Package 'DatAssim'

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Type Package

Title Data Assimilation

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Description For estimation of a variable of interest using Kalman filter by incorporating results from previous assessments, i.e. through development weighted estimates where weights are assigned inversely proportional to the variance of existing and new estimates. For reference see Ehlers et al. (2017) <doi:10.20944/preprints201710.0098.v1>.

License GPL (>= 2)

LazyData TRUE

Imports Rcpp (>= 0.12.4)

Depends R (>= 3.1)

LinkingTo Rcpp, RcppArmadillo

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Contents

`datassim` *Data Assimilation*

Description

This function estimates a variable of interest through Data Assimilation technique by incorporating results from previous assessments.

Usage

```
datassim(X, Var, Corr)
```

Arguments

`X`	Matrix of predictions, with `n` number of rows as the number of observations, and `t` number of columns as the number of time points from which data were collected.
`Var`	Matrix of corresponding prediction variances, same dimension as `X`.
`Corr`	Matrix or value of correlations between observations from different time points, by default `Corr` = 0.

Value

`$weights`	Estimated Kalman gain according to Eq.[7] in Ehlers *et al.* (2017).
`$PreDA`	Predicted values through Data Assimilation according to Eq.[5] in Ehlers *et al.* (2017).
`$VarDA`	Corresponding estimated variances according to Eq.[6] in Ehlers *et al.* (2017).
`$Correlation`	Correlation matrix.

References

Ehlers, S., Saarela, S., Lindgren, N., Lindberg, E., Nyström, M., Grafström, A., Persson, H., Olsson, H. & Ståhl, G. (2017). Assessing error correlations in remote sensing-based predictions of forest attributes for improved data assimilation. DOI

Examples

```
Pred1 = rnorm(10, mean = 50, sd = 100);
Pred2 = rnorm(10, mean = 50, sd = 30);
Pred3 = rnorm(10, mean = 50, sd = 80);
Pred4 = rnorm(10, mean = 50, sd = 100);
# Predictions based on ten observations, at four different time points
Prediction = cbind(Pred1, Pred2, Pred3, Pred4);
Var1 = matrix(10000, 10);
Var2 = matrix(900, 10);
Var3 = matrix(1600, 10);
Var4 = matrix(10000, 10);
```

```
# Corresponding prediction variances
Variance = cbind(Var1, Var2, Var3, Var4);
# Corr = 0 by default
datassim(X = Prediction, Var = Variance);
# Corr = 0.5
datassim(Prediction, Variance, 0.5);
Corr = cor(Prediction);
datassim(Prediction, Variance, Corr);
```

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