

Prof. Piotr Fryzlewicz

TITLE: Time-Threshold Maps: using information from wavelet reconstructions with all threshold values simultaneously

ABSTRACT:

Wavelets have been used in many standard but interesting statistical tasks such as nonparametric smoothing or breakpoint detection. Traditionally, this involved applying a wavelet transform to the data, thresholding the coefficients and applying the inverse transform to obtain an estimate of the desired quantities from the data. In this talk, we argue that it is often possible to gain more insight into the data by producing not just one, but many wavelet reconstructions using a range of threshold values and analysing the resulting object, which we term the Time-Threshold Map (TTM) of the input data. We discuss basic properties of the TTM, in its "basic" and "derivative" versions, using both Haar and Unbalanced Haar wavelet families. We then show how it can be applied to a selection of problems including breakpoint detection in financial time series, where it has the potential to improve the performance of state-of-the-art methods.