

Proposal for a Master Thesis

Topic: Evaluation of Line Search Algorithms for Blind Source Separation

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. A widely used approach for dealing with the acoustic BSS problem is based on the estimation of a set of FIR demixing filters which have to be optimized with respect to a specific cost function, e.g., mutual information of the output signals.

Various cost functions have been proposed for this task, e.g., Independent Vector Analysis (IVA) or TRINICON. With classical methods these cost functions are optimized by *gradient descent* algorithms. However, convergence speed and stability of this class of optimization algorithms are tightly related to the selection of a proper step size. In numerical optimization the step size is often chosen according to a line search method, e.g., Wolf or Goldstein conditions [1].

The goal of this master thesis is to select promising line search methods for gradient based BSS based on a literature overview. The respective algorithms should be implemented and evaluated with respect to convergence speed and stability. Finally, a comparison to existing step size selection approaches should be done.

As prerequisites, the student should have Matlab programming skills, affinity to math and ideally some experience in numerical optimization.

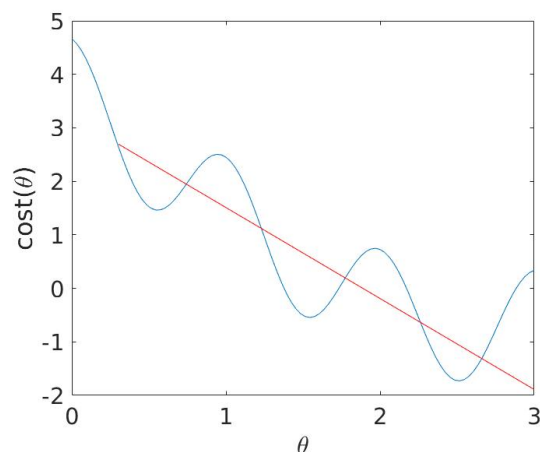


Figure 1: Visualization of a general line search method

[1]: J. Nocedal and S. Wright, Numerical Optimization, Springer, 2006.

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Available: Immediately