

Package ‘pcSteiner’

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Type Package

Version 1.0.0

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Title Tool to Solve the Prize-Collecting Steiner Tree Problem

Description Provides convenient functionality for solving
the Prize-Collecting Steiner Tree problem via message passing approach.

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URL <https://github.com/krashkov/pcSteiner>

BugReports <https://github.com/krashkov/pcSteiner/issues>

Depends R (>= 3.1.0),
igraph (>= 0.6.0)

Imports stats

Suggests knitr,
rmarkdown

VignetteBuilder knitr

License GPL-3

Repository CRAN

Encoding UTF-8

RoxygenNote 7.1.1

R topics documented:

pcs.tree	2
Index	3

pcs.tree

Solve the Prize-Collecting Steiner Tree problem

Description

Solve the Prize-Collecting Steiner Tree problem.

Usage

```
pcs.tree(graph, terminals, lambda, root, depth, eps, max_iter, terminal_infty=10000)
```

Arguments

graph	an igraph graph.
terminals	a numeric or character vector which contains either ids or names of terminal nodes.
lambda	a numeric parameter which establishes a ratio between edge costs and node prizes (see Sec.1 or Sec.3 in the vignette).
root	a numeric or character scalar which corresponds to either id or name of a root (see Sec.3 in the vignette).
depth	a numeric scalar which sets depth of the resultant tree (see Sec.3 in the vignette).
eps	a numeric scalar which specifies tolerance for termination.
max_iter	a numeric scalar which specifies maximum number of iterations.
terminal_infty	a numeric scalar which corresponds to a prize for each terminal node. This value should be large enough to ensure that all terminals will be presented in a solution.

Value

Returns a list with cost and edges of the final tree.

References

1. M. Bayati, C. Borgs, A. Braunstein, J. Chayes, A. Ramezanzpour, and R. Zecchina, "Statistical Mechanics of Steiner Trees". PRL, 2008.
2. M. Bayati, A. Braunstein, and R. Zecchina, "A rigorous analysis of the cavity equations for the minimum spanning tree". Journal of Mathematical Physics, 2008.
3. I. Biazio, A. Braunstein and R. Zecchina, "Performance of a cavity-method-based algorithm for the prize-collecting Steiner tree problem on graphs". PRL, 2012.

Examples

```
g <- graph('Bull')
E(g)$costs <- c(3, 3, 3, 3, 3)
V(g)$prizes <- c(10, 2, 2, 2, 2)
treeData <- pcs.tree(graph=g, terminals=c(4,5), lambda=1, root=3, depth=5, eps=1e-3, max_iter=10)
```

Index

`pcs.tree`, [2](#)