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(Research Article)
Wind noise reduction in recorded speech using Singular Spectrum Analysis (SSA) dataset and machine learning method

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Abstract

In general, recording audio in different environments deals with different challenges. Wind noise in outdoors recording often leads to critical degradation to the speech signal. Because of wide band and nonstationary nature of wind noise, it is very difficult to remove it. Singular Spectrum Analysis (SSA) is a powerful method for time series analysis that is used in applications such as noise reduction, time series prediction and so on. The SSA selects and groups the principal components of the Eigen-space decomposed signals, based on their contributions; then the reconstructed main components are transferred to time domain. In our research, the SSA method combined with K-MEANS algorithm are used to reduce wind noise in speech signals. SNR and PESQ, are used to evaluate the proposed method's results. Speech signals from TIMIT dataset and wind noise from Rheinisch-Westfälische Technische Hochschule Aachen have been utilized in this research. The results show great increase in the quality of speech signal, in terms of perceptual quality and signal to noise ratio. The proposed algorithm shows the good performance compared with other reference algorithms.

Keywords: Singular Spectrum Analysis, Wind noise reduction, K-MEANS algorithm, Perceptual quality, Speech signal.

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