

# IEEE ICASSP 2016 Workshop on Multimedia and Security

**Sponsors:** IEEE Signal Processing Society, Shenzhen University

**Co- Sponsors:** IEEE SPS Guangzhou Chapter, IEEE Shenzhen Joint SPS-ComSoc Chapter

**Organizer:** Shenzhen University

**Chairs:** Jiwu Huang and Bin Li, Shenzhen University

**Date:** March 20, 2016 (Connected to ICASSP 2016)

**Time:** 9.00 am — 3:00 pm

**Location:** Shenzhen, China

**Venue:** Lecture Hall 2, Building of Science and Technology, Shenzhen University, Shenzhen

## Invited Talks

1. Deep Learning: Hype or Hope?

Prof. C.-C. Jay Kuo, University of Southern California, USA

2. Image Forensics: Is a Photo Worth a Thousand Words?

Prof. Alex Kot, Nanyang Technological University, Singapore

3. Audio Forensics: Trends and Challenges

Prof. Hafiz Malik, University of Michigan – Dearborn

**Registration:** All participants are free with registration and welcome to attend. Lunch is provided by organizer.

## Accommodations.

1. Shenzhen Sentosa Hotel (深圳圣淘沙酒店 (翡翠店))

<http://fc.sentosahotel.cn/>

2. Shenzhen Sentosa Hotel at Taoyuan (深圳圣淘沙酒店 (桃园店))

<http://www.sentosahotel.cn/CN/Sentosahotel/index.aspx#>

3. Grand View Hotel (Xin Tao Yuan Hotel),

<http://www.szxintaoyuan.com/index.asp>

## Secretary

Ms. Wanqi Liu, 0755-86716669, [liuwanqi@szu.edu.cn](mailto:liuwanqi@szu.edu.cn)

# Deep Learning: Hype or Hope?

**C.-C. Jay Kuo**

**University of Southern California**

Deep learning has received a lot of attention in recent years due to its superior performance in several speech recognition and computer vision benchmarking datasets. A deep network can learn features (called deep features) automatically from training data. To understand deep learning, the first step is to understand these deep features. After a review of the short history of applying deep learning to vision applications, I will use a quantitative metric called the Gaussian confusion measure (GCM) to shed lights on trained deep features. It is confirmed by experiments that the GCM metric reflects the discriminative ability of trained deep features. Further studies with the metrics as tools reveal important insights into the deep network, such as its good detection performance of some object classes that were considered difficult in the past. Finally, I will explain my view to the deep learning methodology - its pros, cons and potential applications to multimedia security problems.

## Speaker's Biography



Dr. C.-C. Jay Kuo received his Ph.D. degree from the Massachusetts Institute of Technology in 1987. He is now with the University of Southern California (USC) as Director of the Media Communications Laboratory and Dean's Professor in Electrical Engineering-Systems. His research interests are in the areas of digital media processing, compression, communication and networking technologies. Dr. Kuo was the Editor-in-Chief for the IEEE Trans. on Information Forensics and Security in 2012-2014. He was the Editor-in-Chief for the Journal of Visual Communication and Image Representation in 1997-2011, and served as Editor for 10 other international journals. Dr. Kuo received the National Science Foundation Young Investigator Award (NYI) and Presidential Faculty Fellow (PFF) Award in 1992 and 1993, respectively. He was an IEEE Signal Processing Society Distinguished Lecturer in 2006, and the recipient of the Electronic Imaging Scientist of the Year Award in 2010 and the holder of the 2010-2011 Fulbright-Nokia Distinguished Chair in Information and Communications Technologies. Dr. Kuo is a Fellow of AAAS, IEEE and SPIE. Dr. Kuo has guided 130 students to their Ph.D. degrees and supervised 25 postdoctoral research fellows. He is a co-author of about 230 journal papers, 870 conference papers and 13 books.

# Image Forensics: Is a Photo Worth a Thousand Words?

Alex Kot

Nanyang Technological University

With the fast proliferation of digital cameras and other image acquisition devices due to the advancement in digital photography technology, photos from the public may have good news values for making journalist reports. However, one big challenge is how to authenticate the photo contents from the public, which may come from unreliable sources. A large variety of forensics works have been proposed to address various forensic challenges based on different types of tell-tale signs. This talk introduces several techniques for: (1) Accurate detection of image demosaicing regularity as a general type of image forensics features. (2) Identification of various common image source models including digital still cameras, RAW conversion tools and the low-end mobile cameras; (3) Universal detection of a wide range of common image tampering. (4) Tampering detection for blur images. (5) EXIF file tampering or content manipulations, (6) Tempering detection with blur images, and (7) Prevention of the image recapturing threat in spoofing. These techniques help expose common image forgeries, especially those easy-to-make forgeries, which can be hardly seen directly by human eyes. The common theme behind these forensics techniques is through statistical detection of some intrinsic image regularity or tampering anomalies.

## Speaker's Biography



Alex Kot received his BSEE and MBA at Rochester and PhD at Rhode Island, USA. He has been with Nanyang Technological University, Singapore since 1991. He headed the Division of Information Engineering at the School of Electrical and Electronic Engineering for eight years and served as Vice-Dean Research and Associate Chair (Research) for the School of EEE for three years. He is now Professor and Associate Dean for College of Engineering. Dr. Kot served as Associate Editor for IEEE Trans on Signal Processing, IEEE Trans on C&S for Video Technology, IEEE Trans on C&S I and II, He served as Guest Editor for two IEEE Trans. Currently, he is the Associate Editor of the IEEE Trans on Multimedia, IEEE Signal Processing Letter,

Editorial Board Member of the IEEE Signal Processing Magazine and the EURASIP Journal of Advanced Signal Processing. Presently, he is member of the IEEE CAS VSPC and IEEE SP IMDSP Technical Committees. He co-chaired the prestigious IEEE International Conference on Image Processing in 2004. He served an IEEE Distinguished Lecturer and he is a Fellow of IEEE and IES. His research interests include Information Technology that includes Electronic Signature Verification, Fingerprint Verification, Data-Hiding, Secured e-Document Authentication, Binary Image Distortion Measure, Staganalysis and Image Forensic. Signal Processing for Communications that covers Principal Component Techniques, Performance Analysis and Interference Suppression problems in Spread Spectrum Communication Systems, Instantaneous Frequency Tracking and Estimation.

# Audio Forensics: Trends and Challenges

Hafiz Malik

University of Michigan – Dearborn

The use of digital media (audio, video, and images) as evidence in every sector of litigation and criminal proceedings is becoming the norm. For digital media to be admitted as evidence into a court of law, its authenticity and integrity must be verified. This requirement is a complex and challenging task, especially if there are no helping data, such as digital watermarks or fingerprints, and if the media is only available in a compressed format. The availability of powerful, sophisticated, and easy-to-use digital media manipulation tools has made authenticating the integrity of digital media even more difficult. This talk will provide an overview of existing state-of-the-art in audio forensics and current trends. This talk will review the model driven solutions for audio forensics, ranging from acoustic environment classification, acquisition device identification, splicing detection, and linking acquisition device to “the” recording. This talk will discuss mathematical tools for modeling and characterizing of microphone nonlinearities (fingerprints), statistical methods for acoustic environment estimation, and system identification based framework for linking an acquisition device to “the” audio recording. In this talk, I will also highlight the key challenges in audio forensics ranging from detecting forgeries in digital recordings in compressed domain to linking a digital recording to ‘the’ acquisition device, recording environment identification, caller's privacy preservation, robo call detection, securing speaker verification (SV) systems against replay attacks, and recent findings in these areas.

## Speaker’s Biography



Hafiz Malik is Associate Professor in the Electrical and Computer Engineering (ECE) Department at the University of Michigan – Dearborn. His research in multimedia forensics and security, cyber security, intelligent video surveillance, wireless sensor networks, steganography/steganalysis, and biometric security is funded by the National Academies, National Science Foundation (NSF), and other agencies. He has published more than 65 papers in leading journals, conferences, and workshops. Dr. Malik has been serving as an Associate Editor for the IEEE Transactions on Information Forensics and Security (TIFS) since 2014 and an Associate Editor for the Springer Journal of Signal, Image, and Video Processing (SIVP) since 2013. He has been serving as vice president of IEEE SEM, Chapter XVI since 2012. He has served as a secretary of the IEEE SEM, Chapter III from

2009 – 2011. Dr. Malik is the member of the Review Board Committee of IEEE Technical Committee on Multimedia Communications (MMTC). He has also the organized Special Track on Doctoral Dissertation in Multimedia at the 6th IEEE International Symposium on Multimedia (ISM) 2006. He also organized First Workshop on Multimedia Forensic at the King Saud University, Saudi Arabia, May 1 – 3, 2014. Dr. Malik is also serving on several technical program committees, including the IEEE AVSS, ICME, ICASSP, ICIP, MINES, ISPA, CCNC, and ICC.