`robfilter` :
An R Package for Robust Time Series Filters

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`robfilter` is a package of R functions for robust extraction of an underlying signal from a time series. Assuming a standard signal plus noise model for the series, the general idea is to approximate the signal in a moving time window by a local parametric model like a locally constant level, i.e. *location-based methods* (Fried, Bernholt, Gather, 2006), or a local linear trend, so-called *regression-based methods* (Davies, Fried, Gather, 2004; Fried, Einbeck, Gather, 2007).

We present several filters which differ with respect to the signal characteristics and the outlier patterns they can deal with (Schettlinger, Fried, Gather, 2006). In particular, some filters are especially designed to preserve sudden shifts and local extremes (turning points) even if patches of subsequent outliers may occur (Fried, 2004). Furthermore, most of the filters are available both for retrospective filtering as well as online filtering without time delay. Estimation of the signal in the centre of a time window generally leads to better signal approximations. This approach is reasonable for retrospective data analysis, since the estimation always takes place with a time delay of half a window width. The proposed online filters estimate the signal value at the end of each time window without time delay, but the resulting signal estimates have a larger variability than their retrospective counterparts.

We present filters which are applicable to time series containing outliers, trends, trend changes or shifts in the signal level and give recommendations which filter is suitable for which data structure.

References

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