



## Monday October 14, 2019 (8am – 6:30pm)

8:00-  
17:00

**Registration**

8:15-8:30

Ballroom

**Opening Greeting**

B

Chair: Murat Akcakaya, University of Pittsburgh,  
Pittsburgh, PA, USA

8:30-9:30

Ballroom

**Keynote Lecture: A Quantum Theory Inspired**

B

**Framework for Adaptive Signal Processing**

[Jose C. Principe, Distinguished Professor and Eckis Chair  
of Electrical Engineering, Director of Computational  
NeuroEngineering Laboratory, University of Florida](#)

9:30-  
10:00

**Coffee Break**

10:00-  
12:00

Ballroom

**Lecture Session 1: Special Session on Machine Learning  
for Knowledge Discovery in the Social Sciences**

B

Chair: Zois Boukouvalas and Tulay Adali

10:00 **HACD: Hierarchical Agglomerative Community  
Detection in Social Networks**

Ekta Gujral (University of California, Riverside);  
Georgios Theocharous ("Adobe Research, USA");  
Anup Rao (Adobe Research); Evangelos  
Papalexakis (UC Riverside)

10:20 **The Friendship Paradox: Implications in  
Statistical Inference of Social Networks**

Buddhika Nettasinghe (Cornell University); Vikram  
Krishnamurthy (Cornell University)

10:40 **Preventing Poisoning Attacks on AI based Threat  
Intelligence Systems**

Nitika Khurana (UMBC); Sudip Mittal (University

of North Carolina Wilmington ); Aritrans Piplai (UMBC); Anupam Joshi (UMBC)

- 11:00 ***Towards Ethical Content-Based Detection of Online Influence Campaigns***  
Evan Crothers (University of Ottawa); Herna L Viktor (University of Ottawa); Nathalie Japkowicz (American University)
- 11:20 ***A Weighted Ordered Probit Collaborative Kalman Filter For Hotel Rating Prediction***  
Myrsini Ntemi (Aristotle University of Thessaloniki); Constantine Kotropoulos (Aristotle University of Thessaloniki); Emmanouil Gionanidis (Aristotle University of Thessaloniki)
- 11:40 ***Privacy-Aware Distributed Graph-Based Semi-Supervised Learning***  
Basak Guler (University of Southern California); Salman Avestimehr (University of Southern California); Antonio Ortega (University of Southern California)

12:00-13:30 ***Lunch Break***

13:30-15:30 Ballroom B ***Lecture Session 2: Regular Session on Bayesian Learning and modeling***  
Chair: Zhanyu Ma

- 13:30 ***Minimax Active Learning Via Minimal Model Capacity***  
Shachar Shayovitz (Tel Aviv University); Meir Feder (Tel-Aviv University)
- 13:50 ***On convergence rate of Adaptive Multiscale Value Function Approximation for Reinforcement Learning***  
Tao Li (New York University); Quanyan Zhu (New York University)
- 14:10 ***Robust Bayesian transfer learning between Kalman filters***  
Milan Papez (Czech Academy of Sciences); Anthony Quinn (Trinity College Dublin)

14:30 ***Hilbert-Space Reduced-Rank Methods For Deep Gaussian Processes***

Muhammad Emzir (Aalto University); Sari Lasanen (LUT University); Zenith Purisha (Aalto University); Simo Särkkä (Aalto University)

14:50 ***Soft Dropout and Its Variational Bayes Approximation***

Jiyang Xie (Beijing University of Posts and Telecommunications); Zhanyu Ma (Beijing University of Posts and Telecommunications); Guoqiang Zhang (University of Technology Sydney); Jing-Hao Xue (University College London); Zheng-Hua Tan (Aalborg University); Jun Guo (Beijing University of Posts and Telecommunications)

15:10 ***Bayesian Intent Prediction for Fast Maneuvering Objects Using Variable Rate Particle Filters***

Runze Gan (University of Cambridge); Jiaming Liang (University of Cambridge); Bashar Ahmad (University of Cambridge); Simon Godsill (Department of Engineering, University of Cambridge)

15:30-  
16:00

***Coffee Break***

16:00- Ballroom **Poster Session 1: Neural Networks and Applications (11**  
18:30 A **Papers)**

Chairs: Peter Gerstoft

16:00 ***Robust Hybrid Beamforming with Quantized Deep Neural Networks***

Ahmet M. Elbir (Duzce University); Kumar Vijay Mishra (U. S. Army Research Laboratory)

16:00 ***VAE/WGAN-Based Image Representation Learning for Pose-Preserving Seamless Identity Replacement in Facial Images***

Hiroki Kawai (Boston University); Jiawei Chen (Boston University); Prakash Ishwar (Boston University); Janusz Konrad (Boston University)

16:00 ***Information-Preserving Networks and the Mirrored Transform***

Francesco A. N. Palmieri (Universita della Campania Luigi Vanvitelli); Giovanni Di Gennaro (Università della Campania Luigi Vanvitelli); Mario Baldi (Universita della Campania Luigi Vanvitelli); Amedeo Buonanno (ENEA)

16:00 ***Deep Learning for MRI Reconstruction Using a Novel Projection Based Cascaded Network***

Deniz Kocanaogullari (Istanbul Technical University); Ender Mete Eksioglu (Istanbul Technical University)

16:00 ***A Neural Network Model of Spatial Distortion Sensitivity for Video Quality Estimation***

Sören Becker (Fraunhofer HHI); Klaus-Robert Müller (Technische Universität Berlin); Thomas Wiegand (Fraunhofer HHI); Sebastian Bosse (Fraunhofer HHI)

16:00 ***Efficient Pre-Designed Convolutional Front-End for Deep Learning***

Hamza Baali (Hamad Bin Khalifa University); Abdesselam Bouzerdoum (University of Wollongong)

- 16:00 ***AuthNet: Biometric Authentication through Adversarial Learning***  
Arslan Ali (Politecnico di Torino); Matteo Testa (Politecnico di Torino); Tiziano Bianchi (Politecnico di Torino); Enrico Magli (Politecnico di Torino)
- 16:00 ***EEG Signal Dimensionality Reduction and Classification Using Tensor Decomposition and Deep Convolutional Neural Networks***  
Mojtaba Taherisadr (University of Central Florida); Mohsen Joneidi (University of Central Florida); Nazanin Rahnavard (University of Central Florida)
- 16:00 ***Center-Assisted Personal Gait Authentication Using Orientation Adversarial Feature Extraction***  
Yun-Lin Tsai (National Tsing Hua University); Y.-W. Peter Hong (National Tsing Hua University)
- 16:00 ***A Benchmark Study of Backdoor Data Poisoning Defenses for Deep Neural Network Classifiers and a Novel Defense***  
Zhen Xiang (Pennsylvania State University); David Miller (Pennsylvania State University); George Kesidis (Pennsylvania State University)
- 16:00 ***A Deep Feedforward Network for Single-Snapshot Beamforming***  
Emma Ozanich (Scripps Institution of Oceanography); Peter Gerstoft (Scripps Institution of Oceanography); Haiqiang Niu (Chinese Academy of Sciences)

16:00- 18:30 Ballroom **Poster Session 2: Signal Detection, Pattern Recognition, Semi/Un-supervised Learning (11 Papers)**

Chairs: Farhad Pourkamali-Anaraki

16:00 ***Robust Importance-Weighted Cross-Validation Under Sample Selection Bias***

Wouter M Kouw (TU Eindhoven); Jesse Krijthe (Radboud University Nijmegen); Marco Loog (Delft University of Technology & University of Copenhagen)

16:00 ***Multi-Level Mean-Shift Clustering for Single-channel Radio Frequency Signal Separation***

Yi Zhou (Duke University); Yi Feng (Duke University); Vahid Tarokh (Duke University); Vadas Gintautas (BAE Systems); Jesse McClelland (BAE Systems); Denis Garagic

16:00 ***Unsupervised Drift Compensation Based on Information Theory for Single-Molecule Sensors***

Mohamed Ouqamra (University of Montreal); Delphine Bouilly (University of Montreal)

16:00 ***Deep Clustering Based on a Mixture of Autoencoders***

Shlomo E. Chazan (Bar-Ilan University); Sharon Gannot (Bar-Ilan University); Jacob Goldberger (Bar-Ilan University)

16:00 ***Deep Bayesian Unsupervised Source Separation Based on a Complex Gaussian Mixture Model***

Yoshiaki Bando (National Institute of Advanced Industrial Science and Technology); Yoko Sasaki (National Institute of Advanced Industrial Science and Technology); Kazuyoshi Yoshii (Kyoto University)

16:00 ***Quantized Variational Bayesian Joint Channel Estimation and Data Detection for Uplink Massive MIMO Systems with Low Resolution ADCs***

Sai Subramanyam Thoota (Indian Institute of Science); Chandra Murthy (Indian Institute of

Science); Ramesh Annavajjala (Northeastern University)

16:00 ***Large-Scale Sparse Subspace Clustering Using Landmarks***

Farhad Pourkamali-Anaraki (University of Massachusetts Lowell)

16:00 ***Deep Reinforcement Learning Based Energy Beamforming for Powering Sensor Networks***

Ayca Ozcelikkale (Uppsala University); Mehmet Koseoglu (Hacettepe University); Mani Srivastava (University of California, Los Angeles); Anders Ahlén (Uppsala University)

16:00 ***Unknown Signal Detection in Linear Dynamical System Noise***

Gabriel Ford (Lockheed Martin - Advanced Technology Laboratories); Timothy Hu (Lockheed Martin - Advanced Technology Laboratories); Donald J. Bucci Jr (Lockheed Martin - Advanced Technology Laboratories); Benjamin J Foster (Lockheed Martin - Advanced Technology Laboratories)

16:00 ***Incorporating Intra-Spectral Dependencies with a Recurrent Output Layer for Improved Speech Enhancement***

Khandokar Md. Nayem (Indiana University); Donald S. Williamson (Indiana University)

16:00 ***Efficient Parameter Estimation for Semi-Continuous Data: An Application to Independent Component Analysis***

Sai Kumar Popuri (Walmart Labs); Zois Boukouvalas (American University)

## Tuesday October 15, 2019 (8am – 6:30pm)

- 8:00-17:00                      *Registration*
- 8:30-9:00                        *Welcome Refreshment*
- 9:00-10:00    Ballroom *Keynote Lecture: Supervised Learning via Tensor*  
B                      *Completion*  
[Nikolaos Sidiropoulos, Louis T. Rader Professor and](#)  
[Chair, Electrical and Computer Engineering](#)  
[Department, University of Virginia](#)
- 10:00-10:30                      *Coffee Break*
- 10:30-12:30    Ballroom *Lecture Session 3: Special Session on Collaborative*  
B                      *Learning in IoT-enabled Smart Cities*  
Chair: Javad Mohammadi and Soheil Kolouri
- 10:30    *Learning Warm-Start Points for AC Optimal*  
                    *Power Flow*  
Kyri Baker (University of Colorado, Boulder)
- 10:50    *Collaborative Inference of Missing Smart*  
                    *Electric Meter Data for A Building*  
Nan Duan (Lawrence Livermore National  
Laboratory); Jose Cadena (Lawrence Livermore  
National Laboratory); Pedro Sotorrio (Lawrence  
Livermore National Laboratory); Jhi-Young Joo  
(Lawrence Livermore National Laboratory)\*
- 11:10    *Incremental Dictionary Learning For*  
                    *Adaptive Classification and Reconstruction of*  
                    *Facial Imagery*  
Mahmood R Azimi-Sadjadi (); Christopher  
Robbiano (Colorado State University); Yinghui  
Zhao (Chinese Academy of Sciences); John  
Hall (Colorado State University)

- 11:30 ***Collaborative Learning through Shared Collective Knowledge and Local Expertise***  
Javad Mohammadi (Carnegie Mellon University); Soheil Kolouri (HRL Laboratories LLC)
- 11:50 ***Analyzing Transfer Learning Methods for UXO Classification in Varying Shallow Water Environments***  
Nathan Larson (Colorado State University); John Hall (Colorado State University); Mahmood Azimi-Sadjadi (Colorado State University)
- 12:10 ***Joint Multi-Layer GAN-Based Design of Tensorial RF Metasurfaces***  
John A Hodge (Virginia Tech); Kumar Vijay Mishra (U. S. Army Research Laboratory); Amir Zaghloul (U.S. Army Research Lab / Virginia Tech)
- 12:30-14:00 ***Lunch Break***
- 14:00-16:00 Ballroom B ***Lecture Session 4: Regular Session on Learning from Multi-Dimensional Data***  
Chair: David Miller
- 14:00 ***Online One-Shot Learning For Indoor Asset Detection***  
Adith Balamurugan (University of California, Berkeley); Avidah Zakhor (University of California, Berkeley)
- 14:20 ***Accelerating Nonnegative Matrix Factorization over polynomial signals with faster projections***  
Cécile Hauteceur (UCLouvain); François Glineur (Université catholique de Louvain)
- 14:40 ***AH-CoLT: An AI-Human Co-Labeling Toolbox to Augment Efficient Groundtruth Generation***  
Xiaofei Huang (Northeastern University); Behnaz Rezaei (Northeastern University); Sarah Ostadabbas (Northeastern University)

15:00 ***Combining Deep Neural Networks And Beamforming For Real-Time Multi-Channel Speech Enhancement Using A Wireless Acoustic Sensor Network***

Enea Ceolini (University Zürich, ETH Zürich);  
Shih-Chii Liu (Institute of Neuroinformatics)

15:20 ***Audio-Visual Fusion and Conditioning with Neural Networks For Event Recognition***

Mathilde Brousmiche (University of Mons);  
stéphane dupont (umons); Jean Rouat  
(Université de Sherbrooke)

15:40 ***A Spatiotemporal Deep Learning Solution For Automatic Micro-Expressions Recognition From Local Facial Regions***

Mouath Aouayeb (INSA Rennes); Wassim  
Hamidouche (INSA Rennes); Kidiyo Kpalma  
(INSA de Rennes, Université Européenne de  
Bretagne); Amel Benazza (Sup'com)

16:00-16:30

***Coffee Break***

16:30- 18:30 Ballroom A **Poster Session 3: Learning Theory, Dictionary Learning, and Manifold Modeling (12 Papers)**

Chairs: George Atia

16:30 ***On Sparse Complex Gaussian Graphical Model Selection***

Jitendra K Tugnait (Auburn University)

16:30 ***Low-dimensional Decomposition of Manifolds in Presence of Outliers***

Mahlagha Sedghi (University of Central Florida); George Atia (University of Central Florida); Michael Georgiopoulos (University of Central Florida)

16:30 ***Asymptotics of Maximum Likelihood Parameter Estimates for Gaussian Processes: The Ornstein-Uhlenbeck Prior***

Toni Karvonen (Aalto University); Filip Tronarp (Aalto University); Simo Särkkä (Aalto University)

16:30 ***Learning Based Data-Driven Approach for Online Nonuniform Compressed Sensing***

Md Nazmul Karim (University of Central Florida); Alireza Zaeemzadeh (University of Central Florida); Nazanin Rahnavard (University of Central Florida)

16:30 ***Rejection-Sampling-Based Ancestor Sampling for Particle Gibbs***

Roland Hostettler (Uppsala University); Simo Särkkä (Aalto University)

16:30 ***Wave Physics Informed Dictionary Learning in One Dimension***

Harsha Vardhan Tetali (University of Florida); Kishan Supreet Alguri (University of Utah); Joel Harley (University of Florida)

16:30 ***Regularized State Estimation and Parameter Learning via Augmented Lagrangian Kalman Smoother Method***

Rui Gao (Aalto university); Filip Tronarp (Aalto University); Zheng Zhao (Aalto university); Simo Särkkä (Aalto University)

16:30 ***Finding Low-Dimensional Dynamical Structure Through Variational Auto-Encoding Dynamic Mode Decomposition***

Shin Murata (NTT); Yuma Koizumi (NTT); Noboru Harada (NTT)

16:30 ***A New Approach to Online Regression Based on Maximum Correntropy Criterion***

Sajjad Bahrami (University of California, Riverside); Ertem Tuncel (University of California, Riverside)

16:30 ***Generic Bounds on the Maximum Deviations in Sequential Prediction: An Information-Theoretic Analysis***

Song Fang (KTH Royal Institute of Technology); Quanyan Zhu (New York University)

16:30 ***Optimal Pricing in Black Box Producer-Consumer Stackelberg Games Using Revealed Preference Feedback***

Anup Aprem (University of Oxford); Stephen Roberts (University of Oxford)

16:30 ***Scalable Community Detection in The Heterogeneous Stochastic Block Model***

Andre Beckus (University of Central Florida); George Atia (University of Central Florida)

16:30- 18:30 Ballroom A **Poster Session 4: Large Scale Data, Multimodal Data, And Applications (10 Papers)**

Chairs: Constantine Kotropoulos

16:30 ***Less is More: Deep Learning Using Subjective Annotations for Sentiment Analysis From Social Media***

Christina Tzogka (Aristotle University of Thessaloniki); Nikolaos Passalis (Tampere University); Alexandros Iosifidis (Aarhus University); Moncef Gabbouj (Tampere University); Anastasios Tefas (Aristotle University of Thessaloniki)

16:30 ***Voice Anonymization in Urban Sound Recordings***

Alice Cohen-Hadria (IRCAM); Mark Cartwright (New York University); Brian McFee (New York University); Juan P Bello (New York University)

16:30 ***RandNet: Deep Learning with Compressed Measurements of Images***

Thomas Chang (Harvard University); Bahareh Tolooshams (Harvard University); Demba Ba (Harvard University)

16:30 ***Basis Learning Autoencoders for Hybrid Collaborative Filtering***

Kiwon Lee (KAIST); Hyeonsoo Jo (KAIST); Hyoji Kim (KAIST); Yonghoon Lee (KAIST)

16:30 ***A Machine Learning Approach for Classifying Fault in Microgrids Using Wavelet Decomposition***

Aya Khalaf (University of Pittsburgh); Hashim A. Al Hassan (Nil); Adam Emes (University of Pittsburgh); Murat Akcakaya (University of Pittsburgh); Brandon Grainger (University of Pittsburgh)

16:30 ***Distributed Multi-View Subspace Clustering via Auto-Weighted Spectral Embedding***

Pei-Che Chang (National Tsing Hua University); Cheng-Yuan Cheng (National Tsing Hua University); Y.-W. Peter Hong (National Tsing Hua University)

- 16:30 ***Interpretable Online Banking Fraud Detection Based on Hierarchical Attention Mechanism***  
Idan Achituve (Bar-Ilan University); Sarit Kraus (Bar-Ilan University); Jacob Goldberger (Bar-Ilan University)
- 16:30 ***Efficient Capon-Based Approach Exploiting Temporal Windowing for Electric Network Frequency Estimation***  
George Karantaidis (Aristotle University of Thessaloniki); Constantine Kotropoulos (Aristotle University of Thessaloniki)
- 16:30 ***Single-Pixel Camera Sensing Matrix Design for Hierarchical Compressed Spectral Clustering***  
Carlos Hinojosa (Universidad Industrial de Santander); Jorge Bacca (Universidad Industrial de Santander); Edwin M Vargas (Universidad Industrial de Santander); Sergio Castillo (Universidad Industrial de Santander); Henry Arguello (Universidad Industrial Santander)
- 16:30 ***A Multimodal Dense U-Net for Accelerating Multiple Sclerosis MRI***  
Antonio Falvo (Sapienza University of Rome, Italy); Danilo Comminiello (Sapienza University of Rome); Simone Scardapane (Sapienza University of Rome); Michele Scarpiniti (Sapienza University of Rome); Aurelio Uncini (Sapienza University of Rome)

## Wednesday October 16, 2019 (8am – 6:30pm)

8:30-  
12:00                      *Registration*

8:30-9:00                      *Welcome Refreshment*

9:00-     Ballroom B     *Keynote Lecture: Recent Advances of Stochastic  
10:00                      Algorithms for Deep Learning*  
[Yingbin Liang, Professor, Electrical and Computer  
Engineering Department, The Ohio State University](#)

10:00-  
10:30                      *Coffee Break*

10:30-     Ballroom B     *Lecture Session 5: Special Session on Machine learning  
12:30                      for Wireless Systems*  
Chair: Yalin Sagduyu and Tugba Erpek

10:30 *Deep Convolutional Compression for Massive  
MIMO CSI Feedback*  
Qianqian Yang (Imperial College London); Mahdi  
Boloursaz Mashhadi (Imperial College London);  
Deniz Gunduz (Imperial College London)

10:50 *Online Anomaly Detection in Multivariate  
Settings*  
Mahsa Mozaffari (University of South Florida);  
Yasin Yilmaz (University of South Florida)

11:10 *MIMO Channel Estimation with Non-Ideal  
ADC: Deep Learning versus GAMP*  
Marcos Y Takeda (Federal University of Pará);  
Aldebaro Klautau (Federal University of Pará);  
Amine Mezghani (University of Texas at Austin);  
Robert W Heath (University of Texas at Austin)

11:40 *Optimal Mobile Relay Beamforming via  
Reinforcement Learning*  
Athina Petropulu (Rutgers); Konstantinos  
Diamantaras (International Hellenic University)

- 12:00 ***Interference Characterization in Wireless Networks: A Determinantal Learning Approach***  
Chiranjib Saha (Virginia Tech); Harpreet Dhillon (Virginia Tech)
- 12:10 ***A Cascading Bandit Approach to Efficient Mobility Management in Ultra-Dense Networks***  
Chao Wang (USTC); Ruida Zhou (USTC); Jing Yang (Penn State University)\*; Cong Shen (USTC)
- 12:30-13:30 ***Lunch Break***
- 13:30-15:30 Ballroom B ***Lecture Session 6: Regular Session on Large scale and Deep learning***  
Chair: Raviv Raich
- 14:00 ***Strength Adjusted Multilayer Spectral Clustering***  
Abdullah Karaaslanli (Michigan State University); Selin Aviyente (Michigan State University)
- 14:20 ***On Convergence Of Projected Gradient Descent For Minimizing A Large-Scale Quadratic Over The Unit Sphere***  
Trung V Vu (Oregon State University); Raviv Raich (Oregon State University); Xiao Fu (Oregon State University)
- 14:40 ***Insights into the Behaviour of Multi-task Deep Neural Networks for Medical Image Segmentation***  
Lukasz Bienias (Technical University of Denmark); Tommy S Alstrøm (Technical University of Denmark); Line Hagner Nielsen (Technical University of Denmark); Juan Jose Rubio Guillamon (Technical University of Denmark)
- 15:00 ***Block-Term Tensor Decomposition via Constrained Matrix Factorization***  
Xiao Fu (Oregon State University); Kejun Huang (University of Florida)

15:20 ***Extended Variational Inference for Propagating Uncertainty in Convolutional Neural Networks***  
Dimah Dera (Rowan University); Ghulam Rasool (Rowan University); Nidhal Bouaynaya (ACECS-2016 Chair)

15:40 ***A Generative Machine Learning Approach to RFI Mitigation for Radio Astronomy***  
Etienne E Vos (IBM)

15:30-  
16:00

***Coffee Break***

16:00-  
18:00     Ballroom A     ***Poster Session 5: Bioinformatics and Biomedical Applications (8 Papers)***

Chairs: TBD

16:00 ***Automatic Screening of Children with Speech Sound Disorders Using Paralinguistic Features***  
Mostafa Shahin (UNSW); Beena Ahmed (UNSW); Daniel V. Smith (DATA61, CSIRO); Andreas Duenser (DATA61, CSIRO); Julien Epps (UNSW)

16:00 ***Visualizing High Dimensional Dynamical Processes***  
Andres F Duque (Utah State University); Guy Wolf (University of Montreal); Kevin Moon (Utah State University)

16:00 ***Dynamic System Identification for Guidance of Stimulation Parameters in Haptic Simulation Environments***  
Andac N Demir (Northeastern University); Murat Akcakaya (University of Pittsburgh); Deniz Erdogmus (Northeastern University); Safaa Eldeeb (University of Pittsburgh)

16:00 ***EEG-Based Texture Classification During Active Touch***  
Safaa Eldeeb (University of Pittsburgh); Murat Akcakaya (University of Pittsburgh); Deniz

- Erdogmus (Northeastern University); Douglas Weber (University of Pittsburgh); Jordyn Ting (University of Pittsburgh)
- 16:00 ***Mental Workload Classification from Spatial Representation of FNIRS Recordings Using Convolutional Neural Networks***  
Marjan Saadati (George Mason University)
- 16:00 ***Self-Supervised Representation Learning from Electroencephalography Signals***  
Hubert Banville (Inria); Isabela Albuquerque (Institut National de la Recherche Scientifique); Aapo Hyvarinen (Inria & U Helsinki); Graeme Moffat (InteraXon Inc.); Denis-Alexander Engemann (Inria); Alexandre Gramfort (Inria)
- 16:00 ***Protein Tracking by CNN-Based Candidate Pruning and Two-Step Linking with Bayesian Network***  
Mariia Dmitrieva (Oxford University); Jens Rittscher (Oxford University)
- 16:00 ***Kalman Filter Change-point Detection and Trend Characterization***  
Scott Kuzdeba (Boston University); Brandon Hombs (Eigen LLC); Jeremy Greenlee (University of Iowa); Frank H. Guenther (Boston University)

16:00- 18:00 Ballroom A **Poster Session 6: Image, Speech, and Audio Applications (11 Papers)**

Chairs: TBD

16:00 ***Recognition of Atypical Behavior in Autism Diagnosis from Video Using Pose Estimation Over Time***

Kathan Vyas (Northeastern University); Rui Ma (Northeastern University); Behnaz Rezaei (Northeastern University); Shuangjun Liu (Northeastern University); Michael Neubauer (Behavior Imaging); Thomas Ploetz (Georgia Institute of Technology); Ronald Oberleitner (Behavior Imaging); Sarah Ostadabbas (Northeastern University)

16:00 ***End-to-end Detection of Attacks to Automatic Speaker Recognizers with Time-attentive Light Convolutional Neural Networks***

Joao B Monteiro (Institut National de la Recherche Scientifique); Jahangir Alam (Centre de recherche informatique de Montréal); Tiago H Falk (INRS-EMT)

16:00 ***Incremental Label Propagation on Facial Images***

Efstratios Kakaletsis (Aristotle University of Thessaloniki); Anastasios Tefas (Aristotle University of Thessaloniki); Nikos Nikolaidis (Aristotle University of Thessaloniki); Ioannis Pitas (Aristotle University of Thessaloniki)

16:00 ***A Bayesian Generative Model with Gaussian Process Priors for Thermomechanical Analysis of Micro-Resonators***

Maximillian F Vording (Technical University of Denmark); Peter Okeyo (University of Copenhagen); Juan Jose Rubio Guillamon (Technical University of Denmark); Peter Emil Larsen (Technical University of Denmark); Mikkel N. Schmidt (Technical University of Denmark); Tommy S Alstrøm (Technical University of Denmark)

- 16:00 ***Generative vs Discriminative Model-Based Adaptation of Audio Descriptors for Improved Emotion Recognition***  
Upasana Tiwari (TCS Research and Innovation Lab); Rupayan Chakraborty (TCS Research and Innovation Lab); Sunil Kumar Kopparapu (TCS Research and Innovation Lab)
- 16:00 ***Multi-Step Chord Sequence Prediction Based on Aggregated Multi-Scale Encoder-Decoder Networks***  
Tristan J. J. Carsault (IRCAM); Andrew McLeod; Philippe Esling (IRCAM); Jérôme Nika (IRCAM); Eita NAKAMURA (Kyoto University); Kazuyoshi Yoshii (Kyoto University)
- 16:00 ***Low-Resource Language Identification from Speech Using Transfer Learning***  
Kexin Feng (Texas A&M University); Theodora Chaspari (Texas A&M University)
- 16:00 ***High Resolution Water Segmentation for Autonomous Unmanned Surface Vehicles: A Novel Dataset and Evaluation***  
Jussi Taipalmaa (Tampere University); Nikolaos Passalis (Tampere University); Honglei Zhang (Tampere University); Moncef Gabbouj (Tampere University); Jenni Raitoharju (Tampere University)
- 16:00 ***Compressive Classification from Single Pixel Measurements via Deep Learning***  
Jorge Bacca (Universidad Industrial de Santander); Claudia V Correa (Universidad Industrial de Santander); Edwin M Vargas (Universidad Industrial de Santander); Sergio Castillo (Universidad Industrial de Santander); Henry Arguello (Universidad Industrial Santander)
- 16:00 ***Generative Models for Low-Rank Video Representation and Reconstruction from Compressive Measurements***

Rakib Hyder (University of California, Riverside); M. Salman Asif (University of California, Riverside)

16:00 ***Improving Neural Non-Maximum Suppression for Object Detection by Exploiting Interest-Point Detectors***

Charalampos Symeonidis (Aristotle University of Thessaloniki); Ioannis Mademlis (Aristotle University of Thessaloniki); Nikos Nikolaidis (Aristotle University of Thessaloniki); Ioannis Pitas (Aristotle University of Thessaloniki)

# TUTORIAL 1

## Data science with graphs: From social network analysis to autonomous driving

### **Dr. Siheng Chen**

Research Scientist

Mitsubishi Electric Research Laboratories (MERL), USA

#### *Biography:*

Siheng Chen is a research scientist at Mitsubishi Electric Research Laboratories (MERL). Before that, he was an autonomy engineer at Uber Advanced Technologies Group, working on the perception and prediction systems of self-driving cars. Before joining Uber, he was a postdoctoral research associate at Carnegie Mellon University. Dr. Chen received the doctorate in Electrical and Computer Engineering from Carnegie Mellon University in 2016, where he also received two master degrees in Electrical and Computer Engineering and Machine Learning, respectively. He received my bachelors degree in Electronics Engineering in 2011 from Beijing Institute of Technology, China. He is the recipient of the 2018 IEEE Signal Processing Society Young Author Best Paper Award. His coauthored paper received the Best Student Paper Award at IEEE GlobalSIP 2018. His research interests include signal processing, machine learning and autonomous driving.

#### *Abstract:*

A massive amount of data is being generated at an unprecedented level from a diversity of sources, including online social networks, cyber-physical systems, biological networks, urban traffic networks, 3D point clouds, and many others. These seemingly different types of data share a similar pattern: data are associated with complex and irregular structures. The necessity of analyzing such data has led to the birth of a unifying framework, data science with graphs. This framework offers a mathematically rigorous paradigm to analyze high-dimensional data associated with complex and irregular graph structures. It extends tools and concepts from classical signal processing and machine learning to the graph domain. In this talk, we will introduce this emerging framework and consider a series of graph-based theories and methodologies, including graph signal processing and graph neural networks. We will illustrate the power of the proposed methodologies with the applications to social network analysis and autonomous driving.

# TUTORIAL 2

## Natural Language Processing for Healthcare Applications

### **Dr. Amir Tahmasebi**

Director of Machine Learning and AI  
CODAMETRIX, Boston, MA, USA

#### *Biography:*

Amir Tahmasebi is the director of machine learning and AI at CODAMETRIX, Boston, MA. He also serves as a lecturer in Electrical and Computer Engineering Department at Northeastern University, Boston, MA. Prior to joining CODAMETRIX, Dr. Tahmasebi was a Principal R&D Engineer at Disease Management Solutions Business of Philips HealthTech, Cambridge, MA. Dr. Tahmasebi's research is focused on patient clinical context extraction and modeling through medical image analysis and Natural Language Processing. Dr. Tahmasebi received his PhD degree in Computer Science from the School of Computing, Queen's University, Kingston, Canada. He is the recipient of the IEEE Best PhD Thesis award and Tanenbaum Post-doctoral Research Fellowship award. He has been serving as an industrial Chair for IPCAI conference since 2015. Dr. Tahmasebi has published and presented his work in a number of conferences and journals including NIPS, MICCAI, IPCAI, SPIE, JDI, IEEE TMI, and IEEE TBME. He has also been granted more than 10 patent awards.

#### *Abstract:*

This tutorial aims at providing a primer on the design of an end-to-end Natural Language Processing pipeline for healthcare-specific applications such as the Named Entity Recognition (NER) task. Through the course of this tutorial the audience will be introduced to different steps of such pipeline while reviewing the classical approaches as well as state-of-the-art techniques. Here is an outline for the tutorial:

- Introduction to NLP for Healthcare
- NLP pipeline for Named Entity Recognition:
  - Preprocessing: optional or required?
  - Word Embedding: is it necessary to train a domain-specific model?
  - Named Entity Recognition: Anatomical Phrase Labeling in Radiology reports
  - Syntactic versus semantic
- State-of-the-art NLP for Healthcare: A review

## KEYNOTE 1

### Self Driving Cars and AI: Transforming our cities and our lives

**Prof. Jeff Schneider**

Carnegie Mellon University, USA

*Biography:*

Dr. Jeff Schneider is a research professor in the Carnegie Mellon University School of Computer Science where his recent research is on machine learning for autonomous systems. He has over one hundred publications and has given numerous invited talks and tutorials on the subject. Jeff is also an entrepreneur. He was a founding member of Uber's Advanced Technologies Group and spent three years helping to build their self driving car program. Before that, he developed a machine learning based CNS drug discovery system and commercialized it during two years as Psychogenics' Chief Informatics Officer. Earlier in his career he was the co-founder and CEO of Schenley Park Research, a company dedicated to bringing machine learning to industry. Through his research, commercial, and consulting efforts, he has worked with dozens of companies and government agencies around the world.

*Abstract:*

Artificial intelligence and machine learning are critical to reaching full autonomy in self driving cars. I will present two autonomy systems along with the use of machine learning in each of them. I will summarize recent progress in commercializing these systems and make some observations about the potential impact of these systems in our daily life. Some of the biggest remaining challenges include efficiently solving the long tail of unusual events on the road, scaling up from demos to commercially viable systems, and verifying the safety of these AI-based systems. I will finish with thoughts on addressing those issues.

## KEYNOTE 2

### A Quantum Theory Inspired Framework for Adaptive Signal Processing

**Prof. Jose C. Principe**

University of Florida, USA

*Biography:*

Jose C. Principe (M'83-SM'90-F'00) is a Distinguished Professor of Electrical and Computer Engineering and Biomedical Engineering at the University of Florida where he teaches advanced signal processing, machine learning and artificial neural networks (ANNs) modeling. He is BellSouth Professor and the Founder and Director of the University of Florida Computational NeuroEngineering Laboratory (CNEL) ([www.cnel.ufl.edu](http://www.cnel.ufl.edu)). His primary area of interest is processing of time varying signals with adaptive neural models. The CNEL Lab has been studying signal and pattern recognition principles based on information theoretic criteria (entropy and mutual information). Dr. Principe is an IEEE Fellow. He was the past Chair of the Technical Committee on Neural Networks of the IEEE Signal Processing Society, Past-President of the International Neural Network Society, and Past-Editor in Chief of the IEEE Transactions on Biomedical Engineering. He is a member of the Advisory Board of the University of Florida Brain Institute. Dr. Principe has more than 800 publications. He directed 98 Ph.D. dissertations and 65 Master theses. He wrote in 2000 an interactive electronic book entitled "Neural and Adaptive Systems" published by John Wiley and Sons and more recently co-authored several books on "Brain Machine Interface Engineering" Morgan and Claypool, "Information Theoretic Learning", Springer, and "Kernel Adaptive Filtering", Wiley.

***Abstract:***

This talk presents our current goal of developing operators inspired by quantum theory to quantify uncertainty in time series and train adaptive models for machine learning. The basic observation is that data projected to a Reproducing Kernel Hilbert Space (RKHS) are functions that obey the properties of a potential field. Therefore, one can directly apply the Schrodinger equation to the projected data and interpret its Hermite expansion in terms of modes over the space of samples that express multi scale uncertainty. This methodology can be used to quantify signal properties and can also lead to methodologies to train signal processing models. We will exemplify the theory with some preliminary results.

## KEYNOTE 3

### Supervised Learning via Tensor Completion

**Prof. Nikolaos Sidiropoulos**

University of Virginia, USA

***Biography:***

Nikos Sidiropoulos earned his Ph.D. in Electrical Engineering from the University of Maryland–College Park, in 1992. He has served on the faculty of the University of Virginia, University of Minnesota, and the Technical University of Crete, Greece, prior to his current appointment as Chair of ECE at UVA. His research interests are in signal processing, communications, optimization, tensor decomposition, and factor analysis, with applications in machine learning and communications. He received the NSF/CAREER award in 1998, the

IEEE Signal Processing Society (SPS) Best Paper Award in 2001, 2007, and 2011, served as IEEE SPS Distinguished Lecturer (2008-2009), and currently serves as Vice President - Membership of IEEE SPS. He received the 2010 IEEE Signal Processing Society Meritorious Service Award, and the 2013 Distinguished Alumni Award from the University of Maryland, Dept. of ECE. He is a Fellow of IEEE (2009) and a Fellow of EURASIP (2014).

***Abstract:***

Deep neural networks are currently the most popular method for learning to mimic the input-output relationship of a generic nonlinear system, as they have proven to be very effective in approximating complex highly nonlinear functions. In this talk I will discuss an appealing alternative, based on low-rank tensor completion. We model the interactions between the  $N$  input variables and the scalar output of a system by a single  $N$ -way tensor, and setup a weighted low-rank tensor completion problem with smoothness regularization which we tackle using a block coordinate descent algorithm. We extend our method to the multi-output setting and the case of partially observed data, which cannot be readily handled by neural networks. Finally, we demonstrate the effectiveness of the approach using several regression tasks including some standard benchmarks and a challenging student grade prediction task. (Joint work with Nikos Kargas)

## KEYNOTE 4

### Recent Advances of Stochastic Algorithms for Deep Learning

**Prof. Yingbin Liang**

The Ohio State University, USA

***Biography:***

Dr. Yingbin Liang is currently a Professor at the Department of Electrical and Computer Engineering at the Ohio State University (OSU). She received the Ph.D. degree in Electrical Engineering from the University of Illinois at Urbana-Champaign in 2005, and served on the faculty of University of Hawaii and Syracuse University before she joined OSU. Dr. Liang's research interests include machine learning, optimization, information theory and statistical signal processing. Dr. Liang received the National Science Foundation CAREER Award in 2009, and the State of Hawaii Governor Innovation Award in 2009. Her paper received EURASIP Best Paper Award in 2014. She served as an Associate Editor for the Shannon Theory of the IEEE Transactions on Information Theory during 2013-2015.

***Abstract:***

Stochastic algorithms such as stochastic gradient descent (SGD) have been found to be remarkably effective in training a variety of deep neural networks. However, there is still a lack of theoretical understanding on how and why SGD can train these complex networks towards a global minimum. Practically, it is still in high demand to further speed up stochastic

algorithms in deep learning. This talk will present our recent progress towards addressing these issues. The first part of the talk will describe our establishment of the global convergence of SGD in training deep neural networks. By exploiting the star-convexity property that we discover in experiments, our analysis shows that SGD, although has long been considered as a randomized algorithm, converges in an intrinsically deterministic manner to a global minimum. The second part of the talk will focus on stochastic algorithms with variance reduction, and present our advanced designs that further improve the existing art in various scenarios.