IEEE Distinguished Lecturer
Prof. Dr. Tuomas Virtanen

Tampere University, Finland

RUB

Carl von Ossietzky Universität Oldenburg

The IEEE Signal Processing Society Germany Chapter is pleased to invite to a lecture by Prof. Dr. Tuomas Virtanen from the Signal Processing Research Center at Tampere University, Finland, on

Machine Learning for Acoustic Scene Analysis

The presentation will take place at Carl von Ossietzky Universität Oldenburg on January 29th, 2025, starting at 10:15, and at Ruhr-Universität Bochum (RUB) on January 31st, 2025, starting 11:00.

We cordially invite all members of the IEEE Signal Processing Society Germany Chapter as well as students, faculty, and staff from the local universities and their partner institutions to join us for the presentation, discussion, and informal gathering around the lectures of Prof. Virtanen.

Abstract: The presentations will give an overview of machine learning methods for computational analysis of acoustic scenes, focusing on environmental sounds which have gained a significant attention recently. We will first introduce various core analysis tasks, including acoustic scene classification, sound event detection, source localization, audio captioning, and applications of each of them. We will then present the generic signal processing and machine learning methodology used to address these tasks, including deep neural network structures, task-specific acoustic features, and learning mechanisms. Since modern computational analysis methods are heavily based on machine learning, we will discuss the effects of training data, and present how training data can be systematically collected to produce models that generalize well to new environments, and produce reliable evaluation results. We will also give an overview of the DCASE (Detection and Classification of Acoustic Scenes and Events) evaluation campaign, which has had a big effect in the development of the research field of generic audio analysis.

Biography: Tuomas Virtanen is Professor at Tampere University, Finland, where he is leading the Audio Research Group. He received the M.Sc. and Doctor of Science degrees in information technology from Tampere University of Technology in 2001 and 2006, respectively. He has also been working as a research associate at Cambridge University Engineering Department, UK. He is known for his pioneering work on single-channel sound source separation using non-negative matrix factorization-based techniques, and their application to noise-robust speech recognition and music content analysis. Recently he has done significant contributions to sound event detection in everyday environments. In addition to the above topics, his research interests include content analysis of audio signals in general and machine learning for audio. He has authored more than 200 scientific publications on the above topics, which have been cited more than 20000 times. He has received the IEEE Signal Processing Society 2012 best paper award for his article 'Monaural Sound Source Separation by Nonnegative Matrix Factorization with Temporal Continuity and Sparseness Criteria' as well as seven other best paper awards. He is an IEEE Fellow and recipient of the ERC 2014 Starting Grant and has been a member of the IEEE Audio and Acoustic Signal Processing Technical Committee.

Moderators:
Prof. Dr. Simon Doclo @ Universität Oldenburg
Prof. Dr. Rainer Martin @ Ruhr-Universität Bochum
Prof. Dr. Gerald Enzner (IEEE SPS Germany Chapter)

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