



# INDIAN STATISTICAL INSTITUTE

Theoretical Statistics and Mathematics Unit, Kolkata

## SEMINAR

Date: December 21, 2023

Time: 02:30 PM

### VENUE:

**L-infinity**

(5<sup>th</sup> Floor, A.N. Kolmogorov Bhavan), ISI Kolkata

### TITLE:

**Locally Adaptive Nonparametric Regression with  
Pointwise Estimation Error Bounds**

### SPEAKER:

**Sabyasachi Chatterjee**

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### ABSTRACT:

*Trend Filtering is a popular nonparametric regression method which exhibits local adaptivity, in contrast to a host of classical linear smoothing methods. However, there seems to be no unanimous definition of local adaptivity in the literature. A question we seek to answer here is how exactly is Fused Lasso, which is Trend Filtering of order  $\$0\$$ , locally adaptive? To answer this question, we first derive a pointwise characterization of the Fused Lasso estimator in terms of min max optimization of penalized local averages. This pointwise characterization gives a new and concrete explanation of the local adaptivity of Fused Lasso. It yields that the estimation error of Fused Lasso at any given point is bounded by the best bias variance tradeoff for an appropriate notion of bias and variance. We argue that such an explanation of local adaptivity implies the typical notions of local adaptivity used in the literature. We then propose higher order polynomial versions of Fused Lasso which are defined pointwise in terms of min max optimization of penalized local polynomial regressions. These appear to be new nonparametric regression methods, different from any existing method in the nonparametric regression toolbox. They continue to enjoy the notion of local adaptivity in the precise sense that their estimation error at any given point is bounded by the best bias variance tradeoff for appropriately defined notions of bias and variance.*

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