2018 IEEE International Workshop on Machine Learning for Signal Processing
September 17-20, Aalborg, Denmark

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WELCOME MESSAGE FROM THE GENERAL CHAIR

On behalf of the organizing committee, it is with great pleasure that I welcome you to the IEEE 28th International Workshop on Machine Learning for Signal Processing (MLSP2018).

The 28th MLSP workshop is taking place at Comwell Hvide Hus, which is centrally located in Aalborg at Kildeparken, a park with many green areas and a variety of attractions. The workshop is the main annual event organized by the MLSP Technical Committee of the IEEE Signal Processing Society and will present the most recent advances in machine learning for signal processing through keynote talks, tutorials and single-track sessions.

As the driving force behind this wave of AI, machine learning provides essential tools for analyzing signals and data, both of which are plentiful and rapidly increasing in abundance today. The combination of machine learning and signal processing thus delivers powerful solutions to many real-world scientific and societal challenges. It is our hope that MSLP2018 will create an opportunity for scientists and engineers from both academia and industry to present their work, bring state-of-the-art forward, foster an environment for active and constructive exchange of ideas as well as reinforce or establish collaboration networks.

I am delighted to introduce our six insightful invited talks that address various contemporary topics. Regarding the two tutorials, the first one is “Opening the Black Box – How to Interpret Machine Learning Functions and Their Decisions” by Lars Kai Hansen and Laura Rieger (Technical Univ. of Denmark) and the second, “Bayesian Filtering and Smoothing Methods for Machine Learning” by Simo Särkkä (Aalto Univ.). The three keynote talks are 1) “The Bayesian Bonus: Benefits of Being Bayesian in the Deep Learning Era” by Max Welling (Univ. of Amsterdam), 2) “End to End Speech Recognition Systems Explored” by Dong Yu (Tencent AI Lab) and 3) “Temporal Models with Low-rank Spectrogram” by Cédric Févotte (CNRS). The 2018 edition of MLSP has further introduced an industrial keynote talk, which is delivered by Kaare Brandt Petersen (Implement Consulting Group) on the topic of “A Reality Check on Data Driven Business – What are the Real-Life Potential and Barriers?”.

MLSP2018 received 149 eligible submissions that were evaluated by at least two anonymous reviewers. We adopted the process of double blind review and authors' rebuttal. The program chairs worked strenuously to include as many excellent works into the technical program as possible. In the end, 76 papers were chosen for presentations in the oral and poster sessions, yielding a 51% acceptance rate.

We would like to express our deepest gratitude to Jan Larsen (Technical University of Denmark), who was the Web and Publication Chair of MLSP2018 and a member of the core organizing team. Jan provided an all-in-one highly professional conference system and took care of the time-consuming job of managing the website for paper submission, review and publications. Jan was not only a Web and Publication Chair but also an active advisor and

readily available for sharing his experience. Jan's contribution was far beyond the 2018 edition of MLSP. He had been a key figure in shaping the MLSP/NNSP (Neural Networks for Signal Processing) Technical Committee and the series of MLSP/NNSP workshops since the beginning. He participated in every single MLSP/NNSP workshop since its introduction in 1991. With profound sadness, we will be missing Jan at MLSP2018 due to his sudden passing. He will be dearly missed by all who knew him.

Organizing an international event like MLSP requires a great deal of collective effort. Therefore, I am greatly thankful to the organizing team, the local team, the program committee, the reviewers, the tutorial and keynote speakers, the session chairs, the authors, our sponsors and the IEEE for their strong support.

I wish all participants a pleasant stay here in Aalborg and hope that MLSP2018 will be a memorable and an enjoyable event for all of you.

Zheng-Hua Tan (Aalborg University, Denmark)
MLSP2018 General Chair

ORGANIZING COMMITTEE

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PROGRAM

Monday September 17, 2018

9:00-17:00	2nd floor	***Registration***
13:15-13:30	Kilden, 2nd floor	***Opening Greeting*** Chair: Zheng-Hua Tan, Aalborg University, Denmark
13:30-14:30	Kilden, 2nd floor	***Keynote Lecture: The Bayesian Bonus: Benefits of Being Bayesian in the Deep Learning Era*** Max Welling University of Amsterdam, the Netherlands Chair: Børge Lindberg, Aalborg University, Denmark
14:30-15:00	2nd floor	***Coffee Break***
15:00-16:30	Kilden, 2nd floor	***Tutorial: Opening the Black Box - How to Interpret Machine Learning Functions and Their Decisions*** Lars Kai Hansen and Laura Rieger Section for Cognitive Systems, DTU Compute, Technical University of Denmark, Denmark Chair: Ulisses M. Braga-Neto, Texas A&M University, USA
16:45-18:15	Kilden, 2nd floor	***Tutorial: Bayesian Filtering and Smoothing Methods for Machine Learning*** Simo Särkkä Aalto University, Finland Chair: Zhanyu Ma, Beijing University of Posts and Telecommunications, China
18:30-19:00	Kilden, 2nd floor	***MLSP 2018 Data Competition: Map Synchronization (video)*** Yuxin Chen, Yuejie Chi, Junting Dong, Qixing Huang, Kaixiang Lei, Haoyun Wang, Qianqian Wang, Kun Xu, Xiaowei Zhou
19:00-20:00	Ground floor	***Welcome Reception Hosted by the City of Aalborg***

Tuesday September 18, 2018

8:30-12:00	2nd floor	***Registration***
8:30-9:00	2nd floor	***Welcome Refreshment***

9:00-10:00	Kilden, 2nd floor	***Keynote Lecture: End-to-end Speech Recognition Systems Explored*** Dong Yu Tencent AI Lab, Seattle, USA Chair: Zheng-Hua Tan, Aalborg University, Denmark
10:00-10:30	2nd floor	***Coffee Break***
10:30-12:30	Kilden, 2nd floor	***Lecture Session 1: Speech and audio processing*** Chair: Tomoko Matsui, The Institute of Statistical Mathematics, Japan 10:30 *A Variance Modeling Framework Based On Variational Autoencoders For Speech Enhancement* Simon Leglaive, Laurent Girin, Radu Horaud 10:50 *Logical Access Attacks Detection Through Audio Fingerprinting In Automatic Speaker Verification* Juan Manuel Espín López, Roberto Font Ruiz, Javier Gómez Marín-Blazquez, Francisco Esquembre Martínez 11:10 *Analysing Replay Spoofing Countermeasure Performance Under Varied Conditions* Bhusan Chettri, Bob L. Sturm, Emmanouil Benetos 11:30 *Monaural Speech Separation Using A Phase-Aware Deep Denoising Auto Encoder* Donald S. Williamson 11:50 *Speech Emotion Recognition Using Cyclostationary Spectral Analysis* Amin Jalili, Sadid Sahami, Chong-Yung Chi, Rassoul Amirfattahi 12:10 *Noise-Adaptive Deep Neural Network For Single-Channel Speech Enhancement* Hanwook Chung, Taesup Kim, Eric Plourde, Benoit Champagne
12:30-14:00	1st floor	***Lunch***
14:00-16:00	Kilden, 2nd floor	***Lecture Session 2: Bayesian learning and modeling*** Chair: James Reilly, McMaster University, Canada 14:00 *Uncertainty Bounds For Kernel-Based Regression: A Bayesian SPS Approach* Algo Carè, Gianluigi Pillonetto, Marco Campi 14:20 *Markov Recurrent Neural Networks* Che-Yu Kuo, Jen-Tzung Chien 14:40 *Learning Stochastic Differential Equations With Gaussian Processes Without Gradient Matching* Cagatay Yildiz, Markus Heinonen, Jukka Intosalmi, Henrik Mannerström, Harri Lähdesmäki

15:00 *Scaling Bayesian Optimization Up To Higher Dimensions: A Review And Comparison Of Recent Algorithms*
Benoît Choffin, Naonori Ueda

15:20 *Correcting Boundary Over-Exploration Deficiencies In Bayesian Optimization With Virtual Derivative Sign Observations*
Eero Siivola, Aki Vehtari, Javier González, Jarno Vanhatalo, Michael Riis Andersen

15:40 *Computational Optimization For Normal Form Realization Of Bayesian Model Graphs*
Giovanni Di Gennaro, Amedeo Buonanno, Francesco A. N. Palmieri

16:00-16:30 2nd floor ***Coffee Break***

16:30-18:30 Kilden, 2nd floor ***Poster Session 1: Bayesian learning and modeling***
Chair: Gianluigi Pillonetto, University of Padova, Italy

16:30 *Model-Order Selection In Statistical Shape Models*
Alma Eguizabal, Peter J. Schreier, David Ramírez

16:30 *Optimal Classifier Model Status Selection Using Bayes Boundary Uncertainty*
David Ha, Emilie Delattre, Yuya Tomotoshi, Masahiro Senda, Hideyuki Watanabe, Shigeru Katagiri, Miho Ohsaki

16:30 *Network Reconstruction From Time-Course Perturbation Data Using Multivariate Gaussian Processes*
Sara Al-Sayed, Heinz Koeppl

16:30 *Space-Time Extension Of The MEM Approach For Electromagnetic Neuroimaging*
Marie-Christine Roubaud, Jean-Marc Lina, Julie Carrier, Bruno Torrésani

16:30 *Online Variational Message Passing In The Hierarchical Gaussian Filter*
Ismail Senoz, Bert De Vries

16:30 *Nonlinear Probabilistic Latent Variable Models For Groupwise Correspondence Analysis In Brain Structures*
Hernan Felipe Garcia, Alvaro Angel Orozco, Mauricio Alexander Alvarez

16:30 *Guaranteed Deterministic Bounds On The Total Variation Distance Between Univariate Mixtures*
Frank Nielsen, Ke Sun

16:30 *Mixture Representation Of The MatÉrn Class With Applications In State Space Approximations And Bayesian Quadrature*
Filip Tronarp, Toni Karvonen, Simo Särkkä

16:30 *Dynamic Bayesian Knowledge Transfer Between A Pair Of Kalman Filters*
Milan Papez, Anthony Paul Quinn

16:30 *Causality Analysis Based On Matrix Transfer Entropy*
Rongjin Ma, Badong Chen, Jianfeng Xiao, Jingli Shao

Wednesday September 19, 2018

8:30-12:00	2nd floor	***Registration***
8:30-9:00	2nd floor	***Welcome Refreshment***
9:00-10:00	Kilden, 2nd floor	***Keynote Lecture: Temporal models with low-rank spectrogram*** Cédric Févotte CNRS, Toulouse, France Chair: Nelly Pustelnik, ENS Lyon, France
10:00-10:30	1st and 2nd floor	***Coffee Break***
10:30-12:30	Kilden, 2nd floor	***Lecture Session 3: Semi-supervised and Unsupervised learning*** Chair: David Jonathan Miller, Penn State University, USA 10:30 *Unsupervised Parsimonious Cluster-Based Anomaly Detection (PCAD)* David Jonathan Miller, George Kesidis, Zhicong Qiu 10:50 *Stochastic Quantum Information Processing, With Applications To Blind Quantum System Identification And Source Separation* Yannick Deville, Alain Deville 11:10 *Distributed Semi-Supervised Multi-Label Classification* Zhen Xu, Ying Liu 11:30 *Dynamical Component Analysis (dyca): Dimensionality Reduction For High-Dimensional Deterministic Time-Series* Bastian Seifert, Katharina Korn, Steffen Hartmann, Christian Uhl 11:50 *Variational Bayesian Partially Observed Non-Negative Tensor Factorization* Jesper L. Hinrich, Søren F. V. Nielsen, Kristoffer H. Madsen, Morten Mørup 12:10 *Scalable Convolutional Dictionary Learning With Constrained Recurrent Sparse Auto-Encoders* Bahareh Tolooshams, Sourav Dey, Demba Ba
12:30-13:30	1st floor	***Lunch***

13:30-15:30	Kilden, 2nd floor	***Lecture Session 4: Sparse learning***
		Chair: Pierre Chainais, University Lille, France
		13:30 *Sparse Bayesian Binary Logistic Regression Using The Split-And-Augmented Gibbs Sampler* Maxime Vono, Nicolas Dobigeon, Pierre Chainais
		13:50 *Regularization Parameter-Free Convolutional Sparse Coding Via Projections Onto The L1-Ball And The Discrepancy Principle* Paul Rodriguez
		14:10 *BALSON: Bayesian Least Squares Optimization With Nonnegative L1-Norm Constraint* Jiyang Xie, Zhanyu Ma, Guoqiang Zhang, Jing-Hao Xue, Jen-Tzung Chien, Zhiqing Lin, Jun Guo
		14:30 *Joint Topology Learning And Graph Signal Recovery Via Kalman Filter In Causal Data Processes* Mahmoud Ramezani-Mayiami
		14:50 *Learning Sparse Structured Ensembles With Stochastic Gradient MCMC Sampling And Network Pruning* Yichi Zhang, Zhijian Ou
		15:10 *Efficient Separable Filter Estimation Using Rank-1 Convolutional Dictionary Learning* Gustavo Silva, Jorge Quesada, Paul Rodríguez
15:30-16:00	2nd floor	***Coffee Break***
16:00-18:00	Kilden, 2nd floor	***Poster Session 2: Unsupervised to supervised learning***
		Chair: Paul Rodriguez, Pontifical Catholic University of Peru, Peru
		16:00 *Anomaly Detection Of Attacks (ada) On Dnn Classifiers At Test Time* David Jonathan Miller, Yujia Wang, George Kesidis
		16:00 *K-Svd With A Real L0 Optimization: Application To Image Denoising* Yuan Liu, Stéphane Canu, Paul Honeine, Su Ruan
		16:00 *Generalization Bounds For Domain Adaptation Via Domain Transformations* Elif Vural
		16:00 *Greedy Salient Dictionary Learning With Optimal Point Reconstruction For Activity Video Summarization* Ioannis Mademlis, Anastasios Tefas, Ioannis Pitas
		16:00 *A Multi-Layer Perceptron Applied To Number Of Target Indication For Direction-Of-Arrival Estimation In Automotive Radar Sensors* Markus Gardill, Jonas Fuchs, Christian Frank, Robert Weigel

16:00 *Enhanced Noisy Sparse Subspace Clustering Via Reweighted L1-Minimization*
Jwo-Yuh Wu, Liang-Chi Huang, Ming-Hsun Yang, Ling-Hua Chang, Chun-Hung Liu

16:00 *Acoustic Scene Classification: A Competition Review*
Shayan Gharib, Honain Derrar, Daisuke Niizumi, Tuukka Senttula, Janne Tommola, Toni Heittola, Tuomas Virtanen, Heikki Huttunen

16:00 *Generalizable Supervised Manifold Learning Via Lipschitz Continuous Interpolators*
Cem Ornek, Elif Vural

16:00 *Remote Sensing Image Regression For Heterogeneous Change Detection*
Luigi Tommaso Luppino, Filippo Maria Bianchi, Gabriele Moser, Stian Normann Anfinsen

16:00 *Graph-Regularized Fast Low-Rank Matrix Approximation Using The Nystr¨om Method For Clustering*
Jieun Lee, Yoonsik Choe

16:00 *APE: Archetypal-Prototypal Embeddings For Audio Classification*
Arshdeep Singh, Anshul Thakur, Padmanabhan Rajan

16:00 *Label Propagation For Learning With Label Proportions*
Rafael Poyiadzi, Raul Santos-Rodriguez, Niall Twomey

16:00 *Detecting Industrial Fouling By Monotonicity During Ultrasonic Cleaning*
Chang Rajani, Arto Klami, Ari Salmi, Timo Rauhala, Edward Hæggström, Petri Myllymäki

16:00 *Multiclass SVM With Hierarchical Interaction: Application To Face Classification*
Mingyuan Jiu, Nelly Pustelnik, Lin Qi

16:00 *Frame-Level Proximity And Touch Recognition Using Capacitive Sensing And Semi-Supervised Sequential Modeling*
Tobias Fischer, Mariano Etchart, Ernesto Biempica

18:45-22:00	Musikkens Hus	***Banquet***

Thursday September 20, 2018

8:30-12:00	2nd floor	***Registration***
8:30-9:00	2nd floor	***Welcome Refreshment***

9:00-10:00	Kilden, 2nd floor	***Keynote Lecture: Industrial Keynote: A reality check on data driven business-what are the real life potential and barriers?*** Kaare Brandt Petersen Implement Consulting Group, Copenhagen, Denmark Chair: Søren Holdt Jensen, Aalborg University, Denmark
10:00-10:30	2nd floor	***Coffee Break***
10:30-12:30	Kilden, 2nd floor	***Poster Session 3: Neural network and deep learning*** Chair: Robert Jensen, The Arctic University of Norway, Norway 10:30 *Simple Deep Learning Network Via Tensor-Train Haar-Wavelet Decomposition Without Retraining* Wei-Zhi Huang, Sung-Hsien Hsieh, Chun-Shien Lu, Soo-Chang Pei 10:30 *Evaluation Of Loss Functions For Estimation Of Latent Vectors From GAN* Arun Patro, Vishnu Vardhan Makkapati, Jayanta Mukhopadhyay 10:30 *Quality Preserving Face De-Identification Against Deep CNNs* Panteleimon Chriskos, Rosen Zhelev, Vasileios Mygdalis, Ioannis Pitas 10:30 *Affective State Recognition Based On Eye Gaze Analysis Using Two-Stream Convolutional Networks* Christina Chrysouli, Nicholas Vretos, Petros Daras 10:30 *Deep Learning Based Speed Estimation For Constraining Strapdown Inertial Navigation On Smartphones* Santiago Cortes Reina, Arno Solin, Juho Kannala 10:30 *Convolutional Neural Networks For Noise Signal Recognition* Ruslan J. Portsev, Andrey V. Makarenko 10:30 *Using Metaheuristics For Hyper-Parameter Optimization Of Convolutional Neural Networks* Victoria Bibaeva 10:30 *Convex Likelihood Alignments For Bioacoustic Classification* Anshul Thakur, Arshdeep Singh, Padmanabhan Rajan 10:30 *Efficient Cyclic Learning Rate Schedules And Their Evaluations For Neural Network Ensemble* Minoru Mori, Masahiro Nakano 10:30 *Deep Neural Networks For Application Awareness In SDN-Based Network* Jun Xu, Jingyu Wang, Qi Qi, Bo He, Haifeng Sun 10:30 *Light Field Based Face Recognition Via A Fused Deep Representation* Alireza Sepas-Moghaddam, Paulo Lobato Correia, Kamal Nasrollahi, Thomas B Moeslund, Fernando Pereira

10:30 *A Characterization Of The Edge Of Criticality In Binary Echo State Networks*
Pietro Verzelli, Lorenzo Livi, Cesare Alippi

10:30 *Image Deblurring And Super-Resolution Using Deep Convolutional Neural Networks*
Fatma Albluwi, Vladimir A. Krylov, Rozenn Dahyot

10:30 *Detection Of Cut Points For Automatic Music Rearrangement*
Daniel Stoller, Vincent Akkermans, Simon Dixon

12:30-13:30 1st floor ***Lunch***

13:30-14:30 Kilden, 2nd floor ***Lecture Session 5: Neural network and deep learning***
Chair: Jen-Tzung Chien, National Chiao Tung University, Taiwan

13:30 *Recurrent Neural Networks With Flexible Gates Using Kernel Activation Functions*
Simone Scardapane, Steven Van Vaerenbergh, Danilo Comminiello, Simone Totaro, Aurelio Uncini

13:50 *Sketchsegnet: A RNN Model For Labeling Sketch Strokes*
Xingyuan Wu, Yonggang Qi, Jun Liu, Jie Yang

14:10 *Supportive Attention In End-To-End Memory Networks*
Jen-Tzung Chien, Ting-An Lin

14:30-15:00 2nd floor ***Coffee Break***

15:00-17:00 Kilden, 2nd floor ***Poster Session 4: Biomedical applications***
Chair: Simo Särkkä, Aalto University, Finland

15:00 *Machine Learning As Digital Therapy Assessment For Mobile Gait Rehabilitation*
Javier Conte Alcaraz, Sanam Moghaddamnia, Nils Poschadel, Jürgen Peissig

15:00 *Spectro-Temporal ECG Analysis For Atrial Fibrillation Detection*
Zheng Zhao, Simo Särkkä, Ali Bahrami Rad

15:00 *Cross-Corpus EEG-Based Emotion Recognition*
Soheil Rayatdoost, Mohammad Soleymani

15:00 *On-Line Bayesian Parameter Estimation In Electrocardiogram State Space Models*
Kimmo Suotsalo, Simo Särkkä

15:00 *A Deep Learning Architecture To Detect Events In EEG Signals During Sleep*
Stanislas Chambon, Valentin Thorey, Pierrick J Arnal, Emmanuel Mignot, Alexandre Gramfort

15:00 *Single-Channel EEG Classification By Multi-Channel Tensor Subspace Learning And Regression*

		Simon Van Eyndhoven, Martijn Boussé, Borbála Hunyadi, Lieven De Lathauwer, Sabine Van Huffel
		15:00 *Uncertainty Modeling And Interpretability In Convolutional Neural Networks For Polyp Segmentation* Kristoffer Knutsen Wickstrøm, Michael Kampffmeyer, Robert Jenssen
		15:00 *Inference Of Gene Regulatory Networks By Maximum-Likelihood Adaptive Filtering And Discrete Fish School Search* Yukun Tan, Fernando Buarque Lima Neto, Ulisses Braga Neto
		15:00 *Controlling Blood Glucose Levels In Patients With Type 1 Diabetes Using Fitted Q-Iterations And Functional Features* Jonas Nordhaug Myhre, Ilkka Kalervo Launonen, Susan Wei, Fred Godtliebsen
		15:00 *Chronic Wound Tissue Classification Using Convolutional Networks And Color Space Reduction* Vitor Godeiro, José Francisco Silva Neto, Bruno Motta De Carvalho, Julianny Ferraz, Bruno Santana, Renata Antonaci Gama
17:00-17:30	Kilden, 2nd floor	***Closing Ceremony***

TUTORIAL 1

Bayesian Filtering and Smoothing Methods for Machine Learning

Professor Simo Särkkä

Department of Electrical Engineering and Automation
Aalto University, Helsinki, Finland

Biography:

Currently, Dr. Särkkä is an Associate Professor with Aalto University, Technical Advisor of IndoorAtlas Ltd., and an Adjunct Professor with Tampere University of Technology and Lappeenranta University of Technology. In 2013 he was a Visiting Professor with the Department of Statistics of Oxford University and in 2011 he was a Visiting Scholar with the Department of Engineering at the University of Cambridge, UK. His research interests are in multi-sensor data processing systems with applications in location sensing, health technology, machine learning, inverse problems, and brain imaging. He has authored or coauthored ~100 peer-reviewed scientific articles and his book "Bayesian Filtering and Smoothing" along with its Chinese translation were recently published via the Cambridge University Press. His latest book "Applied Stochastic Differential Equations" is published via the Cambridge University Press in 2018. He is a Senior Member of IEEE, serving as an Associate Editor of IEEE Signal Processing Letters, and is a member of IEEE Machine Learning for Signal Processing Technical Committee.

Abstract:

Machine learning methods that are able to continuously learn from continuous streams of large amounts of data are becoming more and more important in applications like ubiquitous sensor systems, self-driving cars, smartphone apps, and artificial intelligence (AI) systems. In those applications a separate training phase is not available, but instead, the methods must be able to learn from the data in real time. Due to this constraint, it is beneficial to use recursive Bayesian estimation methodology, also called Bayesian filtering and smoothing, to both enable the online learning and as well as to speed up the learning. The aim of this tutorial is to give an overview of the state-of-the-art in this kind of methods.

Tentative outline

- From linear regression to Kalman filtering and beyond
- Recursive Bayesian estimation and Bayesian filtering and smoothing
- State-space representation of Gaussian process regression
- Spatiotemporal learning with recursive Bayesian estimation
- Hyper-parameter learning methods
- Applications will be presented aside with the methods

TUTORIAL 2

Opening the Black Box - How to Interpret Machine Learning Functions and Their Decisions

Professor Lars Kai Hansen and PhD Student Laura Rieger

Section for Cognitive Systems, DTU Compute
Technical University of Denmark

Biography:

Lars Kai Hansen has MSc and PhD degrees in physics from University of Copenhagen. Since 1990 he has been with the Technical University of Denmark, where he heads the Section for Cognitive Systems. He has published more than 300 contributions on machine learning, signal processing, and applications in AI and cognitive systems. His research has been generously funded by the Danish Research Councils and private foundations, the European Union, and the US National Institutes of Health. He has made seminal contributions to machine learning including the introduction of ensemble methods('90) and to functional neuroimaging including the first brain state decoding work based on PET('94) and fMRI('97). In the context of neuroimaging he has developed a suite of methods for visualizing machine learning models and quantification of uncertainty. In 2011 he was elected "Catedra de Excelencia" at UC3M Madrid, Spain.

Laura Rieger has dual MSc degrees in Computer Science from the Technical University Berlin and the Korea Advanced Institute of Science and Technology. Since fall 2017, she is a PhD student at DTU Compute, working with Prof. Lars Kai Hansen in the Cognitive Systems section. Her research interests include interpretability and uncertainty of neural networks, deep learning and safety in machine learning.

Abstract:

To "let the data speak" machine learning is often based on weak model assumptions - leading to the general notion of machine learning as a black box approach. Indeed, much machine learning research has been devoted to developing expressive representations and algorithms with high statistical and computational efficiency. However, in certain domains - such as systems neuroscience - interpretability and accountability are key to successful application. We will give an introduction to classic and modern tools for understanding machine learning representations and inference with a specific focus on uncertainty quantification. The tutorial is illustrated by applications in bio-medicine, computer vision and natural language processing.

KEYNOTE 1

The Bayesian Bonus: Benefits of Being Bayesian in the Deep Learning Era

Prof. Dr. Max Welling

University of Amsterdam, the Netherlands

Biography:

Prof. Dr. Max Welling is a research chair in Machine Learning at the University of Amsterdam and a VP Technologies at Qualcomm. He has a secondary appointment as a senior fellow at the Canadian Institute for Advanced Research (CIFAR). He is co-founder of Scyfer BV, a university spin-off in deep learning which got acquired by Qualcomm in summer 2017. In the past he held postdoctoral positions at Caltech (98-00), UCL (00-01) and the U. Toronto (01-03). He received his PhD in 98 under supervision of Nobel laureate Prof. G. 't Hooft. Max Welling has served as associate editor in chief of IEEE TPAMI from 2011-2015 (impact factor 4.8). He serves on the board of the NIPS foundation since 2015 (the largest conference in machine learning) and has been program chair and general chair of NIPS in 2013 and 2014 respectively. He was also program chair of AISTATS in 2009 and ECCV in 2016 and general chair of MIDL 2018. He has served on the editorial boards of JMLR and JML and was an associate editor for Neurocomputing, JCGS and TPAMI. He received multiple grants from Google, Facebook, Yahoo, NSF, NIH, NWO and ONR-MURI among which an NSF career grant in 2005. He is recipient of the ECCV Koenderink Prize in 2010. Welling is in the board of the Data Science Research Center in Amsterdam, he directs the Amsterdam Machine Learning Lab (AMLAB), and co-directs the Qualcomm-UvA deep learning lab (QUVA) and the Bosch-UvA Deep Learning lab (DELTA). Max Welling has over 200 scientific publications in machine learning, computer vision, statistics and physics.

Abstract:

Deep learning is all too often considered as a pure optimization problem instead of a statistical estimation problem. But key to any machine learning algorithm are statistical concepts such as overfitting and the bias-variance tradeoff. Bayesian statistics provides a beautiful consistent statistical framework that can be combined with deep learning resulting in a research field called Bayesian Deep Learning (BDL). In this talk I will discuss a number of advantages of BDL, among which a natural protection against overfitting, confidence estimation, better robustness against adversarial attacks, better privacy preservation and a framework to compress and quantize deep architectures. In the second part of the talk I will focus on making deep learning more power and memory efficient. There are a number of reasons why I believe this is an important direction for research, among which the economic feasibility of large scale applications of AI and the thermal ceiling of AI on the edge. I will provide some examples of how BDL has guided us in developing these efficient deep learning implementations.

KEYNOTE 2

Temporal models with low-rank spectrogram

CNRS senior researcher Cédric Févotte

CNRS, Toulouse, France

Biography:

Cédric Févotte is a CNRS senior researcher at Institut de Recherche en Informatique de Toulouse (IRIT). Previously, he has been a CNRS researcher at Laboratoire Lagrange (Nice, 2013-2016) & Télécom ParisTech (2007-2013), a research engineer at Mist-Technologies (the startup that became Audionamix, 2006-2007) and a postdoc at University of Cambridge (2003-2006). He holds MEng and PhD degrees in EECS from École Centrale de Nantes. His research interests concern statistical signal processing and machine learning, in particular for source separation and inverse problems. He has been a member of the IEEE Machine Learning for Signal Processing technical committee (2012-2018) and a member of SPARS steering committee since 2018. He has been an associate editor for the IEEE Transactions on Signal Processing since 2014. In 2014, he was the co-recipient of an IEEE Signal Processing Society Best Paper Award for his work on audio source separation using multichannel nonnegative matrix factorisation. He is the principal investigator of the European Research Council (ERC) project FACTORY (New paradigms for latent factor estimation, 2016-2021).

Abstract:

Various state-of-the-art signal decomposition techniques rely on the low-rank factorisation of a time-frequency (t-f) transform. In particular, nonnegative matrix factorisation (NMF) of the spectrogram has been considered in many audio applications (source separation, speech enhancement, music transcription). This is an *analysis* approach in the sense that the factorisation is applied to the squared magnitude of the analysis coefficients returned by the t-f transform. In the first part of the talk, I will present a *synthesis* approach, where low-rankness is imposed to the synthesis coefficients of the data signal over a given t-f dictionary (such as a Gabor frame). The proposed paradigm bridges t-f synthesis modelling and traditional analysis-based NMF approaches, with enhanced modelling capabilities (e.g., multilayer hybrid representations). Besides, in the classical NMF approach, the spectrogram acts as a pre-processing of the raw data using an off-the-shelf transform. In the second part of the talk, I will show how to relax the choice of a pre-fixed transform and learn a short-time orthogonal transform *together* with the factorisation. The conceptual and practical benefits of the proposed approaches will be illustrated with audio experiments.

KEYNOTE 3

End-to-end Speech Recognition Systems Explored

Distinguished Scientist and Vice General Manager, Dong Yu

Tencent AI Lab, Seattle, USA

Biography:

Dr. Dong Yu is a distinguished scientist and vice general manager at Tencent AI Lab, an IEEE Fellow and an ACM Distinguished Scientist. Before joining Tencent in 2017, he was a principal researcher at Microsoft Research, where he joined in 1998. His research has been focusing on speech recognition and other applications of machine learning techniques. He has published two monographs and 160+ papers. His works have been cited over 17k times per Google Scholar and have been recognized by the prestigious IEEE Signal Processing Society 2013 and 2016 best paper award.

Dr. Dong Yu currently is serving as a member of the IEEE Speech and Language Processing Technical Committee (2013-2018) and a distinguished lecturer of APSIPA (2017-2018). He has served as an associate editor of the IEEE/ACM transactions on audio, speech, and language processing (2011-2015), an associate editor of the IEEE signal processing magazine (2008-2011), and members of organization and technical committees of many conferences and workshops.

Abstract:

In this talk, I will introduce and compare the most promising end-to-end speech recognition systems such as Connectionist Temporal Classification (CTC), RNN Transducer, RNN aligner, and sequence-to-sequence translation model with attention. I will discuss advantages and shortcomings of each setup, present key observations we have made when exploring these models, and discuss possible further developments.

KEYNOTE 4

Industrial Keynote: A Reality Check on Data Driven Business - What are the Real Life Potential and Barriers?

Data Science Evangelist Dr. Kaare Brandt Petersen

Implement Consulting Group, Copenhagen, Denmark

Biography:

Kaare Brandt Petersen is an expert and enthusiast on data analysis and mathematical modeling for improvement of products, services, work processes, insight and life in general. He is also a passionate participant in discussions on how data analysis impacts the development of society, change the business landscape, and to what extend the human brain is suited for doing data analysis on its own. He is a driver for advance data analysis in Implement Consulting Group and is on a journey to find practical value of the modern advanced data analysis methods. Previously he has had positions such Director of Education & Academics in SAS, Business Manager and Advisor in SAS, Consultant and partner in Epital and as post doc at DTU. He holds a Ph.d. in mathematical modelling from Technical University of Denmark and has some scientific publications and The Matrix Cookbook on his academic resume. Today Kaare Brandt Petersen still has contact to the universities as censor at DTU, part of the program committee at Symposium i Anvendt Statistik and part of the Business employment panel at ITU.

Abstract:

When talking about data driven business we often look to the tech giants and seek inspiration and learning points about how to use data to be better at what we do. But a typical organization does not look like one of the tech giants at all and if such an organization want to start using data and has Google as point of reference, they are in for a rough ride. In this talk, I will present the key findings of interviewing people in many organizations about their use of advanced data analysis and their roadmap, expectations and aspirations about being data driven. Interestingly there are some notable differences from the classical high-profile statements and we also look into the human factor of the data driven future.

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VENUE

Hotel Comwell Hvide Hus Aalborg

Vesterbro 2, 9000 Aalborg, Danmark Phone: +45 9813 8400

Comwell Hvide Hus is a centrally located Hotel in the middle of Aalborg. The hotel is located at Kildeparken with a lot of green areas and different attractions. Have a walk to experience the park and "the singing trees". At the end of Kildeparken you are able to go through the station tunnel, where you will find the central street called Boulevarden. Among and at the end of Boulevarden you will find the center of Aalborg with a lot of different stores and restaurants.

At Comwell Hvide Hus you are also able to see Aalborg from the top. On the 15th floor there is meeting facilities – you are welcome to go and have a look. And you are also welcome to take the outdoor stairs all the way down again.

The hotel offers free Wi-Fi. It is called TDC, and there is no code.

During a conference it is free for the participants to park on the hotels parking lot. You find the parking spaces in front, in the back and in the cellar of the hotel.

In the reception area you will find a Co-Working area, where you are able to have your business meeting, phone call or just a cup of the free coffee.

You will find staff at the reception area twenty-four/seven.

We look forward welcoming you.

Google Map

BANQUET

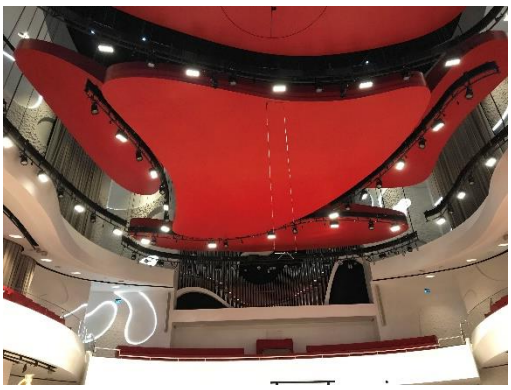
Musikkens Hus, Aalborg

Musikkens Plads 1, 9000 Aalborg, Danmark

The House of Music (Musikkens Hus) is an architectural lighthouse of Aalborg and Northern Jutland, and also very much a national and international rendezvous, where visitors, students, business and musicians are brought together. The vision for the House of Music in Northern Jutland has been to create a venue for concerts with acoustics on an international level to be the focal point of both the musical and cultural life in Aalborg.

Schedule:

- ***18:18*** – Bus departure time at Hvide Hus. It is a 10-minute drive to Musikkens Hus.
- 18:45 – Welcome drinks at Øvre/Upper Foyer of Musikkens Hus. Participants are guided to walk down through the main concert hall to the Upper Restaurant.
- 19:15 – The beginning of banquet at the Upper Restaurant.
- 22:00 – The end of banquet.
- **22:10 (*10:10* p**m) – Bus departure time at Musikkens Hus to drive back to Hvide Hus (Workshop venue).



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