Package: rdist (via r-universe)

October 17, 2026

Title Calculate Pairwise Distances

Version 0.0.6

Description A common framework for calculating distance matrices.

Depends R (>= 3.2.2)

License GPL

URL https://github.com/blasern/rdist

BugReports https://github.com/blasern/rdist/issues

Encoding UTF-8

LinkingTo Rcpp, RcppArmadillo

Imports Rcpp, methods

RoxygenNote 7.2.3

Suggests testthat

NeedsCompilation yes

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

Date/Publication 2026-09-17 13:30:09 UTC

RemoteUrl https://github.com/cran/rdist

RemoteRef HEAD

RemoteSha be94b16b429dc78683a4ba8217b2d3ea490f68d3

Contents

farthest_point_sampling 2
is_metric 3
product_metric 3
rdist 4

Index **6**

`farthest_point_sampling` *Farthest point sampling*

Description

Farthest point sampling returns a reordering of the metric space $P = \{p_1, \ldots, p_k\}$, such that each p_i is the farthest point from the first $i - 1$ points.

Usage

```
farthest_point_sampling(
  mat,
  metric = "precomputed",
  k = nrow(mat),
  initial_point_index = 1L,
  return_clusters = FALSE
)
```

Arguments

`mat`	Original distance matrix
`metric`	Distance metric to use (either "precomputed" or a metric from `rdist`)
`k`	Number of points to sample
`initial_point_index`	Index of p_1
`return_clusters`	Should the indices of the closest farthest points be returned?

Examples

```
# generate data
df <- matrix(runif(200), ncol = 2)
dist_mat <- pdist(df)
# farthest point sampling
fps <- farthest_point_sampling(dist_mat)
fps2 <- farthest_point_sampling(df, metric = "euclidean")
all.equal(fps, fps2)
# have a look at the fps distance matrix
rdist(df[fps[1:5], ])
dist_mat[fps, fps][1:5, 1:5]
```

is_metric *Metric and triangle inequality*

Description

Does the distance matric come from a metric

Usage

```
is_distance_matrix(mat, tolerance = .Machine$double.eps^0.5)

triangle_inequality(mat, tolerance = .Machine$double.eps^0.5)
```

Arguments

mat	The matrix to evaluate
tolerance	Differences smaller than tolerance are not reported.

Examples

```
data <- matrix(rnorm(20), ncol = 2)
dm <- pdist(data)
is_distance_matrix(dm)
triangle_inequality(dm)

dm[1, 2] <- 1.1 * dm[1, 2]
is_distance_matrix(dm)
```

product_metric *Product metric*

Description

Returns the p-product metric of two metric spaces. Works for output of ‘rdist‘, ‘pdist‘ or ‘cdist‘.

Usage

```
product_metric(..., p = 2)
```

Arguments

...	Distance matrices or dist objects
p	The power of the Minkowski distance

Examples

```
# generate data
df <- matrix(runif(200), ncol = 2)
# distance matrices
dist_mat <- pdist(df)
dist_1 <- pdist(df[, 1])
dist_2 <- pdist(df[, 2])
# product distance matrix
dist_prod <- product_metric(dist_1, dist_2)
# check equality
all.equal(dist_mat, dist_prod)
```

`rdist` *rdist: an R package for distances*

Description

`rdist` provide a common framework to calculate distances. There are three main functions:

- `rdist` computes the pairwise distances between observations in one matrix and returns a `dist` object,
- `pdist` computes the pairwise distances between observations in one matrix and returns a `matrix`, and
- `cdist` computes the distances between observations in two matrices and returns a `matrix`.

In particular the `cdist` function is often missing in other distance functions. All calculations involving `NA` values will consistently return `NA`.

Usage

```
rdist(X, metric = "euclidean", p = 2L)

pdist(X, metric = "euclidean", p = 2)

cdist(X, Y, metric = "euclidean", p = 2)
```

Arguments

`X`, `Y`	A matrix
`metric`	The distance metric to use
`p`	The power of the Minkowski distance

Details

Available distance measures are (written for two vectors v and w):

- `"euclidean"`: $\sqrt{\sum_i (v_i - w_i)^2}$
- `"minkowski"`: $(\sum_i |v_i - w_i|^p)^{1/p}$
- `"manhattan"`: $\sum_i (|v_i - w_i|)$
- `"maximum"` or `"chebyshev"`: $\max_i (|v_i - w_i|)$
- `"canberra"`: $\sum_i (\frac{|v_i - w_i|}{|v_i| + |w_i|})$
- `"angular"`: $\cos^{-1}(cor(v, w))$
- `"correlation"`: $\sqrt{\frac{1 - cor(v,w)}{2}}$
- `"absolute_correlation"`: $\sqrt{1 - |cor(v, w)|^2}$
- `"hamming"`: $(\sum_i v_i \neq w_i) / \sum_i 1$
- `"jaccard"`: $(\sum_i v_i \neq w_i) / \sum_i 1_{v_i \neq 0 \cup w_i \neq 0}$
- Any function that defines a distance between two vectors.

Index

cdist *(*rdist*)*, 4

farthest_point_sampling, 2

is_distance_matrix *(*is_metric*)*, 3
is_metric, 3

pdist *(*rdist*)*, 4
product_metric, 3

rdist, *2*, 4
rdist-package *(*rdist*)*, 4

triangle_inequality *(*is_metric*)*, 3