# Package 'juice'

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**Title** Dynamic Systems Estimation - juice extensions

**Description** Multivariate Time Series - extensions

**Depends** R (>= 2.0.0), setRNG (>= 2004.4-1), tframe (>= 2006.1-1), dse1 (>= 2006.1-1)

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**LazyLoad** yes

**License** Free. See the LICENCE file for details.

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## R topics documented:

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`00Intro.juice` *Juice*

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### Description

The attempted approach is that a model of type TSmodelconcentrate should work like KF and ARMA model, so that plot, residual, etc., produce results for the full (reconstitued) data set. Special methods (eg. concentrated.tfplot, concentrated.checkResiduals) do the equivalent thing using the reduced dimensional data as the TSdata and dropping the fact that the model is of class TSmodelconcentrate.

The outputData for a concentrated object is the original data, but for a reconstituted object it is the reconstituted data. So, for example, `tfplot(ConcentratedDataObject)` will plot the original data (as well as the reconstructed data) whereas `tfplot(reconstitute(ConcentratedDataObject))` plots only the reconstituted data. (To plot the concentrated series use `concentrated.tfplot(ConcentratedDat`

Typically one should not work with a reconstituted object unless it is explicitely needed, as the original data is "hidden".

The concentrated data is extracted from both `TSdataconcentrate` and `TSdatareconstitute` using the function `concentrated.outputData`.

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`TSdata.TSdataconcentrate`
*TSdata Specific Methods*

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### Description

See the generic function description.

### Usage

```
## S3 method for class 'TSdataconcentrate':
TSdata(data, names=NULL, ...)
```

### Arguments

| | |
|---|---|
| `data` | a TSdataconcentrate object from which to get TSdata. |
| `names` | series names for the result. |
| `...` | arguments to be passed to other methods. |

### Details

Uses reconstitute to build TSdata.

### See Also

reconstitute TSdata

---

`canonical.prediction` *Canonical Prediction*

---

### Description

Use canonical correlation with input data as the independent variables used to predict output data.

### Usage

```
canonical.prediction(d, conc=concentrator(d),
   q=min(concentrated.nseriesInput(d),
         concentrated.nseriesOutput(d)))
is.TScanonicalPrediction(x)
```

### Arguments

| | |
|---|---|
| d | a TSdataconcentrate object as returned by concentrate. |
| conc | a concentrator. |
| q | integer indicating the number of canonical variates to keep. |
| x | any object. |

### Details

Data d as returned by concentrate. Alternately, a different conc (proj) can be used. Use q canonical variates from input data as predictors of q canonical variates from output data and then use these to reconstruct output data. (ref T.W. Anderson p491) q cannot exceed min(concentrated.nseriesInput(d), concentrated.nseriesOutput(d))

### Value

A TScanonicalPrediction object.

### See Also

concentrate concentrator

### Examples

```
data("eg1.DSE.data.diff", package="dse1")
z <- canonical.prediction(concentrate(eg1.DSE.data.diff))
is.TScanonicalPrediction(z)
```

## checkConsistentDimensions.TSmodelconcentrate

*checkConsistentDimensions Specific Methods*

### Description

See the generic function description.

### Usage

```
## S3 method for class 'TSmodelconcentrate':
checkConsistentDimensions(obj1, obj2=NULL)
```

### Arguments

| | |
|---|---|
| obj1 | a TSmodelconcentrate object. |
| obj2 | a matrix of time series or a TSdata object. |

### See Also

checkConsistentDimensions

## checkResiduals.TSdataconcentrate

*checkResiduals Specific Methods*

### Description

See the generic function description.

### Usage

```
## S3 method for class 'TSdataconcentrate':
checkResiduals(obj, ...)
## S3 method for class 'TSdatareconstitute':
checkResiduals(obj, ...)
## S3 method for class 'concentrated':
checkResiduals(obj, ...)
```

### Arguments

| | |
|---|---|
| obj | a TSdataconcentrate object. |
| ... | arguments passed to checkResiduals. |

### See Also

checkResiduals concentrated.checkResiduals

`concentrate` *Concentrate Series in a TSdata Object*

## Description

Calculate a reduced dimesion version of the data using principal components (or cannonical correlation for TSdata with input and output).

## Usage

```
concentrate(d, conc=NULL, center=TRUE, scale=TRUE, ...)
## Default S3 method:
concentrate(d, conc=NULL, center=TRUE, scale=TRUE, n=1, ...)
## S3 method for class 'TSdata':
concentrate(d,conc=NULL, center=TRUE, scale=TRUE, m=1, p=1, ...)
is.concentrate(x)
is.TSdataconcentrate(x)
is.TSmodelconcentrate(x)
```

## Arguments

| | |
|---|---|
| `d` | a matrix or TSdata object. |
| `...` | arguments to be passed to other methods. |
| `conc` | object containing the concentrator (projection) matrix used for the reduction |
| `center` | center the observations to mean zero first (passed to estProjection). |
| `scale` | scale the observations to SD one first (passed to estProjection). |
| `n` | dimension of the concentrated series (passed to estProjection). |
| `m` | dimension of the concentrated input series (passed to estProjection). |
| `p` | dimension of the concentrated output series (passed to estProjection). |
| `x` | any object. |

## Value

A matrix or TSdata object.

## See Also

`estProjection` `reconstitute` `prcomp`

## Examples

```
data("eg1.DSE.data", package="dse1")
require("stats")
z <- concentrate(eg1.DSE.data)
is.concentrate(z)
```

`concentrateOnly` *Extract Concentrate*

## Description

concentrateOnly

## Usage

```
concentrateOnly(d)
## S3 method for class 'concentrate':
concentrateOnly(d)
## S3 method for class 'TSdataconcentrate':
concentrateOnly(d)
## S3 method for class 'TSdatareconstitute':
concentrateOnly(d)
## S3 method for class 'TSestModel':
concentrateOnly(d)
## S3 method for class 'TSmodelconcentrate':
concentrateOnly(d)
```

## Arguments

| | |
|---|---|
| d | a concentrate object. |

## Details

The concentrated data set is returned as a TSdata object, stripped of the fact that it is a concentrate.

## Value

A TSdata object.

## See Also

`concentrate` `concentrator` `concentrateOriginal`

## Examples

```
data("eg1.DSE.data", package="dse1")
require("stats")
z <- concentrate(eg1.DSE.data)
z <- concentrateOnly(z)
```

`concentrateOriginal` *Extract Original Series*

## Description

concentrateOriginal

## Usage

```
concentrateOriginal(d)
## S3 method for class 'TSdataconcentrate':
concentrateOriginal(d)
## S3 method for class 'TSdatareconstitute':
concentrateOriginal(d)
## S3 method for class 'concentrate':
concentrateOriginal(d)
## S3 method for class 'TScanonicalPrediction':
concentrateOriginal(d)
```

## Arguments

| | |
|---|---|
| `d` | A concentrate object. |

## Details

The original data set is returned as a TSdata object, stripped of the fact that it is a concentrate.

## Value

A TSdata object.

## See Also

`concentrate` `concentrator` `concentrateOnly`

## Examples

```
data("eg1.DSE.data", package="dse1")
require("stats")
z <- concentrate(eg1.DSE.data)
z <- concentrateOriginal(z)
```

## concentrated.checkResiduals

*Check Residuals of Concentrated Data*

### Description

The TSdataconcentrate is passed to checkResiduals as simple TSdata in the reduced dimension space (not expanded).

### Usage

```
concentrated.checkResiduals(data, ...)
```

### Arguments

| | |
|---|---|
| data | a TSdataconcentrate object. |
| ... | arguments passed to checkResiduals. |

### Value

x

### See Also

checkResiduals concentrate

## concentrated.nseriesInput

*Concentrated Dimension of TSdata*

### Description

The dimension (number of series) in concentrate data. This is the dimension onto which the original series has been projected.

### Usage

```
concentrated.nseriesInput(x)
concentrated.nseriesOutput(x)
```

### Arguments

| | |
|---|---|
| x | A concentrated TSdata object. |

### Value

An integer.

### See Also

concentratedDimension concentrate

### Examples

```
data("eg1.DSE.data", package="dse1")
require("stats")
z <- concentrate(eg1.DSE.data)
concentrated.nseriesOutput(z)
```

---

## concentrated.tfplot

*Plot Concentrated Series*

---

### Description

The concentrate data is plotted.

### Usage

```
concentrated.tfplot(x, ...)
```

### Arguments

| | |
|---|---|
| x | A concentrated data object. |
| ... | arguments to be passed to other tfplot. |

### Value

Depends on the argument. For a simple concentrated data object the result is a vector of strings.

### See Also

tfplot

### Examples

```
data("eg1.DSE.data", package="dse1")
require("stats")
z <- concentrate(eg1.DSE.data)
concentrated.tfplot(z)
```

---

## concentratedDimension

*Concentrated Dimension*

---

### Description

The dimension (number of series) in concentrate data. This is the dimension onto which the original series has been projected.

### Usage

```
concentratedDimension(x)
## S3 method for class 'concentrate':
concentratedDimension(x)
```

### Arguments

| | |
|---|---|
| x | a concentrated data object. |

### Value

Depends on the argument. For a simple concentrated data object the result is an integer.

### See Also

`concentrated.nseriesInput` `concentrated.nseriesOutput` `concentrate`

### Examples

```
data("eg1.DSE.data", package="dse1")
require("stats")
z <- concentrate(eg1.DSE.data)
concentratedDimension(outputData(z))
concentrated.nseriesOutput(z)
```

---

## concentratedSeriesNames

*Concentrated Series Names*

---

### Description

The names of series in concentrate data.

### Usage

```
concentratedSeriesNames(x)
## S3 method for class 'concentrate':
concentratedSeriesNames(x)
## S3 method for class 'TSdata':
concentratedSeriesNames(x)
concentratedSeriesNamesInput(x)
concentratedSeriesNamesOutput(x)
```

### Arguments

| | |
|---|---|
| x | A concentrated data object. |

### Value

Depends on the argument. For a simple concentrated data object the result is a vector of strings.

### See Also

seriesNames seriesNamesInput seriesNamesOutput concentratedDimension concentrate

### Examples

```
data("eg1.DSE.data", package="dse1")
require("stats")
z <- concentrate(eg1.DSE.data)
concentratedSeriesNames(z)
```

---

## concentrator *Data Concentrator*

---

### Description

concentrator

### Usage

```
concentrator(d)
## S3 method for class 'concentrate':
concentrator(d)
## S3 method for class 'concentrator':
concentrator(d)
## S3 method for class 'TSdata':
concentrator(d)
## S3 method for class 'TSdataconcentrator':
concentrator(d)
## S3 method for class 'TSmodelconcentrate':
concentrator(d)
is.concentrator(x)
is.TSdataconcentrator(x)
```

### Arguments

| | |
|---|---|
| d | a concentrate or concentrator object. |
| x | any object. |

### Details

The concentrator is extracted from a concentrated data object.

### Value

A concentrator.

### See Also

concentrate concentrateOnly concentrateOriginal

### Examples

```
data("eg1.DSE.data", package="dse1")
require("stats")
z <- concentrate(eg1.DSE.data)
concentrator(z)
is.concentrator(concentrator(z))
```

---

## end.TScanonicalPrediction

*Specific Methods for TScanonicalPrediction*

---

### Description

See the generic function description.

### Usage

```
## S3 method for class 'TScanonicalPrediction':
end(x, ...)
## S3 method for class 'TScanonicalPrediction':
start(x, ...)
## S3 method for class 'TScanonicalPrediction':
periods(x)
## S3 method for class 'TScanonicalPrediction':
frequency(x, ...)
```

### Arguments

| | |
|---|---|
| x | An object containing TSdata. |
| ... | (further arguments, currently disregarded). |

### Value

Depends.

### See Also

`end` `start` `periods` `frequency`

---

## estConcentratedModel

*Estimate a Concentrated Model*

---

### Description

estConcentratedModel

### Usage

```
estConcentratedModel(data, estimation="estVARXls",
                          estimation.args=NULL, ...)
## S3 method for class 'TSdata':
estConcentratedModel(data, estimation="estVARXls",
           estimation.args=NULL, m=1, p=1, center=TRUE, scale=TRUE, ...)
## S3 method for class 'TSdataconcentrate':
estConcentratedModel(data,
            estimation="estVARXls", estimation.args=NULL, warn=TRUE, ...)
```

### Arguments

| | |
|---|---|
| `data` | A TSdata or TSdataconcentrate object. |
| `estimation` | Estimation method. |
| `estimation.args` | Estimation method arguments. |
| `m, p` | dimension of the concentrated series. |
| `center` | center the observations to mean zero first. |
| `scale` | scale the observations to SD one first. |
| `warn` | logical indicating if certain warning messsages should be printed. |
| `...` | arguments to be passed to other methods. |

### Details

A concentrated version of the data (reduced dimension) is used to estimate a reduced dimesion model. The projections for concentrating the data are retained so that model predictions can be expanded to the full dimension data space.

If data is TSdataconcentrate then the concentrator with that data is used and m, p, center and scale are not used. For TSdata these arguments are used to first estimate a concentrated version of the data.

### Value

A TSmodelconcentrate.

### See Also

`concentrate` `concentrator` `estProjection`

### Examples

```
data("eg1.DSE.data.diff", package="dse1")
model <- estConcentratedModel(eg1.DSE.data.diff)
```

`estProjection` *Calculate Projection from Concentrating Series.*

## Description

Calculate the projection to use for a reduced dimesion version of the data using principal components (or cannonical correlation for TSdata with input and output).

## Usage

```
estProjection(data, center=TRUE, scale=TRUE, ...)
## Default S3 method:
estProjection(data, center=TRUE, scale=TRUE, n=1, ...)
## S3 method for class 'TSdata':
estProjection(data, center=TRUE, scale=TRUE, m=1,p=1, ...)
```

## Arguments

| | |
|---|---|
| `data` | a matrix for the default method or TSdata object. |
| `n` | dimension of the concentrated series. |
| `m` | dimension of the concentrated input series. |
| `p` | dimension of the concentrated output series. |
| `center` | logical indicating center the observations to mean zero first. |
| `scale` | logical indicating scale the observations to SD one first. |
| `...` | arguments passed to other methods. |

## Value

An object containing matrix (conc) to use to concentrate the data.

## See Also

`estConcentratedModel` `concentrate` `reconstitute` `prcomp`

## Examples

```
data("eg1.DSE.data", package="dse1")
require("stats")
z <- estProjection(eg1.DSE.data)
```

## l.TSmodelconcentrate *Specific Methods for l*

### Description

See the generic function description.

### Usage

```
## S3 method for class 'TSmodelconcentrate':
l(obj1, obj2, sampleT=nrow(outputData(obj2)),
                                predictT=sampleT, result=NULL, warn=TRUE, ...)
```

### Arguments

| | |
|---|---|
| obj1 | a TSmodelconcentrate model object. |
| obj2 | a TSdataconcentrate data object. |
| sampleT | an integer indicating the number of periods of data to use. |
| predictT | an integer to what period forecasts should be extrapolated. |
| result | if non-NULL then the returned value is only the sub-element indicated by result. result can be a character string or integer. |
| warn | if FALSE then certain warning messages are turned off. |
| ... | arguments passed to other methods. |

### See Also

l l.ARMA l.SS

## nseriesInput.TSmodelconcentrate *Specific Methods for input/nseriesOutput*

### Description

See the generic function description.

### Usage

```
## S3 method for class 'TSmodelconcentrate':
nseriesInput(x)
## S3 method for class 'TSmodelconcentrate':
nseriesOutput(x)
```

### Arguments

| | |
|---|---|
| x | a TSdata or TSmodelconcentrate object. |

### See Also

nseriesInput nseriesOutput

## percentChange.TScanonicalPrediction

*Specific Methods for percentChange*

### Description

See the generic function description.

### Usage

```
## S3 method for class 'TScanonicalPrediction':
percentChange(obj,
     base=NULL, lag=1, cumulate=FALSE, e=FALSE, ...)
```

### Arguments

| | |
|---|---|
| obj | see the generic function. |
| e | see the generic function. |
| base | see the generic function. |
| lag | see the generic function. |
| cumulate | see the generic function. |
| ... | arguments passed to other methods. |

### See Also

percentChange

## plot2by2

*plot2by2*

### Description

plot data series one vs another, two at a time (that is, data[,i] vs data[,j] for all i,j (not on time axis).

### Usage

```
plot2by2(data, ...)
## Default S3 method:
plot2by2(data, pch=".", ...)
## S3 method for class 'TSdata':
plot2by2(data, ...)
```

### Arguments

| | |
|---|---|
| data | a matrix of time series or a TSdata object. |
| pch | character to be used for plotting. |
| ... | arguments passed to tfplot. |

### Value

None.

## print.concentrate *Print Specific Methods*

### Description

See the generic function description.

### Usage

```
## S3 method for class 'concentrate':
print(x, ...)
```

### Arguments

| | |
|---|---|
| x | a concentrate object. |
| ... | arguments to be passed to other methods. |

### See Also

print

## reconstitute *Reconstitute*

### Description

reconstitute

### Usage

```
reconstitute(d, conc=NULL, names=NULL)
## Default S3 method:
reconstitute(d, conc=NULL, names=seriesNames(d))
## S3 method for class 'concentrate':
reconstitute(d, conc=concentrator(d),
                                    names=seriesNames(d))
## S3 method for class 'TSdataconcentrate':
reconstitute(d, conc=concentrator(d),
                                    names=seriesNames(d))
is.TSdatareconstitute(x)
```

### Arguments

| | |
|---|---|
| d | a concentrated data object. |
| conc | a concentrator. |
| names | series names for the result. |
| x | any object. |

### Details

A concentrated data object is used to reconstruct the full dimension data. Thus the result has the same dimension as the original data, but will not be exactly the same because some information is lost when the data is concentrated (unless the concentrate has the full dimension of the original data, which would usually be pointless).

### Value

Depends on the argument.

### See Also

`concentrate`

### Examples

```
data("eg1.DSE.data", package="dse1")
require("stats")
z <- concentrate(eg1.DSE.data)
z <- reconstitute(z)
is.TSdatareconstitute(z)
```

---

## selectSeries.concentrate

*Specific Methods for selectSeries*

---

### Description

See the generic function description.

### Usage

```
## S3 method for class 'concentrate':
selectSeries(x,
     series = seq(nrow(concentrator(x)$proj)))
```

### Arguments

| | |
|---|---|
| `x` | a concentrate data object. |
| `series` | vector of strings or integers indicating series to select. |

### See Also

`selectSeries`

---

`tfplot.concentrate` *tfplot Specific Methods*

---

**Description**

See the generic function description.

**Usage**

```
## S3 method for class 'concentrate':
tfplot(x,
     tf=NULL, start=tfstart(tf), end=tfend(tf),
     series=seq(nseries(x)),
     Title=NULL, xlab=NULL, ylab=NULL,
     graphs.per.page=5, mar=par()$mar, reset.screen=TRUE, ...)
## S3 method for class 'TScanonicalPrediction':
tfplot(x,
     tf=NULL, start=tfstart(tf), end=tfend(tf),
     series=seq(nseries(x)),
     Title=NULL, xlab=NULL, ylab=NULL,
     graphs.per.page=5, mar=par()$mar, reset.screen=TRUE, ...)
## S3 method for class 'TSdataconcentrate':
tfplot(x,
     tf=NULL, start=tfstart(tf), end=tfend(tf),
     select.inputs  = seq(length = nseriesInput(x)),
     select.outputs = seq(length = nseriesOutput(x)),
     Title = NULL, xlab = NULL, ylab = NULL,
     graphs.per.page = 5, mar=par()$mar, reset.screen =TRUE, ...)
## S3 method for class 'TSdatareconstitute':
tfplot(x, ...)
```

**Arguments**

| | |
|---|---|
| `x` | an object to plot. |
| `start` | see the generic `tfplot`. |
| `end` | see the generic `tfplot`. |
| `tf` | see the generic `tfplot`. |
| `series` | see the generic `tfplot`. |
| `select.inputs` | see the generic `tfplot`. |
| `select.outputs` | see the generic `tfplot`. |
| `Title` | see the generic `tfplot`. |
| `xlab` | see the generic `tfplot`. |
| `ylab` | see the generic `tfplot`. |
| `graphs.per.page` | see the generic `tfplot`. |
| `mar` | see the generic `tfplot`. |
| `reset.screen` | see the generic `tfplot`. |
| `...` | arguments to be passed to other methods. |

### See Also

tfplot

---

## tfprint.concentrate

*Tfprint Specific Methods*

---

### Description

See the generic function description.

### Usage

```
## S3 method for class 'concentrate':
tfprint(x, ...)
```

### Arguments

| | |
|---|---|
| x | a concentrate object to print. |
| ... | arguments to be passed to other methods. |

### See Also

tfprint

---

## tframed.concentrate

*Construct a Tframed Object*

---

### Description

Create a trfamed object or set the tframe of an object.

### Usage

```
## S3 method for class 'concentrate':
tframed(x, tf=NULL, names = NULL)
## S3 method for class 'concentrate':
tframe(x) <- value
```

### Arguments

| | |
|---|---|
| x | a (tframed) concentrate object or a concentrate object to be tframed. |
| tf | a tframe attribute to be applied to x. |
| names | optional (new) series names to be applied to x. |

### Details

See the generic.

### Value

A tframed object.

### See Also

`tframe`

---

## `tfwindow.concentrate`

*tfwindow Specific Methods*

---

### Description

See the generic function description.

### Usage

```
## S3 method for class 'concentrate':
tfwindow(x, tf=NULL,
          start=tfstart(tf), end=tfend(tf), warn=TRUE)
```

### Arguments

| | |
|---|---|
| `x` | a concentrate object to trucate. |
| `start` | A start date of a format compatible with the time series |
| `end` | An end date of a format compatible with the time series |
| `tf` | A tframe or tframed object |
| `warn` | A logical indicating if warning should be produced |

### See Also

`tfwindow`

# Index