Package ‘fpcb’

June 7, 2021

Version 0.1.0
Type Package
Title Predictive Confidence Bands for Functional Time Series Forecasting
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Encoding UTF-8
License GPL (>= 3)
Imports FNN
Repository CRAN
NeedsCompilation yes
RoxygenNote 7.1.1
BugReports https://github.com/nicolashernandezb/fpcb/issues
Date/Publication 2021-06-07 06:50:13 UTC

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Description


Author(s)

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References


Description


Usage

arh_rkhs(fdata)

Arguments

fdata an fdata object containing the functional objects and the lambda coefficients of the d dimensional RKHS representation.
**fdata_rkhs**

**Value**

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<tr>
<td>fdata</td>
<td>smoothed curves.</td>
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<tr>
<td>lambda_cent</td>
<td>centered coefficients of the d dimensional RKHS representation.</td>
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<tr>
<td>lambda_ce</td>
<td>average coefficients of the d dimensional RKHS representation.</td>
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<td>rho</td>
<td>autocorrelation operator computed as: $\Gamma_0 \Psi = \Gamma_1$. $\Gamma_0$ correspond to the Covariance and $\Gamma_0 \Psi$ correspond to the Cross-Covariance (of lag 1) operators, both estimated using the coefficients $\lambda$.</td>
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**Author(s)**

N. Hernández and J. Cugliari

**References**


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**fdata_rkhs**

*functional data in rkhs*

**Description**

Representing functional data using Reproducing Kernel Hilbert Spaces. Approximate each curve with a smooth function using a kernel function.

**Usage**

```r
defdata_rkhs(curves, rk, gamma = 1e-05)
```

**Arguments**

- `curves`: a data matrix with observations (curves) in rows and the discretizations points in columns.
- `rk`: kernel function rk object.
- `gamma`: regularization parameter. Default value = 1e-5.

**Details**

With this function each function can be represented with a vector in $R^{d}$. 
predict_rkhs

Value

data input curves.
fd data smoothed curves.
lambda coefficients of the (stable) and d dimensional RKHS representation.
al pha coefficients of the RKHS expansion.
gamma regularization parameter.

Author(s)
N. Hernández and J. Cugliari

References

Examples

t = 1:50
curves = matrix(sin(t)+rnorm(length(t)),nrow=1)
f.data <- fdata_rkhs(curves, rk = rk(t,sigma = 0.01))
plot(t,curves, xlab='time', ylab='PM10 dataset', col='gray', lty=1, type='b')
lines(t,f.data$fdata, col='blue', lty=1)

predict_rkhs Predict functional time series using ARH RKHS.

Description
using an ARH of order 1 obtain 1 step ahead forecast and 1-alpha predictive confidence bands for the forecasted function.

Usage

predict_rkhs(
    model,  
    newdata,  
    bands = FALSE,  
    B = 100,  
    level = 0.95,  
    kvec = round(sqrt(2 * B))  
)
Arguments

- **model**: A `arh_rkhs` object containing the functional objects and the lambda coefficients of the d dimensional RKHS representation and the autocorrelation operator.
- **newdata**: An optional data frame in which to look for variables with which to predict. If missing, the fitted values are used.
- **bands**: Logical variable indicating if the predictive confidence band is computed. Default = FALSE.
- **B**: Number of bootstrap replicates for the band construction. Needed if bands = TRUE. Default = 100.
- **level**: Confidence level for the band construction. Needed if bands = TRUE. Default = 0.95.
- **kvec**: Number of neighbour points to consider in the computation of the minimum entropy set.

Value

- **forecast**: 1 step ahead forecast.
- **fitted**: Fitted values.
- **UB**: Upper bound of the 1-alpha predictive confidence band.
- **LB**: Lower bound of the 1-alpha predictive confidence band.
- **bootstrap.pred**: Bootstrap pseudo replicates.
- **bootstrap.pred.inband**: Bootstrap pseudo replicates included in the 1-alpha predictive confidence band.
- **res**: Estimation residuals.

Author(s)

N. Hernández and J. Cugliari

References


**rk**

*kernel function*

Description

Computes the Gram matrix of the gaussian kernel over a grid of values and computes its singular value decomposition.

Usage

```R
rk(grid, sigma = 1, r, tol = 1e-08)
```
Arguments

grid  grid of points where the kernel function is evaluated.
sigma  is the temperature of the kernel (standard deviation)
r  the dimension of the basis system of the Gram matrix (K). If missing then r is the rank of K.
tol  A tolerance to keep the first d eigenvalues of A. Default = 1e-08.

Value

grid  grid of points where the kernel function is evaluated.
K  Kernel Gram matrix
U  first r eigenvectors of K using svd.
D  first r eigenvectors of K using svd.

Author(s)
J. Cugliari and N. Hernández

Examples

grid = seq(0,1,100)
rk(grid, sigma = 1)
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