

Proposal for a Research Internship

Topic: Evaluation of Circular Convolution Effects for Independent Vector Analysis

Description: *Blind Source Separation* (BSS) refers to the problem of separating mixtures of unknown source signals without having any prior information about the position of the sensors, nor the sources. To tackle this problem different algorithms have been proposed which differ for example in the mixing and demixing model.

One well known approach for dealing with the convolutive BSS problem is called *Independent Vector Analysis* (IVA) [1]. It approximates the ideally linear convolution model as circular convolution. This simplification comes at the cost of possible aliasing effects [2].

The goal of the research internship is to evaluate aliasing effects of the demixing system due to the circular convolution model. First a theoretical examination should be conducted, followed by an experimental evaluation. This includes the creation of source signals and mixing system in Python. The effects should be evaluated by objective signal-based criteria.

As prerequisites, the student should have interest in signal processing and Python programming experience.

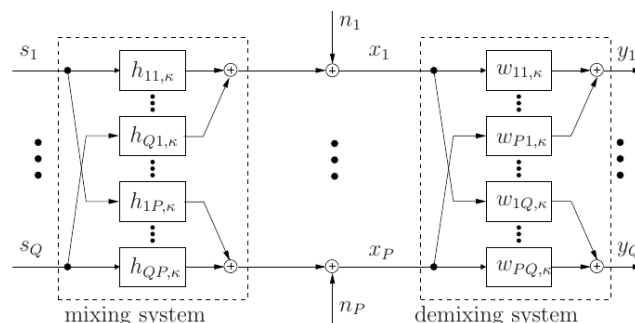


Figure 1: Mixing and demixing model for convolutive BSS

[1]: Kim, T., Attias, H., Lee, S., Lee, T.: *Blind Source Separation Exploiting Higher-Order Frequency Dependencies*, IEEE Transactions on Audio, Speech, and Language Processing, vol. 15, no. 1, pp. 70-79, Jan. 2007.

[2]: Sawada, H., Mukai, R., Ryhove, S., Araki, S., Makino S.: *Spectral Smoothing for Frequency-Domain Blind Source Separation*, International Workshop on Acoustic Echo and Noise Control (IWAENC2003), Sept. 2003.

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Available: Immediately