FRIEDRICH-ALEXANDER
UNIVERSITÄT
ERLANGEN-NÜRNBERG

TECHNISCHE FAKULTÄT

Elektrotechnik-Elektronik-Informationstechnik

EEI KOLLOQUIUM

Bayesian Learning for Robot Audition

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Donnerstag, der 13.07.2017, 16^{00} Uhr
Wetterkreuz 15, Raum 00.071

Diskussionsleitung: Prof. Dr.-Ing. W. Kellermann

Recent advances in robotics and autonomous systems are rapidly leading to the evolution of machines that assist humans across the industrial, healthcare, and social sectors. For intuitive interaction between humans and machines, spoken language is a fundamental prerequisite. However, in realistic environments, speech signals are typically distorted by reverberation, noise, and interference from competing sound sources. Acoustic signal processing is therefore necessary in order to provide machines with the ability to learn, adapt and react to stimuli in the acoustic environment. The processed, anechoic speech signals are naturally time varying due to fluctuations of air flow in the vocal tract. Furthermore, motion of a human talker's head and body lead to spatio-temporal variations in the source positions and orientation, and hence time-varying source-sensor geometries. Therefore, in order to listen in realistic, dynamic multi-talker environments, robots need to be equipped with signal processing algorithms that recognize and exploit constructively the spatial, spectral, and temporal variations in the recorded signals. Bayesian inference provides a principled framework for the incorporation of temporal models capturing prior knowledge of physical quantities, such as the acoustic channel. This talk therefore explores the theory and application of Bayesian learning for robot audition, addressing novel advances in acoustic Simultaneous Localization and Mapping (aSLAM), sound source localization and tracking.