Package: htsDegenerateR (via r-universe)

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Type Package

Title Degenerate Hierarchical Time Series Reconciliation

Version 0.1.0

Description Takes the MinT implementation of [hts: Hierarchical and Grouped Time Series]<https://cran.r-project.org/package=hts> and adapts it to allow degenerate hierarchical structures. Instead of the ``nodes" argument, this function takes an S matrix which is more versatile in the structures it allows. For a demo, see [Degenerate Hierarchical Time Series Reconciliation With The Minimum Trace Algorithm in R]<doi:10.15488/17729>. The MinT algorithm is based on [Optimal Forecast Reconciliation for Hierarchical and Grouped Time Series Through Trace Minimization]<doi:10.1080/01621459.2018.1448825>.

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Encoding UTF-8

Imports SparseM, methods, stats

Suggests forecast, testthat, knitr, rmarkdown, covr

RoxygenNote 7.3.1

NeedsCompilation no

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Repository https://lsteinmeister.r-universe.dev

RemoteUrl https://github.com/lsteinmeister/htsdegenerater

RemoteRef HEAD

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`accuracy.gts` *accuracy.gts*

Description

accuracy.gts

Usage

```
accuracy.gts(fcasts, actuals)
```

Arguments

`fcasts`	forecasts to be evaluated
`actuals`	actuals to compare the forecasts against

Value

Averaged error measures across all time series in matrix form.

`BU` *Bottom-up reconciliation*

Description

Bottom-up reconciliation

Usage

```
BU(fcasts, S)
```

Arguments

`fcasts`	forecasts to be reconciled
`S`	structure matrix representing the hierarchical structure of the hts

Value

reconciled forecasts

MinT — *Using the method of Wickramasuriya et al. (2019), this function (based on Hyndman et al.'s hts library) combines the forecasts at all levels of a hierarchical time series and works for degenerate hierarchies.*

Description

Using the method of Wickramasuriya et al. (2019), this function (based on Hyndman et al.'s hts library) combines the forecasts at all levels of a hierarchical time series and works for degenerate hierarchies.

Usage

```
MinT(
  fcasts,
  Smat,
  residual,
  covariance = c("shr", "sam", "custom"),
  nonnegative = FALSE,
  cov.type = "complete.obs",
  cov.matrix = NULL
)
```

Arguments

fcasts	a vector or a matrix (rows = horizon, columns = ts columns) of forecasts
Smat	a structure matrix detailing the hierarchical structure of the hts. Make sure that the order of the rows align with the order of the forecasts.
residual	a matrix of in-sample residuals (columns = ts columns)
covariance	should a shrinkage estimator or the sample estimator be used? alternatively, a custom covariance matrix can be passed (additionally requires the cov.matrix argument)
nonnegative	not implemented yet.
cov.type	specify how the covariance matrix should be computed (default = complete observations). Note that pairwise.complete.obs may not yield a positive definite matrix!
cov.matrix	specify in case a custom covariance matrix should be used

Value

reconciled forecasts

References

[hts: Hierarchical and Grouped Time Series]<https://cran.r-project.org/package=hts> [Optimal Forecast Reconciliation for Hierarchical and Grouped Time Series Through Trace Minimization]<doi:10.1080/01621459.2018.14
[Degenerate Hierarchical Time Series Reconciliation With The Minimum Trace Algorithm in R]<doi:10.15488/17729>

Examples

```
# Set the seed for reproducibility
set.seed(123)

# Create a sequence of 120 numbers
x <- seq(1, 120)

# Generate the columns
AA <- sin(x*pi/6) + rnorm(120, 0, 1) # Sine component with random noise
AB <- 0.05*x + rnorm(120, 0, 0.5) # Linear component
B <- cos(x*pi/6)+ rnorm(120, 0, 1) # Cosine component

# Combine the columns into a matrix
matrix <- cbind(AA, AB, B)
hts = ts(matrix, frequency = 12)

# Define S matrix
S <- rbind(c(1,1,1), c(1,1,0), diag(1,3))
rownames(S) <-c("Total", "A", "AA", "AB", "B")
colnames(S) <- c("AA", "AB", "B")

# Aggregate hts on all levels
hts.complete <- ts(t(S %*% t(hts)), frequency = 12)

# Fit a model to the time series
hts.models = lapply(hts.complete, function(c.ts) forecast::ets(c.ts))

# Fit a model to the time series
hts.models = lapply(hts.complete, function(c.ts) forecast::ets(c.ts))
# Generate predictions based on this model
hts.forecasts = sapply(hts.models, function(mdl) forecast::forecast(mdl, h = 1)$mean)
# Extract residuals
hts.residuals = sapply(hts.models, function(mdl) mdl$residuals)

# Compute reconciled forecasts
MinT(fcasts = hts.forecasts, Smat = S, residual = hts.residuals)
```

`strucScaling` *Structural Scaling reconciliation*

Description

Structural Scaling reconciliation

Usage

```
strucScaling(fcasts, Smat, weights = rowSums(Smat))
```

Arguments

`fcasts`	forecasts to be reconciled
`Smat`	structure matrix representing the hierarchical structure of the hts
`weights`	use the default for structural scaling and a vector of the residual variances for variance scaling

Value

reconciled forecasts

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