# Package 'netCoin'

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**Type** Package

**Version** 1.1.25

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**Title** Interactive Analytic Networks

**Description** Create interactive analytic networks. It joins the data analysis power of R to obtain coincidences, co-occurrences and correlations, and the visualization libraries of 'JavaScript' in one package. The methods are described in Escobar and Martinez-Uribe (2020) <doi:10.18637/jss.v093.i11>.

**License** GPL-2 | GPL-3

**Depends** R (>= 3.0.0)

**Imports** igraph (>= 1.0.1), Matrix (>= 1.2-4), haven (>= 1.1.0)

**Suggests** knitr, rmarkdown, lavaan, shiny

**VignetteBuilder** knitr

**NeedsCompilation** no

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**Repository** CRAN

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## R topics documented:

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`netCoin-package` *The netCoin package.*

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## Description

Create interactive networked coincidences. It joins the data analysis power of R to study coincidences and the visualization libraries of JavaScript in one package.

## Details

Coincidence analysis detects what events, characters, objects, attributes, or characteristics tend to occur together within certain limits.

These given limits are call scenarios ($S$) and are considered to be the units of analysis, and as such they have to be placed in the rows of a matrix or data.frame.

In each $i$ scenario, a series of $J$ events $X_j$, which are to be represented as dichotomous variables $X_j$ in columns, may occur (1) or may not occur (0). Scenarios and events constitute an incidence matrix (**I**).

**Incidence matrix**

| | $X_1$ | $X_2$ | $X_3$ | ... | $X_J$ |
|---|---|---|---|---|---|
| $S_1$ | 0 | 1 | 0 | ... | 1 |
| $S_2$ | 1 | 0 | 1 | ... | 0 |
| ... | ... | ... | ... | ... | ... |
| $S_n$ | 1 | 1 | 0 | ... | 1 |

From this incidences matrix, a coincidence (**C**) matrix can be obtained with the function `coin`. In this matrix the main diagonal represents frequencies of $X_j$, while the others elements are number of coincidences between two events.

**Coincidence matrix**

| | $X_1$ | $X_2$ | $X_3$ | | $X_J$ |
|---|---|---|---|---|---|
| $X_1$ | 2 | 1 | 1 | ... | 1 |
| $X_2$ | 1 | 2 | 0 | ... | 2 |
| $X_3$ | 1 | 0 | 1 | ... | 0 |
| ... | ... | ... | ... | ... | ... |
| $X_J$ | 1 | 2 | 0 | ... | 2 |

Once there is a `coin` object, a similarity matrix can be obtained. Similarity matrices available in netCoin are:

- Matching (m), Rogers \& Tanimoto (t) Gower (g) Sneath (s) and Anderberg (and).
- Jaccard (j), dice (d), antiDice (a), Ochiai (o) and Kulczynski (k).
- Hamann (ham), Yule (y), Pearson (p), odds ratio (od) and Rusell (r).

Other measures that can be obtained from `coin` are:

- Relative frequencies (x), conditional frequencies (i) coincidence degree (cc) and probable degree of coincidence (cp).
- Haberman (h) and Z value of Haberman (z)

To obtain similarity and other measures matrices, the function `sim` elaborates a list of them.

**Similarity matrix**

| | $X_1$ | $X_2$ | $X_3$ | | $X_J$ |
|---|---|---|---|---|---|
| $X_1$ | 1.73 | -.87 | .87 | ... | -.87 |
| $X_2$ | -.87 | 1.73 | -1.73 | ... | 1.73 |
| $X_3$ | .87 | -1.73 | 1.73 | ... | -1.73 |
| ... | ... | ... | ... | ... | ... |
| $X_J$ | -.87 | 1.73 | -1.73 | ... | 1.73 |

edgeList makes a collecion of edges composed by a list of similarity measures whenever a criterium (generally p(Z)<.50) is met.

**Edge list**

| | source | target | Haberman | P(z) |
|---|---|---|---|---|
| 1 | X1 | X3 | 0.8660254 | 0.22509243 |
| 2 | X2 | X4 | 1.7320508 | 0.09084506 |

In order to make a graph, two data frames are needed: a nodes data frames with names and other nodes attributes (see asNodes) and an edge data frame (see edgeList). For more information go to netCoin.

## Author

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

## References

Escobar, M. (2009): "Redes Semanticas en Textos Periodisticos: Propuestas Tecnicas para su Representacion", en *Empiria*, 17, 13-39.

Escobar, M.(2015): "Studying Coincidences with Network Analysis and Other Multivariate Tools", in *The Stata Journal*, 15(4), 1118-1156.

Escobar, M. and J. Gomez Isla (2015): "The Expression of Identity through the Image: The Photographic Archives of Miguel de Unamuno and Joaquin Turina", en *Revista Espanola de Investigaciones Sociologicas*, 152, 23-46.

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allNet *Networked coincidences from incidences data.*

---

## Description

allNet produces a network object of coincidences from a data frame or a matrix with dichotomous values.

## Usage

```
allNet(incidences, weight = NULL, subsample = FALSE, pairwise = FALSE,
       minimum=1, maximum = nrow(incidences),
       sort = FALSE, decreasing = TRUE,
       frequency = FALSE, percentages = TRUE,
       procedures = "Haberman", criteria = "Z", Bonferroni = FALSE,
       support = -Inf, minL = -Inf, maxL = Inf,
       directed = FALSE, diagonal = FALSE,
       sortL = NULL, decreasingL = TRUE,
       igraph = FALSE, dir=NULL, ...)
```

## Arguments

| | |
|---|---|
| incidences | an incidence matrix or data frame with only 0/1 variables. |
| weight | a vector of weights. Optimal for data.framed tables. |
| subsample | retrict the analysis to scenarios with at least one event. |
| pairwise | Pairwise mode of handling missing values if TRUE. Listwise by default. |
| minimum | minimum frequency to be considered. |
| maximum | maximum frequency to be considered. |
| sort | sort the coincidence matrix according to frequency of events. |
| decreasing | decreasing or increasing sort of the matrix. |
| frequency | a logical value true if frequencies are to be shown. Default = FALSE. |
| percentages | a logical value true if percentages are to be shown. Default = TRUE. |
| procedures | a vector of statistics of similarity. See below. |
| criteria | statistic to be use for selection criteria. |
| Bonferroni | Bonferroni criterium of the signification test. |
| support | minimum value of the frequency of the coincidence to be edged. |
| minL | minimum value of the statistic to include the edge in the list. |
| maxL | maximum value of the statistic to include the edge in the list. |
| directed | includes same edges only once. |
| diagonal | includes auto-links. |
| sortL | sort the list according to the values of a statistic. See below. |
| decreasingL | order in a decreasing way. |
| igraph | Produces an igraph object instead of a netCoin object if TRUE. |
| dir | a "character" string representing the directory where the web files will be saved. |
| ... | Any netCoin argument. |

## Details

Possible measures in procedures are

- Frequencies (f), Relative frequencies (x), Conditional frequencies (i), Coincidence degree (cc), Probable degree (cp),
- Expected (e), Confidence interval (con)
- Matching (m), Rogers & Tanimoto (t), Gower (g), Sneath (s), Anderberg (and),
- Jaccard (j), Dice (d), antiDice (a), Ochiai (o), Kulczynski (k),
- Hamann (ham), Yule (y), Pearson (p), odds ratio (od), Rusell (r),
- Haberman (h), Z value of Haberman (z),
- Hypergeometric p greater value (hyp).
- Convert a matrix into an edge list (shape).

## Value

This function creates a netCoin object (or igraph) and, if stated, a folder in the computer with an HTML document named index.html which contains the produced graph. This file can be directly opened with your browser and sent to a web server to work properly.

## Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

## References

Escobar, M. and Martinez-Uribe, L. (2020) Network Coincidence Analysis: The netCoin R Package. *Journal of Statistical Software*, **93**, 1-32. doi: 10.18637/jss.v093.i11.

## Examples

```
# A character column (with separator)
frame <- data.frame(A = c("Man; Women", "Women; Women",
                          "Man; Man", "Undet.; Women; Man"))
data <- dichotomize(frame, "A", sep = "; ")[2:4]
allNet(data) # network object
```

---

# asNodes *Nodes data frame.*

---

## Description

Nodes data frame from either an edge list or a coin object.

## Usage

```
asNodes(C, frequency = TRUE, percentages = FALSE, language = c("en","es","ca"))
```

## Arguments

| | |
|---|---|
| C | has to be an edge list or, better, a coin object. |
| frequency | add frequency of nodes |
| percentages | add nodes percentages |
| language | a character vector (es=spanish; en=english; ca=catalan). |

## Value

A data frame with nodes' names and their frequency and/or percentages if the input is a coin object

## Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

## References

Escobar, M. and Martinez-Uribe, L. (2020) Network Coincidence Analysis: The netCoin R Package. *Journal of Statistical Software*, **93**, 1-32. doi: 10.18637/jss.v093.i11.

## Examples

```
# From a random incidence matrix I(25X4)
I <- matrix(rbinom(100, 1, .5), nrow = 25, ncol = 4,
     dimnames = list(NULL, c("A", "B", "C", "D")))
C <- coin(I)
asNodes(C)
```

---

barCoin *Networked coincidences.*

---

## Description

barCoin produces a barCoin object.

## Usage

```
barCoin(data, variables = colnames(data), commonlabel = NULL,
        dichotomies = c("_all","_none"), valueDicho = 1, weight = NULL,
        subsample = FALSE, sort = NULL, decreasing = TRUE, nodes = NULL,
        name = NULL, select = NULL, scalebar = FALSE, note = NULL,
        label = NULL, text = NULL, color = NULL, defaultColor = "#1f77b4",
       expected = FALSE, confidence = FALSE, level = .95, significance = FALSE,
        minimum = 1 , maximum = nrow(data), percentages = FALSE,
        criteria = c("Z","hyp"), Bonferroni = FALSE,
        support = 1, minL = -Inf, maxL = 1,
        language = c("en","es","ca"), cex = 1.0, dir = NULL)
```

## Arguments

| | |
|---|---|
| data | a data frame |
| variables | a vector of variables included in the previous data frame |
| commonlabel | a vector of variables whose names are to be included in nodes labels |
| dichotomies | a vector of dichotomous variables to appear as just one categorie |
| valueDicho | value to be selected for dichotomous variables. Default is 1 |
| weight | a vector of weights. Optimal for data.framed tables. |
| subsample | retrict the analysis to scenarios with at least one event. |

| | |
|---|---|
| sort | name of the vector in the nodes data frame to order the graph. |
| decreasing | decreasing or increasing sort of the graph order. |
| nodes | a data frame with at least two vectors of names and incidences. |
| name | name of the vector with names in the nodes data frame. |
| select | Name of the event (in nodes name column) to start the visualization. |
| scalebar | Should the bars fill the screen height? Default = FALSE. |
| note | lower title of the graph. |
| label | name of the vector with labels in the nodes data frame. |
| text | name of the vector with html text in the nodes data frame. |
| color | name of the vector with color variable in the nodes data frame. |
| defaultColor | a character vector giving a valid html color. |
| expected | name of the vector with expected coincidences in the links data frame. |
| confidence | name of the vector with confidence interval in the links data frame. |
| level | confidence level |
| significance | name of the vector with significance in the links data frame. |
| minimum | minimum frequency to be considered. |
| maximum | maximum frequency to be considered. |
| percentages | a logical value true if percentages are to be shown. Default = TRUE. |
| criteria | statistic to be use for selection criteria. |
| Bonferroni | Bonferroni criterium of the signification test. |
| support | minimum value of the frequency of the coincidence to be edged. |
| minL | minimum value of the statistic to include the edge in the list. |
| maxL | maximum value of the statistic to include the edge in the list. |
| language | a character vector (es=spanish; en=english; ca=catalan). |
| cex | number indicating the amount by which plotting text should be scaled relative to the default. Default = 1. |
| dir | a "character" string representing the directory where the web files will be saved. |

## Value

Object of class `barCoin`.

## Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

## Examples

```
# A character column (with separator)
frame <- data.frame(A = c("Man; Women", "Women; Women",
                          "Man; Man", "Undet.; Women; Man"))
data <- dichotomize(frame, "A", sep = "; ")[2:4]

barCoin(data,dichotomies="_all")
barCoin(data,dichotomies="_all",confidence=TRUE,percentages=TRUE)
```

---

`coin` *Coincidence matrix.*

---

## Description

A coincidence object consists of a list with two elements: 1) the number of scenarios ($n), and 2) a coincidence matrix of events, whose main diagonal figures are the frequency of events and outside this diagonal there are conjoint frequencies of these events ($f)

## Usage

```
coin(incidences, minimum = 1, maximum = nrow(incidences),
     sort = FALSE, decreasing = TRUE,
     total = FALSE, subsample = FALSE,
     weight = NULL, pairwise = FALSE)
```

## Arguments

| | |
|---|---|
| `incidences` | an incidence matrix or data frame with only 0/1 variables |
| `minimum` | minimum frequency to be considered |
| `maximum` | maximum frequency to be considered |
| `sort` | sort the coincidence matrix according to frequency of events |
| `decreasing` | decreasing or increasing sort of the matrix |
| `total` | add one first row and column with total |
| `subsample` | retrict the analysis to scenarios with at least one event |
| `weight` | a vector of weights. Optimal for data.framed tables |
| `pairwise` | Pairwise mode of handling missing values if TRUE. Listwise by default. |

## Details

Produce a matrix of coincidences from a matrix of incidences.

## Value

An object of `coin` class

| | |
|---|---|
| `n` | Number of scenarios (rows of the incidence matrix) |
| `f` | Coincidence matrix |

## Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

## References

Escobar, M. and Martinez-Uribe, L. (2020) Network Coincidence Analysis: The netCoin R Package. *Journal of Statistical Software*, **93**, 1-32. doi: 10.18637/jss.v093.i11.

## Examples

```
## Random incidence matrix: 25 scenarios, 4 events.
I <- matrix(rbinom(100, 1, .5), nrow = 25, ncol = 4,
            dimnames = list(NULL, c("A", "B", "C", "D")))
coin(I, sort = TRUE)

## Hair by Eye by Sex table from M. Friendly (2000)
data(HairEyeColor)
H<-as.data.frame(HairEyeColor)
W<-H$Freq
I<-dichotomize(H,c("Hair","Eye","Sex"),add=FALSE)
coin(I,w=W)
```

---

# coocur *Coocurrence matrix.*

---

## Description

A coocurrence object consists of a matrix with the number of ocurrences in its main diagonal and the number of coocurrences outside this diagonal. Besides, this object has two attributes: 1) n is the total of the sum of the ocurrences in each row.2) m is the sum of the maximum number of ocurrences in each row.

## Usage

```
coocur(ocurrences, minimum = 1, maximum = Inf,
       sort = FALSE, decreasing = TRUE)
```

## Arguments

| | |
|---|---|
| ocurrences | an ocurrence matrix or data frame |
| minimum | minimum frequency to be considered |
| maximum | maximum frequency to be considered |
| sort | sort the coincidence matrix according to frequency of events |
| decreasing | decreasing or increasing sort of the matrix |

### Details

Produce a matrix of coocurrences from a matrix of occurences.

### Value

An object of cooc class with a coocurrence matrix. It has two attributes:

| | |
|---|---|
| n | Total sum of occurences) |
| m | Sum of maximum occurences in each row of the ocurrence matrix |

### Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

### Examples

```
## Tossing two coins five times.
D<-data.frame(Head=c(2,1,1,0,2),Tail=c(0,1,1,2,0))
coocur(D)
```

---

## dice *Data: Roll a die (100 times).*

---

### Description

Data frame with events as result.

### Usage

```
data("dice")
```

### Format

A data frame with 100 observations (scenarios) on the following 11 variables (events):

`dice` : a numeric vector, representing dice results

`1` : a dichotomous vector of the elemental event "1"

`2` : a dichotomous vector of the elemental event "2"

`3` : a dichotomous vector of the elemental event "3"

`4` : a dichotomous vector of the elemental event "4"

`5` : a dichotomous vector of the elemental event "5"

`6` : a dichotomous vector of the elemental event "6"

`odd` : a dichotomous vector of odd events

`even` : a dichotomous vector of even events

`small` : a dichotomous vector of small number events

`large` : a dichotomous vector of large number events

## Source

Random extraction via `sample(1:6,100,replace=TRUE)`

## References

See `events`.

## Examples

```
data(dice)
head(dice,10)
```

---

`dichotomize` *Dichotomize.*

---

## Description

This converts factor(s) o character(s) column(s) of a data frame into a set of dichotomous columns. Their names will correspond to the labels or text of every category.

## Usage

```
dichotomize(data, variables,
            sep = "", min = 1, length = 0, values = NULL,
            sparse = FALSE, add = TRUE, sort = TRUE, nas = "None")
```

## Arguments

| | |
|---|---|
| `data` | a data frame with a factor or textual column which can be simple (only one value for each scenario) or multiple if components are delinited with a separator. |
| `variables` | vector of column names that have to be converted into dichotomous vectors. |
| `sep` | vector of characters used to divide columns with multiple events. If this separator is "", every unique cell of every column is converted into a dichotomus data frame's column. |
| `min` | convert to dichotomous vectors only label or text that has a frequency less or equal to the value of this parameter. If the value of min is between 0 and 1, its value is interpreted as a percentage |
| `length` | maximum number of dichotomous columns generated for every variable |
| `values` | vector of labels or texts selected to their conversion to dichotomous columns |
| `sparse` | produce a sparse matrix instead of a data.frame |
| `add` | add the new columns to the input data.frame |
| `sort` | order the new columns by their frequencies |
| `nas` | variable name to convert the NA values of the set of variables |

## Value

A data frame composed by the original plus the added dichotmous columns.

## Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca, and Luis Martinez Uribe, Fundacion Juan March. See https://sociocav.usal.es/blog/modesto-escobar/

## References

Escobar, M. and Martinez-Uribe, L. (2020) Network Coincidence Analysis: The netCoin R Package. *Journal of Statistical Software*, **93**, 1-32. doi: 10.18637/jss.v093.i11.

## Examples

```
# A character column
frame1 <- data.frame(A = c("Man", "Women", "Man", "Undet."))
dichotomize(frame1, "A", sep = "; ")

# A character column (with separator)
frame2 <- data.frame(A = c("Man; Women", "Women; Women",
                           "Man; Man", "Undet.; Women; Man"))
dichotomize(frame2, "A", sep = "; ")

# A character column and another factor column (same sepatator)
frame3 <- data.frame(A = c("Man; Women", "Women; Women",
                           "Man; Man", "Undet.; Women; Man"),
                     C = factor(c(1:4), labels = c("Paris", "New York",
                           "London; New York", "<NA>")))
dichotomize(frame3, c("A", "C"), sep = "; ")

# A set of simple character or factor (same levels) variables.
# In this case, you must use "C" separator.
frame4 <- data.frame(A = c("Man", "Women","Man", "Undet",NA),
                     B = c("Women","Women","Man","Women",NA),
 C = c(NA,NA,NA,"Man",NA))
dichotomize(frame4,c("A","B","C"), sep="C")
```

---

# distant *Distance matrix.*

---

## Description

Convert a similarity matrix into a distance matrix.

## Usage

```
distant(s, t = FALSE)
```

### Arguments

| | |
|---|---|
| s | a similarity matrix |
| t | return the same matrix if t=FALSE |

### Details

For better resultas, use the parameter distance in sim function.

### Value

A distance matrix.

### Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

### Examples

```
# From a random incidence matrix I(25X4)
I <- matrix(rbinom(100, 1, .5), nrow = 25, ncol = 4,
     dimnames = list(NULL, c("A", "B", "C", "D")))
J <- sim(I, "Jaccard")
distant(J, t = TRUE)
#Same results
sim(I, "Jaccard", distance = TRUE)
```

---

## edgeList *Edge list.*

---

### Description

Convert a coincidence/similarity/distance matrix into an edge list form.

### Usage

```
edgeList(data, procedures="Haberman",
         criteria="Z", level=.95, Bonferroni=FALSE,
         min=-Inf, max=Inf, support=-Inf, directed=FALSE,
         diagonal=FALSE, sort=NULL, decreasing=TRUE, pairwise=FALSE)
```

## Arguments

| | |
|---|---|
| data | a coin object, let's say an R matrix with frequencies and an attribute (n) giving the number of scenarios. In case of change of shape, data should be a matrix. |
| procedures | a vector of statistics of similarity. See below. |
| criteria | statistic to be use for selection criteria. |
| level | confidence level |
| Bonferroni | Bonferroni criterium of the signification test. |
| min | minimum value of the statistic to include the edge in the list. |
| max | maximum value of the statistic to include the edge in the list. |
| support | minimum value of the frequency of the coincidence to be edged |
| directed | includes same edges only once. |
| diagonal | includes auto-links |
| sort | sort the list according to the values of a statistic. See below |
| decreasing | order in a decreasing way. |
| pairwise | Pairwise mode of handling missing values if TRUE. Listwise by default. |

## Details

Possible measures in procedures are

- Frequencies (f), Relative frequencies (x), Conditional frequencies (i), Coincidence degree (cc), Probable degree (cp),
- Expected (e), Confidence interval (con)
- Matching (m), Rogers & Tanimoto (t), Gower (g), Sneath (s), Anderberg (and),
- Jaccard (j), Dice (d), antiDice (a), Ochiai (o), Kulczynski (k),
- Hamann (ham), Yule (y), Pearson (p), odds ratio (od), Rusell (r),
- Haberman (h), Z value of Haberman (z),
- Hypergeometric p greater value (hyp).
- Convert a matrix into an edge list (shape).

## Value

A data frame in which the two first columns are source and target. The rest of the columns are the different statistics explicited in funcs parameter.

## Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

## References

Escobar, M. and Martinez-Uribe, L. (2020) Network Coincidence Analysis: The netCoin R Package. *Journal of Statistical Software*, **93**, 1-32. doi: 10.18637/jss.v093.i11.

## Examples

```
# From a random incidence matrix I(25X4)
I<-matrix(rbinom(100,1,.5),nrow=25,ncol=4,
dimnames=list(NULL,c("A","B","C","D")))
C<-coin(I)
edgeList(C)
```

---

`ess` *Data: European Social Survey, Round-8.*

---

## Description

A sample size of 1,000 respondents from the European Social Survey, Round-8.

## Usage

```
data("ess")
```

## Format

A data frame with 1000 cases (respondents) and 5 variables:

`Gender` Gender (factor vector): Female, Male.

`Age` Age (recoded factor vector): 15-29, 30-30, 40-49, 50-59, 60-69, 70 and +.

`Social participation` Social participation (factor vector): No, Yes.

`Political participation` Political participation (factor vector): No, Yes.

`cweight` cweight (numeric vector): Cases weight.

## References

ESS Round 8: European Social Survey Round 8 Data (2016). Data file edition 2.1. NSD - Norwegian Centre for Research Data, Norway - Data Archive and distributor of ESS data for ESS ERIC. doi:10.21338/NSD-ESS8-2016.

## Examples

```
data("ess")
head(ess,10)
```

## events *Data: Attributes of the dice events.*

### Description

Data frame with the attributes of the events of dice.

### Usage

```
data("events")
```

### Format

A data frame with 10 observations on the following 4 variables:

`name` : a factor vector with 10 levels

`label` : a factor vector with 10 levels

`frequency` : a numeric vector

`type` : a factor vector with 2 levels

### Source

data(dice); coin.dice<-coin(dice); asNodes(coin.dice)

### References

See `dice`.

### Examples

```
data(events)
events
```

## expectedList *Expected list.*

### Description

Converts a `coin` object to a links data frame with coincidences and expected values.

### Usage

```
expectedList(data, names = NULL, min = 1, confidence=FALSE)
```

### Arguments

| | |
|---|---|
| data | is a coin object. See coin |
| names | a character vector. |
| min | minimum value of the statistic to include the edge in the list. |
| confidence | add the confidence interval if TRUE. |

### Value

A links data frame with coincidences and expected values.

### Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

### Examples

```
# A character column (with separator)
frame <- data.frame(A = c("Man; Women", "Women; Women",
                          "Man; Man", "Undet.; Women; Man"))
data <- dichotomize(frame, "A", sep = "; ")[2:4]
C <- coin(data) # coincidence matrix
expectedList(C) # edge data frame
```

---

## families *Data: Italian families in the Renaissance.*

---

### Description

Data frame with the characteristics of powerful families of Renaissance Italy.

### Usage

```
data("families")
```

### Format

A data frame with 16 families (rows) and 6 characteristics.

`name` Family's name

`f.Marriages` number of marriage links

`f.Business` number of business links

`wealth` wealth's index

`priorates` number of priorates on control

`seat` At least priorate

## Source

PADGETT, J. F. Y C. K. ANSELL (1993): "Robust Action and the Rise of the Medici, 1400-1434", in American Journal of Sociology, 98, 1259-1319. (http://www.jstor.org/stable/2781822)

## Examples

```
data("families")
head(families)
```

---

# finches *Data: Finches'attributes in Galapagos islands.*

---

## Description

Data frame with events as result.

## Usage

```
data("finches")
```

## Format

A data frame with 13 observations (pinches) and 4 variables (name and characteristics):

`name` : Genus and species of the finche

`frequency` : number of islands where the finche can be found

`type` : Genus of the finche

`species` : name of the file containing the picture of the finche

## References

Sanderson, James (2000). Testing Ecological Patterns: A Well-known Algorithm from Computer Science Aids the Evaluation of Species Distributions. American Scientist, 88, pp. 332-339.

## Examples

```
data(finches)
head(finches,10)
```

## fromIgraph *Produce interactive networks from igraph objects.*

### Description

fromIgraph produce an interactive network from an igraph object.

### Usage

```
fromIgraph(G, ...)
```

### Arguments

| | |
|---|---|
| G | an igraph object. |
| ... | Any netCoin argument. |

### Value

This function returns a netCoin object. If the 'dir' attribute is specified, the function creates a folder in the computer with an HTML document named index.html which contains the produced graph. This file can be directly opened with your browser and sent to a web server to work properly.

### Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

### References

Escobar, M. and Martinez-Uribe, L. (2020) Network Coincidence Analysis: The netCoin R Package. *Journal of Statistical Software*, **93**, 1-32. doi: 10.18637/jss.v093.i11.

## Galapagos *Data: Finches' presence in Galapagos Islands.*

### Description

Data frame with absence(0) presence(1) of finches in the Galagos Islands.

### Usage

```
data("Galapagos")
```

## Format

A data frame with 17 localizations (islands) and 13 variables (Genus and species of the finches):

Geospiza magnirostris

Geospiza fortis

Geospiza fuliginosa

Geospiza difficilis

Geospiza scandens

Geospiza conirostris

Camarhynchus psitticula

Camarhynchus pauper

Camarhynchus parvulus

Platyspiza crassirostris

Cactospiza pallida

Cactospiza heliobates

Certhidea olivacea

## References

Sanderson, James (2000). Testing Ecological Patterns: A Well-known Algorithm from Computer Science Aids the Evaluation of Species Distributions. American Scientist, 88, pp. 332-339.

## Examples

```
data(Galapagos)
head(Galapagos,10)
```

---

# glmCoin *Regression Graphs*

---

## Description

produces a netCoin object from a set of glm regressions.

## Usage

```
glmCoin(formulas, data, weights=NULL, pmax=.05,
                    twotail=FALSE, showArrows=TRUE,
                    frequency = FALSE, percentage = TRUE,
                    color="variable", lwidth="z.value",
                    circle= NA, language=c("en","es","ca"),
                    igraph=FALSE, ...)
```

## Arguments

| | |
|---|---|
| formulas | A set of formulas separated, folowed by the family and a return. For example: model <- "counts ~ outcome + treatment, poisson counts ~ outcome, poisson" |
| data | Data frame containing the variables in the model. |
| weights | Optional vector of weights to be used in the fitting process. |
| pmax | Selection of links with Pr(>\|z\|) less than p (one-tail by default). |
| twotail | Logical value indicating if twotail test must be appied. Defaul=FALSE. |
| showArrows | a logical value true if the directional arrows are to be shown. Default = FALSE. |
| frequency | a logical value true if frequencies are to be shown. Default=FALSE. |
| percentage | a logical value true if percentages are to be shown. Default=TRUE. |
| color | Nodes' attribute to be used for expressing color ("variable" by default). |
| lwidth | Nodes' attribute to be used for widht of arrows ("z.value" by default). |
| circle | Degre of rotation in case of fixed circled dependent variables. |
| language | Language of the graph controls. |
| igraph | Produces an igraph object instead of a netCoin object if TRUE. |
| ... | Any netCoin argument. |

## Value

This function creates a netCoin object (or igraph) and, if stated, a folder in the computer with an HTML document named index.html which contains the produced graph. This file can be directly opened with your browser and sent to a web server to work properly.

## Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

## Examples

```
## Dobson (1990) Page 93: Randomized Controlled Trial :
counts <- c(18,17,15,20,10,20,25,13,12)
outcome <- gl(3,1,9)
treatment <- gl(3,3)
Dobson <- data.frame(counts=counts, outcome=outcome, treatment=treatment)
model <- "counts ~ outcome + treatment, poisson"
glmCoin(model,Dobson)
```

incTime *Time incidences.*

## Description

Convert a data frame with two numbers (normally a beginning year and end year) into an incidences matrix whose rows are the intermediate numbers, and whose columns are the content of the names column.

## Usage

```
incTime(data, name = "name", beginning = "birth", end= "death")
```

## Arguments

| | |
|---|---|
| data | a data frame a name and two numbers. |
| name | Column with the names (default= "name"). |
| beginning | Column with the beginning number to include (default= "birth"). |
| end | Column with the end number to include (default= "death"). |

## Value

A data frame in which the two first columns are source and target. The rest of the columns are sim.=(1+threshold-real difference) and dist.=(difference between numbers)

## Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

## Examples

```
# From sociologists data
data("sociologists")
head(incTime(sociologists))[,1:5]
```

## layoutCircle *Produce a circle layout of any number of nodes.*

### Description

`layoutCircle` produces a circle layout of any number of nodes.

### Usage

```
layoutCircle(N,nodes,deg=0,name=NULL)
```

### Arguments

| | |
|---|---|
| `N` | a data frame of nodes. |
| `nodes` | a vector specifing nodes. |
| `deg` | degrees to rotate. |
| `name` | name of column with node names. |

### Value

This function returns the input data frame of nodes with the resulting layout applied.

### Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

## layoutGrid *Produce a layout of any number of nodes.*

### Description

`layoutGrid` produces a grid layout of any number of nodes.

### Usage

```
layoutGrid(N,string,name=NULL)
```

### Arguments

| | |
|---|---|
| `N` | a data frame of nodes. |
| `string` | a character vector specifing grouped nodes. |
| `name` | name of column with node names. |

## Value

This function returns the input data frame of nodes with the resulting layout applied.

## Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

---

# links *Data: Links between Italian families in the Renaissance.*

---

## Description

Data frame with the marriage and business links.

## Usage

```
data("links")
```

## Format

A data frame with 36 links (rows) amongst 16 Italian families in the Renaissance.

`Albizzi`

`Acciaiuoli`

`Barbadori`

`Bischeri`

`Castellani`

`Guadagni`

`Lamberteschi`

`Medici`

`Pazzi`

`Peruzzi`

`Ridolfi`

`Salviati`

`Strozzi`

`Tornabuoni`

`Ginori`

`Pucci`

`link` Type of link: marriage or business

## Source

PADGETT, J. F. Y C. K. ANSELL (1993): "Robust Action and the Rise of the Medici, 1400-1434", in American Journal of Sociology, 98, 1259-1319. (http://www.jstor.org/stable/2781822)

## Examples

```
data("links")
head(links)
```

---

`lower` *Similarity/distance matrix display.*

---

## Description

Display the lower part of a matrix with a specified number of decimals.

## Usage

```
lower(matrix, decimals = 3)
```

## Arguments

| | |
|---|---|
| `matrix` | a symmetric similarity/distance matrix |
| `decimals` | number of decimals to be displayed |

## Value

A data frame of characters.

## Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

## Examples

```
# From a random incidence matrix I(25X4)
I <- matrix(rbinom(100, 1, .5), nrow = 25, ncol = 4,
     dimnames = list(NULL, c("A", "B", "C", "D")))
lower(sim(I, "Jaccard"), 2)
```

mobileEdges *Mobile Edges.*

## Description

Convert a data frame with one number (normally a year) into an edge list form with those whose numbers (years) have a difference lower or equal to a quantity.

## Usage

```
mobileEdges(data, name = 1, number = 2, difference=0)
```

## Arguments

| | |
|---|---|
| data | a data frame with a name and a number (year). |
| name | Column with the names (default= first column). |
| number | Column with the number (year) to compare (default= second column. |
| difference | Minimum difference between numbers of every two pair of names to create the edge or link (default=15). |

## Value

A data frame in which the two first columns are source and target. The rest of the columns are sim.=(1+threshold-real difference) and dist.=(difference between numbers)

## Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

## Examples

```
# From a random incidence matrix I(25X4)
data("sociologists")
mobileEdges(sociologists)
```

`multigraphCreate` *Produce interactive multi graphs.*

## Description

`multigraphCreate` produce an interactive multi graph.

## Usage

```
multigraphCreate(..., mode = c("default","parallel","frame"),
                 frame = 0, speed = 50, dir = "MultiGraph", show = TRUE)
```

## Arguments

| | |
|---|---|
| `...` | coin graphs (netCoin, barCoin, timeCoin) objects or html "directories". |
| `mode` | a string specifying the displaying mode. The "default" displays graphs one by one, "parallel" splits screen and "frame" allows dinamic graphs in time. |
| `frame` | number of frame to start a dynamic network. |
| `speed` | a percentage for frame speed in dynamic networks. |
| `dir` | a "character" string representing the directory where the graph will be saved. |
| `show` | a logical value true if the graph is to be shown. Default = TRUE. |

## Value

The function creates a folder in your computer with an HTML document named index.html which contains the graph. This file can be directly opened with your browser.

## Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

## Examples

```
## Not run:
# A character column (with separator)
frame <- data.frame(A = c("Man; Women", "Women; Women",
                          "Man; Man", "Undet.; Women; Man"))
data <- dichotomize(frame, "A", sep = "; ")[2:4]
C <- coin(data) # coincidence matrix
N <- asNodes(C) # node data frame
E <- edgeList(C,c("frequency","expected","haberman")) # edge data frame
bC<- barCoin(data,dichotomies="_all") # barCoin object
cC<- barCoin(data,dichotomies="_all",expected=TRUE) # barCoin object
nC<- netCoin(N,E) # netCoin object
multigraphCreate("Bar graph" = bC,
                 "Conditional bar graph" = cC,
```

```
                  "Net graph"=nC,
                  dir="./example") # See ./example/index.html file

## End(Not run)
```

---

`netCoin` *Networked coincidences.*

---

## Description

`netCoin` produces a netCoin object of coincidences. Its input has to be two data.frames: one of attributes of events or nodes, and the other of attributes of the edges or links.

## Usage

```
netCoin(nodes, links = NULL, tree = NULL, name = NULL, label = NULL,
        labelSize = NULL, size = NULL, color = NULL, shape = NULL,
        legend = NULL, ntext = NULL, info = NULL,
        orderA = NULL, orderD = NULL, group = NULL, community = NULL,
        lwidth = NULL, lweight = NULL, lcolor = NULL, ltext = NULL,
        nodeFilter = NULL, linkFilter = NULL, degreeFilter = NULL,
        nodeBipolar = FALSE, linkBipolar = FALSE, defaultColor = "#1f77b4",
        distance = 10, repulsion = 25, zoom = 1, fixed = showCoordinates,
        scenarios = NULL, main = NULL, note = NULL, help = NULL,
        helpOn = FALSE, cex = 1, background = NULL, layout = NULL,
        limits = NULL, controls = 1:5, mode = c("network","heatmap"),
        showCoordinates = FALSE, showArrows = FALSE, showLegend = TRUE,
        showAxes = FALSE, axesLabels = NULL, language = c("en","es","ca"),
        image = NULL, imageNames = NULL, dir = NULL)
```

## Arguments

| | |
|---|---|
| `nodes` | a data frame with at least one vector of names. |
| `links` | a data frame with at least two vectors with source and target, including names of nodes. |
| `tree` | a data frame with two vectors: source and target, describing relationships between nodes. |
| `name` | name of the vector with names in the nodes data frame. By default, if language="en", name is "name". |
| `label` | name of the vector with labels in the nodes data frame. |
| `group` | name of the vector with groups in the nodes data frame. |
| `community` | algorithm to make communities: edge_betweenness("ed"), fast_greedy("fa"), label_prop("la"), leiden_eigen("le"), louvain("lo"), optimal("op"), spinglass("sp"), walktrap("wa") |
| `labelSize` | name of the vector with label size in the nodes data frame. |

| | |
|---|---|
| size | name of the vector with size in the nodes data frame. |
| color | name of the vector with color variable in the nodes data frame. |
| shape | name of the vector with shape variable in the nodes data frame. |
| legend | name of the vector with the variable to represent as a legend in the nodes data frame. |
| ntext | name of the vector with html text in the nodes data frame. |
| info | name of the vector with information to display in a panel in the nodes data frame. |
| orderA | name of the vector with node ascending order in the nodes data frame. |
| orderD | name of the vector with node descending order in the nodes data frame. |
| lwidth | name of the vector with width variable in the links data frame. |
| lweight | name of the vector with weight variable in the links data frame. |
| lcolor | name of the vector with color variable in the links data frame. |
| ltext | name of the vector with labels in the links data frame. |
| nodeFilter | condition for filtering nodes. |
| linkFilter | condition for filtering links. |
| degreeFilter | numeric vector to filter the resulting network by degree. |
| nodeBipolar | a logical value that polarizes negative and positive node values in the graphical representation. Default = FALSE. |
| linkBipolar | a logical value that polarizes negative and positive link values in the graphical representation. Default = FALSE. |
| defaultColor | a character vector giving a valid html color. |
| repulsion | a percentage for repulsion between nodes. |
| distance | a percentage for distance of links. |
| zoom | a number between 0.1 and 10 to start displaying zoom. |
| fixed | prevent nodes from being dragged. |
| scenarios | a note showing number of scenarios. |
| main | upper title of the graph. |
| note | lower title of the graph. |
| help | help text of the graph. |
| helpOn | Should the help be shown at the beginning? |
| background | background color or image of the graph. |
| layout | a matrix with two columns or an algorithm to elaborate the coordinates: davidson.harel drl("da"), circle("ci"), fruchterman.reingold("fr"), gem("ge"), grid("gr"), kamada.kawai("ka"), lgl("lg"), mds("md"), random("ra"), reingold.tilford("re"), star("sta"), sugiyama("sug") |
| limits | vector indicating size references to display layout, must be a numeric vector of length 4: x1, y1, x2, y2. |
| cex | number indicating the amount by which plotting text should be scaled relative to the default. Default = 1. |

| | |
|---|---|
| controls | a numeric vector indicating which controls will be shown. 1 = sidebar, 2 = selection buttons, 3 = tables, 4 = sliders & buttons, 5 = export buttons. NULL hide all controls, negative values deny each control and 0 deny all. |
| mode | a character vector indicating the graph mode allowed: network, heatmap or both (both by default). |
| showCoordinates | a logical value true if the coordinates are to be shown in tables and axes. Default = FALSE. |
| showArrows | a logical value true if the directional arrows are to be shown. Default = FALSE. |
| showLegend | a logical value true if the legend is to be shown. Default = TRUE. |
| showAxes | a logical value true if the axes are to be shown. Default = FALSE. |
| axesLabels | a character vector giving the axes names. |
| language | a character vector (es=spanish; en=english; ca=catalan). |
| image | name of the vector with image files in the nodes data frame. |
| imageNames | name of the vector with names for image files in the nodes data frame. |
| dir | a "character" string representing the directory where the web files will be saved. |

## Value

This function returns a netCoin object. If the 'dir' attribute is specified, the function creates a folder in the computer with an HTML document named index.html which contains the produced graph. This file can be directly opened with your browser and sent to a web server to work properly.

## Note

nodes and links arguments can be substituted by a netCoin object to add or change options to it.

## Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

## References

Escobar, M. and Martinez-Uribe, L. (2020) Network Coincidence Analysis: The netCoin R Package. *Journal of Statistical Software*, **93**, 1-32. doi: 10.18637/jss.v093.i11.

## Examples

```
# A character column (with separator)
frame <- data.frame(A = c("Man; Women", "Women; Women",
                          "Man; Man", "Undet.; Women; Man"))
data <- dichotomize(frame, "A", sep = "; ")[2:4]
C <- coin(data) # coincidence matrix
N <- asNodes(C) # node data frame
E <- edgeList(C) # edge data frame
netCoin(N, E) # netCoin object
```

netCorr *Networked correlations.*

## Description

netCorr produces a network object of correlations. Its input has to be at least one set of quantitative variables.

## Usage

```
netCorr(variables, weight=NULL, pairwise=FALSE,
        minimum=-Inf, maximum=Inf, sort=FALSE, decreasing=TRUE,
        frequency=FALSE, means=TRUE,
        method="pearson", criteria="p", Bonferroni=FALSE,
        minL=0, maxL=Inf,
        sortL=NULL, decreasingL=TRUE,
        igraph=FALSE, ...)
```

## Arguments

| | |
|---|---|
| variables | a data frame with at least two quantitative variables. |
| weight | a vector of weights. Optimal for data.framed tables |
| pairwise | Pairwise mode of handling missing values if TRUE. Listwise by default. |
| minimum | minimum frequency to be considered |
| maximum | maximum frequency to be considered |
| sort | sort the correlation matrix according to the frequency of the events |
| decreasing | decreasing or increasing sort of the matrix |
| frequency | a logical value true if frequencies are to be shown. Default=FALSE. |
| means | a logical value true if means are to be shown. Default=TRUE. |
| method | a vector of statistics of similarity. Pearson correlation by default. spearman and kendall are also possible |
| criteria | statistic to be use for selection criteria. |
| Bonferroni | Bonferroni criterium of the signification test. |
| minL | minimum value of the statistic to include the edge in the list. |
| maxL | maximum value of the statistic to include the edge in the list. |
| sortL | sort the list according to the values of a statistic. See below |
| decreasingL | order in a decreasing way. |
| igraph | Produces an igraph object instead of a netCoin object if TRUE |
| ... | Any netCoin argument. |

## Value

The function creates a netCoin object and eventually a folder in the computer with an HTML document named index.html which contains the produced graph. This file can be directly opened with your browser and sent to a web server to work properly.

## Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

## Examples

```
# A character column (with separator)
data(iris)
netCorr(iris[,1:4],ltext="value",
 main="Correlations between measurements of Iris Species",
 note="Anderson, Edgar (1935) y Fisher, R. A. (1936)") # network object
```

---

# pathCoin *Structural Equation Models Graphs.*

---

## Description

pathCoin produces a netCoin object from a lavaan object, i.e., parameters of structural equation model.

## Usage

```
pathCoin(model, estimates=c("b","se","z","pvalue","beta"),
         fitMeasures=c("chisq", "cfi", "rmsea"), ...)
```

## Arguments

| | |
|---|---|
| model | a lavaan object. |
| estimates | A vector with at least one element amongst "b", "se", "z", "pvalue", "beta". |
| fitMeasures | Default values: "chisq", "df", "pvalue", "cfi", "rmsea" |
| ... | Any netCoin argument. |

## Value

The function creates a netCoin object and eventually a folder in the computer with an HTML document named index.html which contains the produced graph. This file can be directly opened with your browser and sent to a web server to work properly.

## Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

## Examples

```
# Classic Wheaton et al. model
library(lavaan)
lower <- '
11.834
6.947 9.364
6.819 5.091 12.532
4.783 5.028 7.495 9.986
-3.839 -3.889 -3.841 -3.625 9.610
-21.899 -18.831 -21.748 -18.775 35.522 450.288 '
wheaton.cov <- getCov(lower,
               names = c("anomia67", "powerless67","anomia71", "powerless71",
                         "education", "sei"))
wheaton.model <- '
# latent variables
ses =~ education + sei
alien67 =~ anomia67 + powerless67
alien71 =~ anomia71 + powerless71
# regressions
alien71 ~ alien67 + ses
alien67 ~ ses
# correlated residuals
anomia67 ~~ anomia71
powerless67 ~~ powerless71
'
fit <- sem(wheaton.model, sample.cov = wheaton.cov, sample.nobs = 932)

pathCoin(fit)
```

---

`propCoin` *Express Coin Entries as Fraction of Marginal Table*

---

## Description

This is like 'prop.table' for 'coin' objects.

## Usage

```
propCoin(x, margin= 0, decimals=1)
```

## Arguments

| | |
|---|---|
| `x` | 'coin' object. |
| `margin` | index, or vector of indices to generate margin for. |
| `decimals` | integer indicating the number of decimal places to be used. |

## Value

Table like 'x' expressed relative to 'margin'.

### Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

### Examples

```
## Random incidence matrix: 25 scenarios, 4 events.
I <- matrix(rbinom(100, 1, .5), nrow = 25, ncol = 4,
            dimnames = list(NULL, c("A", "B", "C", "D")))
C <- coin(I, sort = TRUE)

propCoin(C, 1)
```

---

## savePajek *Save a netCoin object as a .net (.paj) file to be read in Pajek, Gephi, ...*

---

### Description

savePajek produces a .net (.paj) file from a netCoin object.

### Usage

```
savePajek(net, file="file.net", arcs=NULL, edges=NULL,
          partitions=NULL, vectors=NULL)
```

### Arguments

| | |
|---|---|
| net | a netCoin object. |
| file | The name of the file without extension. It will be .net or .paj acoording to data. The default is file.net or file.paj |
| arcs | Names of netCoin$links to be included and considered as arcs in the Pajek file.. |
| edges | Names of netCoin$links to be included and considered as edges in the Pajek file.. |
| partitions | Names of netCoin$nodes to be included and considered as partitions in the Pajek file. |
| vectors | Names of netCoin$nodes to be included and considered as vectors in the Pajek file. |

### Value

The function creates a file with vertices and arcs or edges of a netCoin objetct. Vectors and partitions can be also included. .

### Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

## Examples

```
## Not run:
# A character column (with separator)
frame <- data.frame(A = c("Man; Women", "Women; Women",
                          "Man; Man", "Undet.; Women; Man"))
data <- dichotomize(frame, "A", add=FALSE, sep = "; ")
graph <- allNet(data) # graph from an incidence matrix

savePajek(graph,"graph",edges="Haberman") # save graph.net file

## End(Not run)
```

---

shinyCoin *Include netCoin Plots in Shiny.*

---

## Description

Load a netCoin plot to display in shiny.

## Usage

```
shinyCoin(x)
```

## Arguments

| | |
|---|---|
| x | is a netCoin, barCoin or timeCoin object. |

## Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

## Examples

```
## Not run:
# A character column (with separator)
frame <- data.frame(A = c("Man; Women", "Women; Women",
                          "Man; Man", "Undet.; Women; Man"))
data <- dichotomize(frame, "A", sep="; ")[2:4]
C <- coin(data) # coincidence matrix
N <- asNodes(C) # node data frame
E <- edgeList(C) # edge data frame
net <- netCoin(N, E) # netCoin object
shinyCoin(net)

## End(Not run)
```

`sim` *Similarity matrix.*

## Description

It calculates a similarity/distance matrix from either an incidence data frame/matrix or a coin object.

## Usage

```
sim(input, procedures="Jaccard", level=.95, distance=FALSE,
    minimum=1, maximum=Inf, sort=FALSE, decreasing=FALSE,
    weight = NULL, pairwise = FALSE)
```

## Arguments

| | |
|---|---|
| `input` | a binary data frame or a coin object, let's say an R list composed by a number of scenarios (`$n`) and a coincidence matrix with frequencies (`$f`). |
| `procedures` | a vector of statistics of similarity. See details below. |
| `level` | confidence level |
| `distance` | convert the similarity matrix into a distance matrix |
| `minimum` | minimum frequency to obtain a similarity/distance measure. |
| `maximum` | maxium frequency to obtain a similarity/distance measure. |
| `sort` | sort the list according to the values of a statistic. See details below |
| `decreasing` | order in a decreasing way. |
| `weight` | a vector of weights. Optimal for data.framed tables |
| `pairwise` | Pairwise mode of handling missing values if TRUE. Listwise by default. |

## Details

Possible measures in procedures are

- Frequencies (f), Relative frequencies (x), Conditional frequencies (i), Coincidence degree (cc), Probable degree (cp),
- Expected (e), Confidence interval (con)
- Matching (m), Rogers & Tanimoto (t), Gower (g), Sneath (s), Anderberg (and),
- Jaccard (j), Dice (d), antiDice (a), Ochiai (o), Kulczynski (k),
- Hamann (ham), Yule (y), Pearson (p), odds ratio (od), Rusell (r),
- Haberman (h), Z value of Haberman (z).
- Hypergeometric p greater value (hyp).

## Value

A similarity/distance matrix.

## Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

## Examples

```
# From a random incidence matrix I(25X4)
I<-matrix(rbinom(100,1,.5),nrow=25,ncol=4,
   dimnames=list(NULL,c("A","B","C","D")))
sim(I)
#Same results
C<-coin(I)
sim(C)
```

---

`sociologists` *Data: Sociologists born in the 19th century.*

---

## Description

Data frame with names, birth and death year data, birth country and movement.

## Usage

```
data("sociologists")
```

## Format

A data frame with 33 observations and the following 4 variables (events) to study coincidences in time:

`name` : name and last name of the sociologist

`birth` : birth year

`death` : death year

`birthcountry` : birth country

`movements` : movement or school of thought

## Source

Own elaboration from manuals of sociology.

## References

See `events`.

## Examples

```
data(sociologists)
head(sociologists, 10)
tail(sociologists, 10)
```

---

surCoin *Networked coincidences from a data frame.*

---

## Description

surCoin produces a network object of coincidences from a data frame converting variables into dichotomies.

## Usage

```
surCoin(data,variables=names(data), commonlabel=NULL,
        dichotomies=NULL, valueDicho=1, metric=NULL, exogenous=NULL,
        weight=NULL, subsample=FALSE, pairwise=FALSE,
        minimum=1, maximum=nrow(data), sort=FALSE, decreasing=TRUE,
        frequency=FALSE, percentages=TRUE,
        procedures="Haberman", criteria="Z", Bonferroni=FALSE,
        support=-Inf, minL=-Inf, maxL=Inf,
        directed=FALSE, diagonal=FALSE, sortL=NULL, decreasingL=TRUE,
        igraph=FALSE, coin=FALSE, dir=NULL, ...)
```

## Arguments

| | |
|---|---|
| data | a data frame |
| variables | a vector of variables included in the previous data frame |
| commonlabel | a vector of variables whose names are to be included in nodes labels |
| dichotomies | a vector of dichotomous variables to appear as just one category |
| valueDicho | value to be selected for dichotomous variables. Default is 1 |
| metric | a vector of metrics |
| exogenous | a vector of variables whose relations amongst them are of no interest. None by default |
| weight | a vector of weights. Optimal for data.framed tables |
| subsample | retrict the analysis to scenarios with at least one event |
| pairwise | Pairwise mode of handling missing values if TRUE. Listwise by default. |
| minimum | minimum frequency to be considered |
| maximum | maximum frequency to be considered |
| sort | sort the coincidence matrix according to frequency of events |
| decreasing | decreasing or increasing sort of the matrix |
| frequency | a logical value true if frequencies are to be shown. Default=FALSE. |

| | |
|---|---|
| percentages | a logical value true if percentages are to be shown. Default=TRUE. |
| procedures | a vector of statistics of similarity. See below. |
| criteria | statistic to be use for selection criteria. |
| Bonferroni | Bonferroni criterium of the signification test. |
| support | minimum value of the frequency of the coincidence to be edged |
| minL | minimum value of the statistic to include the edge in the list. |
| maxL | maximum value of the statistic to include the edge in the list. |
| directed | includes same edges only once. |
| diagonal | includes auto-links |
| sortL | sort the list according to the values of a statistic. See below |
| decreasingL | order in a decreasing way. |
| igraph | Produces an igraph object instead of a netCoin object if TRUE. |
| coin | Only return the coincidences matrix if TRUE |
| dir | a "character" string representing the directory where the web files will be saved. |
| ... | Any netCoin argument. |

## Details

Possible measures in procedures are

- Frequencies (f), Relative frequencies (x), Conditional frequencies (i), Coincidence degree (cc), Probable degree (cp),
- Expected (e), Confidence interval (con)
- Matching (m), Rogers & Tanimoto (t), Gower (g), Sneath (s), Anderberg (and),
- Jaccard (j), Dice (d), antiDice (a), Ochiai (o), Kulczynski (k),
- Hamann (ham), Yule (y), Pearson (p), odds ratio (od), Rusell (r),
- Haberman (h), Z value of Haberman (z),
- Hypergeometric p greater value (hyp).
- Convert a matrix into an edge list (shape).

## Value

This function creates a netCoin object (or igraph) and, if stated, a folder in the computer with an HTML document named index.html which contains the produced graph. This file can be directly opened with your browser and sent to a web server to work properly.

## Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

## References

Escobar, M. and Martinez-Uribe, L. (2020) Network Coincidence Analysis: The netCoin R Package. *Journal of Statistical Software*, **93**, 1-32. doi: 10.18637/jss.v093.i11.

## Examples

```
# A data frame with two variables Gender and Opinion
frame<-data.frame(Gender=c(rep("Man",3),rep("Woman",3)),
                  Opinion=c("Yes","Yes","No","No","No","Yes"))
surCoin(frame,commonlabel="") # network object
```

---

`timeCoin` *Networked coincidences.*

---

## Description

`timeCoin` produces a timeCoin object.

## Usage

```
timeCoin(nodes, name = "name", start = "start", end = "end", group = NULL,
         text = NULL, main = NULL, note = NULL, info = NULL, events = NULL,
       eventChild = "eventChild", eventParent = "eventParent", eventTime = "Time",
         eventColor = NULL, eventShape = NULL,
         cex = 1, language = c("en","es","ca"), dir = NULL)
```

## Arguments

| | |
|---|---|
| `nodes` | a data frame with at least three vectors of names, start and end. |
| `name` | name of the vector with names in the nodes data frame. |
| `start` | name of the vector with starts in the nodes data frame. |
| `end` | name of the vector with ends in the nodes data frame. |
| `group` | name of the vector with groups in the nodes data frame. |
| `text` | name of the vector with html text in the nodes data frame. |
| `main` | upper title of the graph. |
| `note` | lower title of the graph. |
| `info` | name of the vector with information to display in a panel in the nodes data frame. |
| `events` | a data frame of events realted to nodes with three columns: node name, event name and event date |
| `eventChild` | name of the vector with sources in the events data frame. |
| `eventParent` | name of the vector with targets in the events data frame. |
| `eventTime` | name of the vector with time points in the events data frame. |
| `eventColor` | name of the vector with color criteria in the events data frame. |
| `eventShape` | name of the vector with shape criteria in the events data frame. |
| `cex` | number indicating the amount by which plotting text should be scaled relative to the default. Default = 1. |
| `language` | a character vector (es=spanish; en=english; ca=catalan). |
| `dir` | a "character" string representing the directory where the web files will be saved. |

## Value

Object of class timeCoin.

## Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

## Examples

```
# Database of 19th century sociologists
data(sociologists)
timeCoin(sociologists,"name","birth","death","birthcountry")
```

---

# toIgraph *igraph object.*

---

## Description

igraph object from a netCoin object.

## Usage

```
toIgraph(net)
```

## Arguments

| | |
|---|---|
| net | is a netCoin object. See netCoin |

## Value

An igraph object.

## Author(s)

Modesto Escobar, Department of Sociology and Communication, University of Salamanca. See https://sociocav.usal.es/blog/modesto-escobar/

## Examples

```
# A character column (with separator)
frame <- data.frame(A = c("Man; Women", "Women; Women",
                          "Man; Man", "Undet.; Women; Man"))
data <- dichotomize(frame, "A", sep="; ")[2:4]
C <- coin(data) # coincidence matrix
N <- asNodes(C) # node data frame
E <- edgeList(C) # edge data frame
net <- netCoin(N, E) # netCoin object
toIgraph(net) # conversion into a igraph object
```

# Index