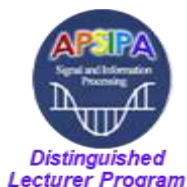
Invited Speaker: Prof. Saeid Sanei PhD, DIC, FBCS, SrMIEEE

Abstract: The brain mesial, temporal or occipital interictal epileptiform discharges (IEDs) are often invisible in the scalp EEG (sEEG) signals. However, due to within-electrode temporal correlation and between-electrode spatial correlation, they still have their signatures in the sEEG. Therefore, it is expected to have some common spatial and temporal features among the IEDs. This requires development of an effective project algorithm to map the scalp observations into their underlying intracranial information which are often invisible in the sEEG. Hence, in this talk we will see what the IEDs are and how they can be detected from over the scalp mainly by developing and applying new DNN structures. To do that, we will explore in detail the use of DNN-based projection approaches, such as an asymmetric autoencoder, as well as generative adversarial networks (GANs).



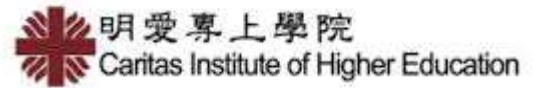
Additionally, we will see how the uncertainty in labelling the IEDs, as a popular problem in medical data analytics, can be incorporated into the IED detection formulation using a tensor structure. The IED study is now being extended to the area of brain stimulation for the treatment of drug-resistant epilepsy which opens another arena for brain research. Here, we will briefly look at some preliminary results of brain excitability assessment, localization of epileptic zone, and deep brain stimulation for seizure suppression. During this talk the participants can try two different packages for the autoencoder and GAN mappers which can have many other applications such as mapping between two different image modalities and image transformation.

Invited Speaker: Prof. Saeid Sanei received his PhD in Biomedical Signal and Image Processing from Imperial college London in 1991. Since then, he has been working in National University of Singapore, King's College London, Cardiff University, University of Surrey, and currently in Nottingham Trent University (as a Professor of Signal Processing & Machine Learning) and Imperial College London (as an Academic Visitor in Digital Health). He is a Fellow of British Computer Society (FBCS) and a member of IEEE Signal Processing and Bioengineering Societies. Biosignal and Image Processing, Brain-Computer Interfacing (BCI), Assistive Technology, Bio-statistical Data Processing, Biomedical Systems Modelling, Body Sensor Networking, Speech, AI & Machine Learning, and IoT for health monitoring are his main research areas. Dr Sanei published 5 books, a number of book chapters and edited books, and over 400 peer-reviewed publications. He has been an Associate Editor for the IEEE Signal Processing Magazine, IEEE Signal Processing Letters, and Journal of Computational Intelligence and Neuroscience and many others. He organised and chaired several reputed conferences including ICASSP 2019, MLSP 2013, SSP 2009, DSP 2007, and DSP 2017 in the UK and Technical Chair of EUSIPCO 2016.





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2-Day IEEE Workshop on Deep Learning (2023)

CLIP and CLIPasso: Semantic Understanding and Object Sketching

Tuesday, 4 April 2023, 11:00-12:30 p.m.

Speaker: Dr. Tina, Xueting Liu, PhD, SrMIEEE

Abstract: Understanding the semantics of an image is a classic research area that leads to many important applications, such as object classification, recognition, and segmentation. Extensive approaches have been proposed, but these methods usually require labeled dataset for training and may generate unsatisfying results when the input does not appear in the training data. By exploring the connections between images and text, a new neural network called CLIP was proposed, with the capability of achieving “zero-shot” image classification tasks. CLIP was later adopted in various applications, such as image segmentation, image style transfer, sketch generation, and object sketching. Among these applications, CLIPasso was an impressive work that achieves object sketching in different levels of details. In this talk, the speaker will first introduce the CLIP network and then show its applications with a demo of object sketching using CLIPasso.



Speaker: Dr. LIU Xueting received her B.Eng. degree in Computer Science and Technology from Tsinghua University and Ph.D. degree in Computer Science from The Chinese University of Hong Kong in 2009 and 2014 respectively. She is currently an Assistant Professor in the School of Computing and Information Sciences, Caritas Institute of Higher Education. Her research interests include computer graphics, computational art, and intelligent art.

