

# Package ‘htsDegenerateR’

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**Type** Package

**Title** Degenerate Hierarchical Time Series Reconciliation

**Version** 0.1.0

**Description** Takes the MinT implementation of the 'hts' <<https://cran.r-project.org/package=hts>> package 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 Steinmeister and Pauly (2024) <[doi:10.15488/17729](https://doi.org/10.15488/17729)>. The MinT algorithm is based on Wickramasuriya et al. (2019) <[doi:10.1080/01621459.2018.1448825](https://doi.org/10.1080/01621459.2018.1448825)>.

**License** GPL (>= 2)

**Encoding** UTF-8

**Imports** SparseM, methods, stats

**Suggests** forecast, testthat, knitr, rmarkdown, covr

**RoxygenNote** 7.3.1

**NeedsCompilation** no

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accuracy.gts

*accuracy.gts*

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**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.

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BU

*Bottom-up reconciliation*

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**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

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MinT	<i>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.</i>
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### 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:10.1080/01621459.2018.1444444](https://doi.org/10.1080/01621459.2018.1444444)>  
 [Degenerate Hierarchical Time Series Reconciliation With The Minimum Trace Algorithm in R]<[doi:10.15488/17729](https://doi.org/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)

```

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strucScaling

*Structural Scaling reconciliation*


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**Description**

Structural Scaling reconciliation

**Usage**

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

**Arguments**

<code>fcsts</code>	forecasts to be reconciled
<code>Smat</code>	structure matrix representing the hierarchical structure of the hts
<code>weights</code>	use the default for structural scaling and a vector of the residual variances for variance scaling

**Value**

reconciled forecasts

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