Feasible and flexible multiscale changepoint inference

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January 08, 2025

The data segmentation problem, or multiple changepoint problem, considers inference for a piecewise constant mean function based on observations with iid noise. Recent advances on statistical lower bounds for this problem have shown that multiscale methods achieve the optimal detection rates. Yet, despite their theoretical interest, optimal multiscale methods are often statistically infeasible, as their implementation requires known tail bounds for the noise variables. To enable feasible inference, we establish the limit theory for multiscale scan statistics and a suitable boostrap scheme. Central to our development is a new tightness condition for partial sums of random variables, which is also applicable to nonstationary and dependent noise terms.

In the second part of the talk, I present a novel multiple testing perspective which allows us to extend the multiscale approach to a broad range of segmentation problems in a canonical way. In particular, we consider inference for breaks in distribution, variance, and specific marginal quantiles.