

Package ‘RANN’

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Title Fast Nearest Neighbour Search (Wraps Arya and Mount's ANN Library)

Version 2.5

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Description Finds the k nearest neighbours for every point in a given dataset in $O(N \log N)$ time using Arya and Mount's ANN library (v1.1.3). There is support for approximate as well as exact searches, fixed radius searches and bd as well as kd trees.

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URL <https://github.com/jefferis/RANN>

Suggests testthat

NeedsCompilation yes

Repository CRAN

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| RANN-package | <i>Wrapper for Arya and Mount's Approximate Nearest Neighbours (ANN) C++ library</i> |
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Description

Wrapper for Arya and Mount's Approximate Nearest Neighbours (ANN) C++ library

See Also

[nn2](#)

| | |
|-----|---------------------------------|
| nn2 | <i>Nearest Neighbour Search</i> |
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Description

Uses a kd-tree to find the p number of near neighbours for each point in an input/output dataset. The advantage of the kd-tree is that it runs in $O(M \log M)$ time.

Usage

```
nn2(data, query = data, k = min(10, nrow(data)), treetype = c("kd", "bd"),
     searchtype = c("standard", "priority", "radius"), radius = 0, eps = 0)
```

Arguments

| | |
|------------|--|
| data | An $M \times d$ data.frame or matrix, where each of the M rows is a point or a (column) vector (where $d=1$). |
| query | A set of $N \times d$ points that will be queried against data. d , the number of columns, must be the same as data. If missing, defaults to data. |
| k | The maximum number of nearest neighbours to compute. The default value is set to the smaller of the number of columns in data |
| treetype | Character vector specifying the standard 'kd' tree or a 'bd' (box-decomposition, AMNSW98) tree which may perform better for larger point sets |
| searchtype | See details |
| radius | Radius of search for searchtype='radius' |
| eps | Error bound: default of 0.0 implies exact nearest neighbour search |

Details

The RANN package utilizes the Approximate Near Neighbor (ANN) C++ library, which can give the exact near neighbours or (as the name suggests) approximate near neighbours to within a specified error bound. For more information on the ANN library please visit <http://www.cs.umd.edu/~mount/ANN/>.

Search types: `priority` visits cells in increasing order of distance from the query point, and hence, should converge more rapidly on the true nearest neighbour, but `standard` is usually faster for exact searches. `radius` only searches for neighbours within a specified radius of the point. If there are no neighbours then `nn.idx` will contain 0 and `nn.dists` will contain `1.340781e+154` for that point.

Value

A list of length 2 with elements:

| | |
|-----------------------|---|
| <code>nn.idx</code> | A $N \times k$ integer matrix returning the near neighbour indices. |
| <code>nn.dists</code> | A $N \times k$ matrix returning the near neighbour Euclidean distances. |

Author(s)

Gregory Jefferis based on earlier code by Samuel E. Kemp (knnFinder package)

References

Bentley J. L. (1975), Multidimensional binary search trees used for associative search. *Communication ACM*, 18:309-517.

Arya S. and Mount D. M. (1993), Approximate nearest neighbor searching, *Proc. 4th Ann. ACM-SIAM Symposium on Discrete Algorithms (SODA'93)*, 271-280.

Arya S., Mount D. M., Netanyahu N. S., Silverman R. and Wu A. Y (1998), An optimal algorithm for approximate nearest neighbor searching, *Journal of the ACM*, 45, 891-923.

Examples

```
x1 <- runif(100, 0, 2*pi)
x2 <- runif(100, 0,3)
DATA <- data.frame(x1, x2)
nearest <- nn2(DATA,DATA)
```

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