

# Package ‘PINMA’

May 22, 2023

**Type** Package

**Title** Improved Methods for Constructing Prediction Intervals for  
Network Meta-Analysis

**Version** 1.1-2

**Date** 2023-05-21

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**Description** Improved methods to construct prediction intervals for network meta-analysis. The parametric bootstrap and Kenward-Roger-type adjustment by Noma et al. (2022) <forthcoming> are implementable.

**Imports** stats, MASS, metafor

**License** GPL-3

**Encoding** UTF-8

**LazyData** true

**NeedsCompilation** no

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**Depends** R (>= 3.5.0)

**Repository** CRAN

**Date/Publication** 2023-05-22 04:10:02 UTC

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PINMA-package

*The 'PINMA' package.*

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### Description

Improved Methods for Constructing Prediction Intervals for Network Meta-Analysis.

### References

Noma, H., Hamura, Y., Sugawara, S. and Furukawa, T. A. (2022+). Improved methods to construct prediction intervals for network meta-analysis. Forthcoming.

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data.edit

*Transforming arm-level data to contrast-based summary statistics*

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### Description

Transforming arm-level data to contrast-based summary statistics.

### Usage

```
data.edit(study, trt, d, n)
```

### Arguments

study	Study ID
trt	Numbered treatment (=1,2,...)
d	Number of events
n	Sample size

### Value

Contrast-based summary statistics are generated.

- y: Contrast-based summary estimates.
- S: Vecteded within-study covariance matrix.

### Examples

```
data(dstr)
attach(dstr)

edat <- data.edit(study, trt, d, n)
```

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dstr	<i>Siontis et al. (2018)'s network meta-analysis data</i>
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**Description**

- study: Study ID
- treat: Treatment
- trt: Numbered treatment (1:CCTA, 2:CMR, 3:exercise ECG, 4:SPECT-MPI, 5:standard care, 6:Stress Echo)
- n: Sample size
- d: Number of events

**Usage**

```
data(dstr)
```

**Format**

A arm-based dataset with 29 rows and 5 variables

**References**

Siontis, G. C., Mavridis, D., Greenwood, J. P., et al. (2018). Outcomes of non-invasive diagnostic modalities for the detection of coronary artery disease: network meta-analysis of diagnostic randomised controlled trials. *BMJ*. **360**: k504.

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KR	<i>Kenward-Roger-type adjustment for constructing prediction intervals of network meta-analysis</i>
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**Description**

Kenward-Roger-type adjustment for constructing prediction intervals of network meta-analysis.

**Usage**

```
KR(y, S)
```

**Arguments**

y	Contrast-based summary data of the outcome measure
S	Covariance estimates of y

**Value**

Results of the Kenward-Roger-type adjustment for inference of multivariate random-effects model and prediction intervals for network meta-analysis.

- **Estimates:** Restricted maximum likelihood (REML) estimates, their SE, and Wald-type 95% confidence intervals by the Kenward-Roger-type adjustment.
- **Between-studies\_SD:** Between-studies SD estimate.
- **95%PI:** 95% prediction intervals by the Kenward-Roger-type adjustment.

**References**

Noma, H., Hamura, Y., Sugawara, S. and Furukawa, T. A. (2022+). Improved methods to construct prediction intervals for network meta-analysis. Forthcoming.

**Examples**

```
data(dstr)
attach(dstr)

# Transforming the arm-level data to the contrast-based summaries
edat <- data.edit(study,trt,d,n)

y <- edat$y
S <- edat$S

KR(y,S) # Results of the NMA analysis (log OR scale)
```

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 PBS

*Parametric bootstrap procedure for constructing prediction intervals of network meta-analysis*

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**Description**

Parametric bootstrap procedure for constructing prediction intervals of network meta-analysis.

**Usage**

```
PBS(y, S, B=2000)
```

**Arguments**

y	Contrast-based summary data of the outcome measure
S	Covariance estimates of y
B	Number of bootstrap resampling (default: 2000).

**Value**

The parametric bootstrap prediction intervals for network meta-analysis.

- Estimates: Restricted maximum likelihood (REML) estimates, their SE, and 95% Wald-type confidence intervals.
- Between-studies\_SD: Between-studies SD estimate.
- 95%PI: 95% prediction intervals by the parametric bootstrap.

**References**

Noma, H., Hamura, Y., Sugawara, S. and Furukawa, T. A. (2022+). Improved methods to construct prediction intervals for network meta-analysis. Forthcoming.

**Examples**

```
data(dstr)
attach(dstr)

# Transforming the arm-level data to the contrast-based summaries
edat <- data.edit(study,trt,d,n)

y <- edat$y
S <- edat$S

PBS(y,S,B=10) # Results of the NMA analysis (log OR scale); B is recommended to be >= 1000.
```

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tPI	<i>The ordinary t-approximation for constructing prediction intervals of network meta-analysis</i>
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**Description**

The ordinary t-approximation for constructing prediction intervals of network meta-analysis.

**Usage**

```
tPI(y, S)
```

**Arguments**

y	Contrast-based summary data of the outcome measure
S	Covariance estimates of y

**Value**

The ordinary t-approximation prediction intervals for network meta-analysis.

- Estimates: Restricted maximum likelihood (REML) estimates, their SE, and Wald-type 95% confidence intervals.
- Between-studies\_SD: Between-studies SD estimate.
- 95%PI: 95% prediction intervals by the ordinary t-approximation.

**References**

Cooper, H., Hedges, L. V., and Valentine, J. C. (2009). *The Handbook of Research Synthesis and Meta-Analysis*, 2nd edition. New York: Russell Sage Foundation.

Chaimani, A., and Salanti, G. (2015). Visualizing assumptions and results in network meta-analysis: the network graphs package. *Stata Journal* **15**, 905-920.

**Examples**

```
data(dstr)
attach(dstr)

# Transforming the arm-level data to the contrast-based summaries
edat <- data.edit(study,trt,d,n)

y <- edat$y
S <- edat$S

tPI(y,S) # Results of the NMA analysis (log OR scale)
```

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