Outlier Robust Filtering

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In time series analysis state space models are very popular. Often it is interesting to sequentially estimate the distribution of the hidden states given all observations available. That problem is called filtering. For linear Gaussian state space models the filtering distribution can be exactly computed with the Kalman filter. For nonlinear or nongaussian models one can rely on particle methods to estimate an approximation of the filtering distribution. Standard optimal Bayesian filtering with the Kalman or bootstrap particle filter is not an outlier robust method. Several proposals to robustify the filters for general nonlinear nongaussian state space models have been made (**?**; **?**). We introduce an Outlier Robust Filter which has the lowest possible efficiency cost for a certain impact bound of a new observation on the estimated filtering density. The performance of the new filter is compared with the existing methods. It turns out that our filter performs very well with contaminated time series, while still performing adequately with clean time series.

References

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