A New Approach to Envelope Estimation for EMD

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Abstract

The Empirical Mode Decomposition (EMD) is a self-adaptive and data-driven method for additively separating multi-component, non-linear, non-stationary signals into Intrinsic Mode Functions (IMFs) (see [Hua+98]). The separation process, called sifting, is based on the estimation of lower and upper envelopes. The established B-Spline-based method proposed in [Che+06] has the disadvantage that the estimated envelopes can intersect with the original signal (which violates the envelope-property).

There have been numerous approaches to improve the mathematical formulation and estimation of envelopes (see for example [HPH12], [HK13] and [Niu+21]) with their own downsides in regard to precision and efficiency.

This talk presents a new iterative method for envelope estimation that solves the intersection-problem and has interesting properties in regard to the EMD algorithm itself.

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