Applying Compressive Sensing to the Cocktail Party Problem

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Abstract

A Compressed Sensing framework to approach blind source separation is proposed. We compare previous attempts, such as non-negative matrix factorization, and convey the potential advantages of Compressive Sensing: namely, it providing a more accurate reconstruction that relies far less on the necessity of learning.

1 Introduction

The applications of the Cocktail Party Problem are far-reaching: from surveying and separating radio signals, to imagining and examining neural signals, source separation plays an important role in an ever-expanding number of fields. An efficient approach to solving the Problem, then, has implications that extend far beyond the realm of Computer Science.

Past techniques have relied largely on the learning of a specific dictionary, and using this dictionary to reconstruct History and theory

Using Compressive Sensing, along with an assumption of sparsity, the Problem can be framed as a sparse signal recovery problem, and is solvable using any one of several greedy algorithms. Specifically, we use Orthogonal Matching Pursuit to reconstruct the separate sparse signals.

Methods section (use paper)

results (comparison to other techniques (ICA))

References

[1] Alexander, J.A. & Mozer, M.C. (1995) Template-based algorithms for connectionist rule extraction. In G. Tesauro, D.S. Touretzky and T.K. Leen (eds.), *Advances in Neural Information Processing Systems 7*, pp. 609–616. Cambridge, MA: MIT Press.

[2] Bower, J.M. & Beeman, D. (1995) *The Book of GENESIS: Exploring Realistic Neural Models with the GEneral NEural SImulation System.* New York: TELOS/Springer–Verlag.

[3] Hasselmo, M.E., Schnell, E. & Barkai, E. (1995) Dynamics of learning and recall at excitatory recurrent synapses and cholinergic modulation in rat hippocampal region CA3. *Journal of Neuroscience* **15**(7):5249-5262.

[4] BAO, G., YE, Z., XU, X. AND ZHOU, Y. *A Compressed Sensing Approach to Blind Separation of Speech Mixture Based on a Two-Layer Sparsity Model* - IEEE Journals & Magazine Bao, G., Ye, Z., Xu, X. and Zhou, Y. (2017). A Compressed Sensing Approach to Blind Separation of Speech Mixture Based on a Two-Layer Sparsity Model - IEEE Journals & Magazine. [online] Ieeexplore.ieee.org. Available at: http://ieeexplore.ieee.org/document/6384713/

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