Package: coupling (via r-universe)

May 16, 2026

Title Analysis of Coupling Coordination Degree

Version 0.2

Description Implements coupling coordination degree (CCD) models and supports metacoupling analysis following Tang et al. (2021) <doi:10.1016/j.scs.2021.103405>.

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Encoding UTF-8

URL https://stscl.github.io/coupling/, https://github.com/stscl/coupling

BugReports https://github.com/stscl/coupling/issues

Depends R (>= 4.1.0)

LinkingTo Rcpp, RcppThread

Suggests gdverse, infoxtr, knitr, pc, Rcpp, RcppThread, rmarkdown, sdsfun, spEDM

VignetteBuilder knitr

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Repository https://stscl.r-universe.dev

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Contents

ccd *Coupling Coordination Degree (CCD)*

Description

Coupling Coordination Degree (CCD)

Usage

```
ccd(data, weight = NULL, method = c("standard", "wang", "fan"), threads = 1)
```

Arguments

`data`	A numeric matrix or data.frame. Rows are observations, columns are indicators.
`weight`	Numeric vector of indicator weights. Must have length equal to `ncol(data)`. If `NULL`, equal weights are used.
`method`	Coupling model. One of `"standard"`, `"wang"`, or `"fan"`.
`threads`	Number of threads used in computation.

Details

Full model definitions and formulas are available at: https://github.com/stscl/coupling/discussions/3

Value

A data.frame with:

- `C`: coupling degree
- `D`: coordination degree

Note

Input values should be normalized to `[0, 1]`.

Examples

```
set.seed(42)
mat = matrix(runif(20), nrow = 5)
coupling::ccd(mat)
```

`metacoupling` *Metacoupling Analysis*

Description

Metacoupling Analysis

Usage

```
metacoupling(
  data,
  swm_peri = NULL,
  swm_tele = NULL,
  weight = NULL,
  method = c("standard", "wang", "fan"),
  threads = 1
)
```

Arguments

`data`	A numeric matrix or data.frame. Rows are observations, columns are indicators.
`swm_peri`	A numeric matrix representing the **peri (local) spatial weight matrix**. Must be square with dimension equal to `nrow(data)`. If `NULL`, a zero matrix is used.
`swm_tele`	A numeric matrix representing the **tele (long-distance) spatial weight matrix**. Must be square with dimension equal to `nrow(data)`. If `NULL`, a zero matrix is used.
`weight`	Numeric vector of indicator weights. Must have length equal to `ncol(data)`. If `NULL`, equal weights are used.
`method`	Coupling model. One of `"standard"`, `"wang"`, or `"fan"`.
`threads`	Number of threads used in computation.

Details

Full model definitions and formulas are available at: https://github.com/stscl/coupling/discussions/8

Value

A data.frame with:

- `Intra_C`: intra-system coupling degree
- `Intra_D`: intra-system coordination degree
- `Peri_C`: peri-coupling degree
- `Peri_D`: peri coordination degree
- `Tele_C`: tele-coupling degree
- `Tele_D`: tele coordination degree

Note

Input values should be normalized to `[0, 1]`. Spatial weight matrices are typically symmetric.

Examples

```
set.seed(42)
mat = matrix(runif(20), nrow = 5)
swm1 = apply(matrix(runif(25), 5, 5), 1, \(.x) .x / sum(.x))
swm2 = apply(matrix(runif(25), 5, 5), 1, \(.x) .x / sum(.x))
coupling::metacoupling(mat, swm1, swm2)
```

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