

# Package ‘prolsirm’

September 20, 2023

**Type** Package

**Title** Procrustes Matching for Latent Space Item Response Model

**Version** 0.1.0

**Description** Procrustes matching of the posterior samples of person and item latent positions from latent space item response models. The methods implemented in this package are based on work by Borg, I., Groenen, P. (1997, ISBN:978-0-387-94845-4), Jeon, M., Jin, I. H., Schweinberger, M., Baugh, S. (2021) <[doi:10.1007/s11336-021-09762-5](https://doi.org/10.1007/s11336-021-09762-5)>, and Andrew, D. M., Kevin M. Q., Jong Hee Park. (2011) <[doi:10.18637/jss.v042.i09](https://doi.org/10.18637/jss.v042.i09)>.

**License** GPL (>= 3)

**Imports** MCMCpack

**Encoding** UTF-8

**RoxygenNote** 7.2.3

**NeedsCompilation** no

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**Repository** CRAN

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### Description

Procrustes matching of posterior samples of latent positions of persons ( $z$ ) and items ( $w$ ) from LSIRM with  $q$ -dimensional interaction map

### Usage

```
procrustes(z, w, ref = 1)
```

### Arguments

$z$	A list of length $M$ . $M$ posterior samples of person latent positions $N \times q$ , where $N$ is the number of respondents and $q$ is the dimension of the interaction map.
$w$	A list of length $M$ . $M$ posterior samples of item latent positions $I \times q$ , where $I$ is the number of items and $q$ is the dimension of the interaction map.
ref	Reference configuration (i.e., iteration) index. Default is 1 (i.e., posterior samples at iteration 1).

### Details

The function performs Procrustes matching by aligning the  $M-1$  posterior samples of  $z$  and  $w$  to the reference configuration (e.g., iteration 1). Users can select any configuration as the reference with the `ref` argument. The function returns  $M$  matched lists of  $z$  and  $w$  after the Procrustes matching process.

### Value

A list of  $M$  matched posterior samples of  $z$  and a list of  $M$  matched posterior samples of  $w$ .

### References

- Borg and Groenen. 1997 *Modern Multidimensional Scaling*. New York: Springer. pp. 340–342.
- Jeon, M., Jin, I. H., Schweinberger, M., & Baugh, S. 2021 Mapping Unobserved Item–Respondent Interactions: A Latent Space Item Response Model with Interaction Map. *Psychometrika*, **86**(2), 378–403.
- Andrew, D. M., Kevin M. Q., Jong Hee Park. 2011 MCMCpack: Markov Chain Monte Carlo in R. *Journal of Statistical Software*. **42**(9): 1–21.

**Examples**

```
# Load package
library(prolsirm)

# Generate example posterior samples
# M=3 samples of person latent positions (N=50, q=2)
z <- list(matrix(rnorm(100), ncol = 2),
            matrix(rnorm(100), ncol = 2),
            matrix(rnorm(100), ncol = 2))

# M=3 samples of item latent positions (I=5, q=2)
w <- list(matrix(rnorm(10), ncol = 2),
            matrix(rnorm(10), ncol = 2),
            matrix(rnorm(10), ncol = 2))

# Perform Procrustes matching
matched_data <- procrustes(z = z, w = w)
```

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