TECHNISCHE FAKULTÄT

Department Elektrotechnik-Elektronik-Informationstechnik

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Blind Audio Source Separation based on Independent Component Analysis

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

This talk describes a state-of-the-art method for the blind source separation (BSS) of convolutive mixtures of audio signals, especially speech. A statistical and computational technique, called independent component analysis (ICA), is examined. We provide examples to show how ICA criteria change as the number of audio sources increases. By achieving nonlinear decorrelation, nonstationary decorrelation, or time-delayed decorrelation, we can find source signals only from observed mixed signals. We then discuss a frequency-domain approach where simple instantaneous ICA is employed in each frequency bin. Particular attention is paid to the physical interpretation of BSS from the acoustical signal processing point of view. Frequency-domain BSS is shown to be equivalent to two sets of frequency domain adaptive microphone arrays, i.e., adaptive beamformers (ABFs). Although BSS makes spatial notch to a jammer as well as ABF, BSS has a strong advantage over ABF. BSS can be regarded as an intelligent version of ABF in the sense that it can adapt without any information on the array manifold or the target direction, and sources can be simultaneously active in BSS.