robKalman — A PACKAGE ON ROBUST KALMAN FILTERING

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Abstract

We want to discuss a proposal on an implementation of Robust Kalman filtering based on
S4 classes. To do so, we are geared to the existing implementations of the Kalman filter from the
basis R distribution (cf. [5] and [1]) as well as from the bundle dse (cf. [2]). By
means of the package robKalman mechanism (cf. [3]), we register existing S3 classes from these
implementations as S4 classes and extend them for our purposes. As generic functions we
will present implementations of the classical Kalman filter, the ACM filter from [3], and the
rLS-filter from [4].

Robust Kalman Filtering

Implementation so far

```r
# generation of data from AO model:
Eps <- arima.sim(n=100, ma=c(1,-0.9), 100, innov=Eps) Mu <- arima.sim(n=100, 1, 0.1) Noise <- rnorm(100, sd=18)

# specification of NMM: (per 4, q=2)
phi <- c(0, 0.5, 0.2, 0.1, 0.2, 0.2) phi <- phi[1:2]
F <- matrix(c(1.5, 0.5, 0.5, 0.5, 1, 1), 2)
Q <- matrix(c(2.5, 0.5, 0.5, 0.5, 1, 1), 2)

# NMM-contaminations
as <- c(0, 0.3)

# Simulation:
X <- simulateState(0, F, Q, TT)
Y <- simulateObs(X, 2, V, as, V=0)
Yr <- simulateObs(X, 2, V, as, V=rct)

# calibration

# Smoothing
S2 <- Sm2(t,r)

# Evaluation of rLS
H1 <- rLSfilter(Yr, 1, p=2, F, Q, 2, W, H1(0))
H2 <- rLSfilter(Yr, 2, p=2, F, Q, 2, W, H2(0))
H1 <- rLSfilter(Yr, 1, p=2, F, Q, 2, W, H1(0))
H2 <- rLSfilter(Yr, 2, p=2, F, Q, 2, W, H2(0))
```

References

University Press.
file dse/robKalman/doc/robKalman.pdf distributed together with the R bundle dse, to be downloaded from
http://cran.r-project.org


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http://www.R-project.org