World Academy of Science, Engineering and Technology
International Journal of Electrical and Computer Engineering
Vol:13, No:06, 2019

A Mixing Matrix Estimation Algorithm for Speech Signals under the Under-Determined Blind Source Separation Model

Authors : Jing Wu, Wei Lv, Yibing Li, Yuanfan You

Abstract : The separation of speech signals has become a research hotspot in the field of signal processing in recent years. It has many applications and influences in teleconferencing, hearing aids, speech recognition of machines and so on. The sounds received are usually noisy. The issue of identifying the sounds of interest and obtaining clear sounds in such an environment becomes a problem worth exploring, that is, the problem of blind source separation. This paper focuses on the under-determined blind source separation (UBSS). Sparse component analysis is generally used for the problem of under-determined blind source separation. The method is mainly divided into two parts. Firstly, the clustering algorithm is used to estimate the mixing matrix according to the observed signals. Then the signal is separated based on the known mixing matrix. In this paper, the problem of mixing matrix estimation is studied. This paper proposes an improved algorithm to estimate the mixing matrix for speech signals in the UBSS model. The traditional potential algorithm is not accurate for the mixing matrix estimation, especially for low signal-to noise ratio (SNR).In response to this problem, this paper considers the idea of an improved potential function method to estimate the mixing matrix. The algorithm not only avoids the inuence of insufficient prior information in traditional clustering algorithm, but also improves the estimation accuracy of mixing matrix. This paper takes the mixing of four speech signals into two channels as an example. The results of simulations show that the approach in this paper not only improves the accuracy of estimation, but also applies to any mixing matrix.

Keywords : DBSCAN, potential function, speech signal, the UBSS model
Conference Title : ICEMI 2019 : International Conference on Electronic Measurement and Instruments
Conference Location : London, United Kingdom
Conference Dates : June 27-28, 2019