Package 'TSEind'

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Type Package

Title Total Survey Error (Independent Samples)

Version 0.1.0

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Description
Calculates total survey error (TSE) for one or more surveys, using both scale-dependent and scale-independent metrics. Package works directly from the data set, with no hand calculations required: just upload a properly structured data set (see TESTIND and its documentation), properly input column names (see functions documentation), and run your functions. For more on TSE, see: Weisberg, Herbert (2005, ISBN:0-226-89128-3); Biemer, Paul (2010) <doi:10.1093/poq/nfq058>; Biemer, Paul et.al. (2017, ISBN:9781119041672); etc.

Note 'TSEind' is a companion package to 'TSE'. Both calculate TSE for your surveys, but use 'TSEind' if your surveys and the ``gold standard'' survey have independent samples, and use 'TSE' if your surveys and the ``gold standard'' survey have paired samples.

Imports stats

Depends R (>= 3.5)

License GPL (>= 2)

Encoding UTF-8

LazyData true

RoxygenNote 6.1.1

Suggests knitr, rmarkdown

NeedsCompilation no

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`FULLSDi` *Full scale-dependent statistics (MAE, MSE, RMSE, MSLE, and RMSLE)*

Description

Calculates MAE, MSE, RMSE, MSLE, and RMSLE when Actual# and Survey# have independent samples

Usage

```
FULLSDi(Actual1, Survey1, ...)
```

Arguments

`Actual1`	data from a "gold standard" survey; data are assumed to be the "actual" response, without survey error
`Survey1`	data from another survey, but with survey error; function will calculate MAE, MSE, RMSE, MSLE, and RMSLE for this survey
`...`	used for additional surveys with survey error, survey 2 through survey #

Value

Matrix with MAE, MSE, RMSE, MSLE, and RMSLE values for survey 1 through survey #

Note

Make sure to properly order inputs, per the example: for each survey, inputs must be paired as Actual#, Survey#, and each pair given in sequential order

Examples

```
FULLSDi(Actual1=TESTIND$A1, Survey1=TESTIND$S1, Actual2=TESTIND$A1, Survey2=TESTIND$S2,
Actual3=TESTIND$A2, Survey3=TESTIND$S3)
```

FULLSIi *Full scale-independent statistics (MAPE, SMAPE, RAE, RSE, and RRSE)*

Description

Calculates MAPE, SMAPE, RAE, RSE, and RRSE when Actual# and Survey# have independent samples

Usage

```
FULLSIi(Actual1, Survey1, ...)
```

Arguments

Actual1	data from a "gold standard" survey; data are assumed to be the "actual" response, without survey error
Survey1	data from another survey, but with survey error; function will calculate MAPE, SMAPE, RAE, RSE, and RRSE for this survey
...	used for additional surveys with survey error, survey 2 through survey #

Value

Matrix with MAPE, SMAPE, RAE, RSE, and RRSE values for survey 1 through survey #

Note

Make sure to properly order inputs, per the example: for each survey, inputs must be paired as Actual#, Survey#, and each pair given in sequential order

Examples

```
FULLSIi(Actual1=TESTIND$A1, Survey1=TESTIND$S1, Actual2=TESTIND$A1, Survey2=TESTIND$S2,
Actual3=TESTIND$A2, Survey3=TESTIND$S3)
```

MAEi *Mean absolute error (MAE)*

Description

Calculates MAE when Actual# and Survey# have independent samples

Usage

```
MAEi(Actual1, Survey1, ...)
```

Arguments

Actual1	data from a "gold standard" survey; data are assumed to be the "actual" response, without survey error
Survey1	data from another survey, but with survey error; function will calculate MAE for this survey
...	used for additional surveys with survey error, survey 2 through survey #

Value

Matrix with MAE values for survey 1 through survey #

Note

Make sure to properly order inputs, per the example: for each survey, inputs must be paired as Actual#, Survey#, and each pair given in sequential order

Examples

```
MAEi(Actual1=TESTIND$A1, Survey1=TESTIND$S1, Actual2=TESTIND$A1, Survey2=TESTIND$S2,
Actual3=TESTIND$A2, Survey3=TESTIND$S3)
```

MAPEi *Mean absolte percentage error (MAPE)*

Description

Calculates MAPE when Actual# and Survey# have independent samples

Usage

```
MAPEi(Actual1, Survey1, ...)
```

Arguments

`Actual1`	data from a "gold standard" survey; data are assumed to be the "actual" response, without survey error
`Survey1`	data from another survey, but with survey error; function will calculate MAPE for this survey
`...`	used for additional surveys with survey error, survey 2 through survey #

Value

Matrix with MAPE values for survey 1 through survey #

Note

Make sure to properly order inputs, per the example: for each survey, inputs must be paired as Actual#, Survey#, and each pair given in sequential order

Examples

```
MAPEi(Actual1=TESTIND$A1, Survey1=TESTIND$S1, Actual2=TESTIND$A1, Survey2=TESTIND$S2,
Actual3=TESTIND$A2, Survey3=TESTIND$S3)
```

`MSEi` *Mean squared error (MSE) with bias-variance decomposition*

Description

Calculates MSE with bias-variance decomposition when Actual# and Survey# have independent samples

Usage

```
MSEi(Actual1, Survey1, ...)
```

Arguments

`Actual1`	data from a "gold standard" survey; data are assumed to be the "actual" response, without survey error
`Survey1`	data from another survey, but with survey error; function will calculate MSE with bias-variance decomposition for this survey
`...`	used for additional surveys with survey error, survey 2 through survey #

Value

Matrix with MSE, bias^2, and variance values for survey 1 through survey #

Note

Make sure to properly order inputs, per the example: for each survey, inputs must be paired as Actual#, Survey#, and each pair given in sequential order

Examples

```
MSEi(Actual1=TESTIND$A1, Survey1=TESTIND$S1, Actual2=TESTIND$A1, Survey2=TESTIND$S2,
Actual3=TESTIND$A2, Survey3=TESTIND$S3)
```

MSLEi *Mean squared logarithmic error (MSLE)*

Description

Calculates MSLE when Actual# and Survey# have independent samples

Usage

```
MSLEi(Actual1, Survey1, ...)
```

Arguments

Actual1	data from a "gold standard" survey; data are assumed to be the "actual" response, without survey error
Survey1	data from another survey, but with survey error; function will calculate MSLE for this survey
...	used for additional surveys with survey error, survey 2 through survey #

Value

Matrix with MSLE values for survey 1 through survey #

Note

Make sure to properly order inputs, per the example: for each survey, inputs must be paired as Actual#, Survey#, and each pair given in sequential order

Examples

```
MSLEi(Actual1=TESTIND$A1, Survey1=TESTIND$S1, Actual2=TESTIND$A1, Survey2=TESTIND$S2,
Actual3=TESTIND$A2, Survey3=TESTIND$S3)
```

RAEi *Relative absolute error (RAE)*

Description

Calculates RAE when Actual# and Survey# have independent samples

Usage

```
RAEi(Actual1, Survey1, ...)
```

Arguments

Actual1	data from a "gold standard" survey; data are assumed to be the "actual" response, without survey error
Survey1	data from another survey, but with survey error; function will calculate RAE for this survey
...	used for additional surveys with survey error, survey 2 through survey #

Value

Matrix with RAE values for survey 1 through survey #

Note

Make sure to properly order inputs, per the example: for each survey, inputs must be paired as Actual#, Survey#, and each pair given in sequential order

Examples

```
RAEi(Actual1=TESTIND$A1, Survey1=TESTIND$S1, Actual2=TESTIND$A1, Survey2=TESTIND$S2,
Actual3=TESTIND$A2, Survey3=TESTIND$S3)
```

RMSEi *Root mean squared error (MAE)*

Description

Calculates RMSE when Actual# and Survey# have independent samples

Usage

```
RMSEi(Actual1, Survey1, ...)
```

Arguments

Actual1	data from a "gold standard" survey; data are assumed to be the "actual" response, without survey error
Survey1	data from another survey, but with survey error; function will calculate RMSE for this survey
...	used for additional surveys with survey error, survey 2 through survey #

Value

Matrix with RMSE values for survey 1 through survey #

Note

Make sure to properly order inputs, per the example: for each survey, inputs must be paired as Actual#, Survey#, and each pair given in sequential order

Examples

```
RMSEi(Actual1=TESTIND$A1, Survey1=TESTIND$S1, Actual2=TESTIND$A1, Survey2=TESTIND$S2,
Actual3=TESTIND$A2, Survey3=TESTIND$S3)
```

RMSLEi *Root mean squared logarithmic error (RMSLE)*

Description

Calculates RMSLE when Actual# and Survey# have independent samples

Usage

```
RMSLEi(Actual1, Survey1, ...)
```

Arguments

Actual1	data from a "gold standard" survey; data are assumed to be the "actual" response, without survey error
Survey1	data from another survey, but with survey error; function will calculate RMSLE for this survey
...	used for additional surveys with survey error, survey 2 through survey #

Value

Matrix with RMSLE values for survey 1 through survey #

Note

Make sure to properly order inputs, per the example: for each survey, inputs must be paired as Actual#, Survey#, and each pair given in sequential order

Examples

```
RMSLEi(Actual1=TESTIND$A1, Survey1=TESTIND$S1, Actual2=TESTIND$A1, Survey2=TESTIND$S2,
Actual3=TESTIND$A2, Survey3=TESTIND$S3)
```

RRSEi *Root relative squared error (RRSE)*

Description

Calculates RRSE when Actual# and Survey# have independent samples

Usage

```
RRSEi(Actual1, Survey1, ...)
```

Arguments

Actual1	data from a "gold standard" survey; data are assumed to be the "actual" response, without survey error
Survey1	data from another survey, but with survey error; function will calculate RRSE for this survey
...	used for additional surveys with survey error, survey 2 through survey #

Value

Matrix with RRSE values for survey 1 through survey #

Note

Make sure to properly order inputs, per the example: for each survey, inputs must be paired as Actual#, Survey#, and each pair given in sequential order

Examples

```
RRSEi(Actual1=TESTIND$A1, Survey1=TESTIND$S1, Actual2=TESTIND$A1, Survey2=TESTIND$S2,
Actual3=TESTIND$A2, Survey3=TESTIND$S3)
```

RSEi *Relative squared error (RSE)*

Description

Calculates RSE when Actual# and Survey# have independent samples

Usage

```
RSEi(Actual1, Survey1, ...)
```

Arguments

Actual1	data from a "gold standard" survey; data are assumed to be the "actual" response, without survey error
Survey1	data from another survey, but with survey error; function will calculate RSE for this survey
...	used for additional surveys with survey error, survey 2 through survey #

Value

Matrix with RSE values for survey 1 through survey #

Note

Make sure to properly order inputs, per the example: for each survey, inputs must be paired as Actual#, Survey#, and each pair given in sequential order

Examples

```
RSEi(Actual1=TESTIND$A1, Survey1=TESTIND$S1, Actual2=TESTIND$A1, Survey2=TESTIND$S2,
Actual3=TESTIND$A2, Survey3=TESTIND$S3)
```

SMAPEi *Symmetric mean absolte percentage error (SMAPE)*

Description

Calculates SMAPE when Actual# and Survey# have independent samples

Usage

```
SMAPEi(Actual1, Survey1, ...)
```

Arguments

Actual1	data from a "gold standard" survey; data are assumed to be the "actual" response, without survey error
Survey1	data from another survey, but with survey error; function will calculate SMAPE for this survey
...	used for additional surveys with survey error, survey 2 through survey #

Value

Matrix with SMAPE values for survey 1 through survey #

Note

Make sure to properly order inputs, per the example: for each survey, inputs must be paired as Actual#, Survey#, and each pair given in sequential order

Examples

```
SMAPEi(Actual1=TESTIND$A1, Survey1=TESTIND$S1, Actual2=TESTIND$A1, Survey2=TESTIND$S2,
Actual3=TESTIND$A2, Survey3=TESTIND$S3)
```

TESTIND

A data set created by merging 1) data from a "gold standard" survey and 2) data from other surveys of the same universe. Data from the "gold standard" survey are assumed to be the survey universe's "actual" response; data from the other surveys have survey error which the functions in 'TSEind' can calculate. Data are organized by survey (columns) and survey question (rows), and their values are the aggregate, "topline" responses to the survey questions which can range from 1 to 99 (the scale used by each survey question).

Description

A data set created by merging 1) data from a "gold standard" survey and 2) data from other surveys of the same universe. Data from the "gold standard" survey are assumed to be the survey universe's "actual" response; data from the other surveys have survey error which the functions in 'TSEind' can calculate. Data are organized by survey (columns) and survey question (rows), and their values are the aggregate, "topline" responses to the survey questions which can range from 1 to 99 (the scale used by each survey question).

Usage

```
TESTIND
```

Format

A data frame with 10 rows and 6 variables

Q survey questions, numbered 1 through 10

A1, A2 data from "gold standard" survey; A1 is the "actual" data for all 10 survey questions, A2 is the "actual" data for all survey questions except Q2 (in function examples, A2 is paired with S3 which is missing data for Q2

S1, S2, S3 data from other surveys; S3 is missing data for Q2

Source

Example data generated by author

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