Package 'cpa'

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Type Package

Title Confirmatory Path Analysis through the d-sep tests

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Author Alessandro Bellino and Daniela Baldantoni

Maintainer Alessandro Bellino <alessandro_bellino@gmx.com>

Description The package includes functions to test and compare causal models.

License GPL (>= 2)

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cpa-package *Confirmatory Path Analysis through the d-sep tests*

Description

The package includes functions to test and compare causal models

Details

Package:	cpa
Type:	Package
Version:	1.0
Date:	2013-10-12
License:	GPL (>= 2)

For usage, see the documentation of the main function 'cpa'

Author(s)

Alessandro Bellino and Daniela Baldantoni

Maintainer: Alessandro Bellino <alessandro_bellino@gmx.com>

References

Bellino A, Baldantoni D, De Nicola F, Iovieno P, Zaccardelli M, Alfani A. (in press) Compost amendments in agricultural ecosystems: confirmatory path analysis to clarify the effects on soil chemical and biological properties. *Journal of Agricultural Science*

See Also

`ggm`

Examples

```
x <- cpa()
```

`Arrows` *List of direct interactions for the model in Bellino and co-workers (in press)*

Description

Each row of the dataframe is a vector of two elements (cause,effect). The dataframe contains the list of the direct causal interactions for the model developed by Bellino and co-workers (in press).

Usage

```
Arrows.txt
```

Format

Dataframe with 2 columns and 46 rows

References

Bellino A, Baldantoni D, De Nicola F, Iovieno P, Zaccardelli M, Alfani A. (in press) Compost amendments in agricultural ecosystems: confirmatory path analysis to clarify the effects on soil chemical and biological properties. *Journal of Agricultural Science*

`cpa` *Confirmatory Path Analysis*

Description

`cpa` performs a confiratory path analysis on causal hypotheses expressed as directed acyclic graphs (DAGs) through the use of d-sep tests.

Usage

```
cpa()
```

Details

The function builds a graphical user interface to load the necessary files and perform the analyses. The user is asked to supply a data matrix, a list with the direct interactions implied by a given DAG and the list of variables included in the DAG. The data matrix and the list of the direct interactions should be comma-separated text files. Each direct interaction is coded as a vector of two elements, the first of which is the causal parent (the cause) and the second one the causal child (the effect). Once the files are loaded, it is possible to plot the DAG and start the analyses.

The script, sequentially, builds the basis set, performs the conditional independence tests and the Fisher's C test, calculates the Akaike's Information Criterium according to Shipley (2013), and performs the structural regressions implied by the given DAG. For an in-depth description of the code, the algorithms and the calculations refer to Bellino and co-workers (in press).

Value

The function returns an environment containing (if any) a set of user-defined environments. The user is asked to discard or save the results of each analysis, which will be then stored in an environment containing the following objects:

`C`	Value of the Fisher's C statistics
`P`	Null probability of the Fisher's C test
`AIC`	Akaike's Information Criterium
`Bu`	Table with the conditional independence claims and the null probability associated
`Ti`	List containing the conditional independence tests
`Ti_summary`	List containing the summaries of the conditional independence tests

`dctests` List containing the linear models that fit the structural equations implied by the DAG. The names of its elements are the corresponding dependent variables of each model

`dctests_summary` List containing the summaries of the linear models contained in 'dctests'

Author(s)

Alessandro Bellino and Daniela Baldantoni

References

Bellino A, Baldantoni D, De Nicola F, Iovieno P, Zaccardelli M, Alfani A. (in press) Compost amendments in agricultural ecosystems: confirmatory path analysis to clarify the effects on soil chemical and biological properties. *Journal of Agricultural Science*

Shipley B. (2013) The AIC model selection method applied to path analytic models compared using a d-separation test. *Ecology* **94 (3)**, 560–564.

See Also

`basisSet` and `shipley.test` functions of package `ggm` for an alternative way to perform the Fisher's C test

Examples

```
## Start the GUI and save the results of the analyses in an environment

x <- cpa()

## Inspect the content of the environment, it will contain every
## user-defined environment in which the results of each performed
## analysis are stored.

ls(x)
```

Data *Dataset from Bellino and co-workers (in press)*

Description

This dataset was used in Bellino *et al.* (in press) to develop and test a causal model describing the dynamics of some soil properties following repeated compost amendments.

Usage

```
Data.txt
```

Format

Dataframe with 12 obervations and 16 variables, with two missing data.

References

Bellino A, Baldantoni D, De Nicola F, Iovieno P, Zaccardelli M, Alfani A. (in press) Compost amendments in agricultural ecosystems: confirmatory path analysis to clarify the effects on soil chemical and biological properties. *Journal of Agricultural Science*

`Variables` *List of variables for model in Bellino and co-workers (in press)*

Description

The dataframe contains the names of variables in the dataset Data.txt.

Usage

```
Variables.txt
```

Format

Dataframe with 1 column and 16 rows

References

Bellino A, Baldantoni D, De Nicola F, Iovieno P, Zaccardelli M, Alfani A. (in press) Compost amendments in agricultural ecosystems: confirmatory path analysis to clarify the effects on soil chemical and biological properties. *Journal of Agricultural Science*

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