Forensic Speaker Verification in Noisy Environmental by Enhancing the Speech Signal Using ICA Approach

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Abstract : We propose a system to real environmental noise and channel mismatch for forensic speaker verification systems. This method is based on suppressing various types of real environmental noise by using independent component analysis (ICA) algorithm. The enhanced speech signal is applied to mel frequency cepstral coefficients (MFCC) or MFCC feature warping to extract the essential characteristics of the speech signal. Channel effects are reduced using an intermediate vector (i-vector) and probabilistic linear discriminant analysis (PLDA) approach for classification. The proposed algorithm is evaluated by using an Australian forensic voice comparison database, combined with car, street and home noises from QUT-NOISE at a signal to noise ratio (SNR) ranging from -10 dB to 10 dB. Experimental results indicate that the MFCC feature warping-ICA achieves a reduction in equal error rate about (48.22%, 44.66%, and 50.07%) over using MFCC feature warping when the test speech signals are corrupted with random sessions of street, car, and home noises at -10 dB SNR.

Keywords : noisy forensic speaker verification, ICA algorithm, MFCC, MFCC feature warping
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