Package ‘magree’

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Type Package

Title Implements the O’Connell-Dobson-Schouten Estimators of Agreement for Multiple Observers

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Depends graphics

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landis  

Landis and Koch dataset.

Description

Canonical dataset for agreement for multiple observers described in Landis and Koch (Biometrics 1977; 33: 363-374).

Usage

data("landis")

Format

The format is: int [1:118, 1:7] 4 1 3 4 3 2 1 3 2 1 ... - attr(*, "dimnames")=List of 2 ..$ : chr [1:118] "1" "2" "3" "4" ... ..$ : chr [1:7] "A" "B" "C" "D" ...

Source

Landis and Koch (Biometrics 1977; 33: 363-374)

Examples

data(landis)
## maybe str(landis) ; plot(landis) ...

magree  

O’Connell-Dobson-Schouten estimators for multiobserver agreement.

Description

Use the O’Connell-Dobson-Schouten estimators of agreement for nominal or ordinal data.

Usage

magree(X, weights=c("unweighted","linear","quadratic"), score = NULL)

Arguments

X  
A matrix or data-frame with observations/subjects as rows and raters as columns.

weights  
"unweighted" For nominal categories - only perfect agreement is counted.  
"linear" For ordinal categories where disagreement is proportional to the distance between the categories. This is analogous to the agreement weights $w_{ij} = 1 - |score[i] - score[j]|/(max(score) - min(score))$.
,"quadratic" For ordinal categories where disagreement is proportional to the square of the distance between the categories. This is analogous to the agreement weights $w_{i,j} = 1 - \frac{(score[i] - score[j])^2}{(max(score) - min(score))^2}$.

**score** The scores that are to be assigned to the categories. Currently, this defaults to a sorted list of the unique values.

**Details**

The Fortran code from Professor Dianne O'Connell was adapted for R.

The output object is very similar to the Fortan code. Not all of the variance terms are currently used in the `print` and `summary` methods.

**Value**

- **oconnell** object from the `oconnell` function
- **schouten** object from the `schouten` function
- **call** As per `sys.call()`, to allow for using `update`

**See Also**

- `oconnell`, `schouten`

**Examples**

```r
## Table 1 (O'Connell and Dobson, 1984)
summary(fit <- magree(landis, weights="unweighted"))
update(fit, weights="linear")
update(fit, weights="quadratic")

## Table 5, O'Connell and Dobson (1984)
magree(landis==1)
magree(landis==2)
magree(landis==3)
magree(landis==4)
magree(landis==5)

## Plot of the marginal distributions
plot(fit)

## Plot of the average agreement by observer
plot(fit, type="kappa by observer")
```
Description

Use the O’Connell-Dobson estimator of agreement for nominal or ordinal data. This includes a range of statistics on agreement for assuming either distinct or homogeneous items.

Usage

\[ oconnell(X, \text{weights}=c("unweighted","linear","quadratic"), i=NULL, score = NULL) \]

Arguments

\textbf{X} \hspace{1cm} A matrix or data-frame with observations/subjects as rows and observers as columns.

\textbf{weights} \hspace{1cm} "unweighted" For nominal categories - only perfect agreement is counted.

"linear" For ordinal categories where disagreement is proportional to the distance between the categories. This is analogous to the agreement weights \( w_{i,j} = 1 - |\text{score}[i] - \text{score}[j]|/(\max(\text{score}) - \min(\text{score})) \).

"quadratic" For ordinal categories where disagreement is proportional to the square of the distance between the categories. This is analogous to the agreement weights \( w_{i,j} = 1 - (\text{score}[i] - \text{score}[j])^2/(\max(\text{score}) - \min(\text{score}))^2 \).

\textbf{i} \hspace{1cm} 1. For nominal categories - only perfect agreement is counted.

2. For ordinal categories where disagreement is proportional to the distance between the categories. This is analogous to the agreement weights \( w_{i,j} = 1 - |\text{score}[i] - \text{score}[j]|/(\max(\text{score}) - \min(\text{score})) \).

3. For ordinal categories where disagreement is proportional to the square of the distance between the categories. This is analogous to the agreement weights \( w_{i,j} = 1 - (\text{score}[i] - \text{score}[j])^2/(\max(\text{score}) - \min(\text{score}))^2 \).

This argument takes precedence over \textbf{weights} if it is specified.

\textbf{score} \hspace{1cm} The scores that are to be assigned to the categories. Currently, this defaults to 1:L, where codeL is the number of categories.

Details

The Fortran code from Professor Dianne O’Connell was adapted for R.

The output object is very similar to the Fortan code. Not all of the variance terms are currently used in the \texttt{print}, \texttt{summary} and \texttt{plot} methods.
Value

\[ X \quad \text{As input} \]
\[ i \quad \text{As input} \]
\[ nrater \quad \text{Number of observers} \]
\[ nscore \quad \text{Number of categories} \]
\[ nsubj \quad \text{Number of subjects} \]
\[ p1[j,k] \quad \text{Probability of observer } j \text{ giving score } k \text{ when observers are distinct} \]
\[ p2[k] \quad \text{Probability of score } k \text{ when observers are homogeneous} \]
\[ w1[j,k] \quad \text{Weighted average of } d[] \text{ for observer } j, \text{ score } k \]
\[ w2[k] \quad \text{Weighted average of } d[] \text{ for score } k \text{ when observers are homogeneous} \]
\[ d[j] \quad \text{Amount of disagreement for subject } j \]
\[ s1[j] \quad \text{Chance-corrected agreement statistic for subject } j \text{ when observers are distinct} \]
\[ s2[j] \quad \text{Chance-corrected agreement statistic for subject } j \text{ when observers are homogeneous; } s[j] = 1-d[j]/\text{expdel}. \]
\[ \delta[j,k] \quad j<k: \text{amount of disagreement expected by change for observers } j \text{ and } k; \ j>k \text{ amount of disagreement expected by chance for observers } j \text{ and } k \text{ when observers are homogeneous} \]
\[ \text{expd1} \quad \text{Amount of disagreement expected by chance in null case when observers are distinct} \]
\[ \text{expd2} \quad \text{Amount of disagreement expected by chance when observers are homogeneous} \]
\[ \text{d-bar} \quad \text{Average value of } d[] \text{ over all subjects} \]
\[ \text{sav1} \quad \text{Chance-corrected agreement statistic over all subjects when observers are distinct} \]
\[ \text{sav2} \quad \text{Chance-corrected agreement statistic over all subjects when observers are homogeneous} \]
\[ \text{var0s1} \quad \text{Null variance of } S \text{ when observers are distinct} \]
\[ \text{var0s2} \quad \text{Null variance of } S \text{ when observers are homogeneous} \]
\[ \text{vars1} \quad \text{Unconstrained variance of } S \text{ when observers are distinct} \]
\[ \text{vars2} \quad \text{Unconstrained variance of } S \text{ when observers are homogeneous} \]
\[ \text{v0sav1} \quad \text{Null variance of } \text{Sav} \text{ when observers are distinct} \]
\[ \text{v0sav2} \quad \text{Null variance of } \text{Sav} \text{ when observers are homogeneous} \]
\[ \text{vsav1} \quad \text{Unconstrained variance of } \text{Sav} \text{ when observers are distinct} \]
\[ \text{vsav2} \quad \text{Unconstrained variance of } \text{Sav} \text{ when observers are homogeneous} \]
\[ \text{p0sav1} \quad \text{Probability of overall agreement due to chance when observers are distinct} \]
\[ \text{p0sav2} \quad \text{Probability of overall agreement due to chance when observers are homogeneous} \]
\[ \text{resp}[i,j] \quad \text{Response for observer } i \text{ on subject } j; \text{ transpose of } X \text{ (BEWARE)} \]
\[ \text{score}(i) \quad \text{Score associated with } i\text{'th category} \]
\[ \text{call} \quad \text{As per sys.call(), to allow for using update} \]
See Also

`magree, schouten`.

Examples

```r
## Table 1 (O'Connell and Dobson, 1984)
summary(fit <- oconnell(landis, weights="unweighted"))
update(fit, weights="linear")
update(fit, weights="quadratic")

## Table 3 (O'Connell and Dobson, 1984)
slideTypeGroups <-
  list(c(2,3,5,26,31,34,42,58,59,67,70,81,103,120),
       c(7,10:13,17,23,30,41,51,55,56,60,65,71,73,76,86,87,105,111,116,119,124),
       c(4,6,24,25,27,29,39,68,77,79,94,101,102,117),
       c(9,32,36,44,52,62,84,85),
       c(35,53,69,72),
       c(8,15,18,19,47,64,82,93,99,107,110,112,115,121),
       c(1,16,22,49,63,66,78,90,100,113),
       c(28,37,40,61,108,114,118),
       106,
       43,
       83,
       c(54,57,88,91,126),
       c(74,104),
       38,
       46,
       c(89,122),
       c(80,92,96,123),
       85)

data.frame(SlideType=1:18,
    S1=sapply(slideTypeGroups,
        function(ids) mean(fit$s1[as.character(ids)])),
    S2=sapply(slideTypeGroups,
        function(ids) mean(fit$s2[as.character(ids)])))

## Table 5, O'Connell and Dobson (1984)
oconnell(landis==1)
oconnell(landis==2)
oconnell(landis==3)
oconnell(landis==4)
oconnell(landis==5)

## Plot of the marginal distributions
plot(fit)
```

plot.magree

plot methods for magree, oconnell and schouten objects
Description

plot methods for magree, oconnell and schouten objects

Usage

## S3 method for class 'magree'
plot(x, type = c("p1", "kappa by observer"), xlab = NULL, ylab = NULL, main = NULL, ...)
## S3 method for class 'oconnell'
plot(x, type = c("p1"), xlab = NULL, ylab = NULL, main = NULL, ...)
## S3 method for class 'schouten'
plot(x, type = c("kappa by observer"), xlab = NULL, ylab = NULL,
     main = NULL, xdelta = 0.1, axes = TRUE, ...)

Arguments

x magree, oconnell or schouten object.
type Type of plot. For "p1", plot the probabilities by observer. For "kappa by observer", plot the kappas for each observer.
xlab ylab main
xdelta For plot.schouten and "kappa by observer", specifies the width of the brackets for the confidence intervals.
axes Bool for whether to plot the axes.
...

Examples

fit <- schouten(landis)
plot(fit)
fit <- oconnell(landis)
plot(fit,type="p1")

Description

print methods for magree objects
print.summary.magree

Usage

## S3 method for class 'magree'
print(x, ...)
# S3 method for class 'oconnell'
print(x, ...)
# S3 method for class 'schouten'
print(x, ...)
Schouten estimators for multiobserver agreement.

Description

Use the Schouten estimator of agreement for nominal or ordinal data. This includes a range of statistics on agreement.

Usage

schouten(X, weights=c("unweighted","linear","quadratic","user"), w=NULL, score=NULL)

Arguments

X
A matrix or data-frame with subjects as rows and observers as columns.

weights
"unweighted" For nominal categories - only perfect agreement is counted.
"linear" For ordinal categories where disagreement is proportional to the distance between the categories. This is analogous to the agreement weights \( w_{i,j} = 1 - |i - j|/(c - 1) \).
"quadratic" For ordinal categories where disagreement is proportional to the square of the distance between the categories. This is analogous to the agreement weights \( w_{i,j} = 1 - (i - j)^2/(c - 1)^2 \).
"user" An indicator for a user-defined weight matrix. The weights argument will be defined as "user" if the w argument is specified.

w
A user-defined weights matrix. This argument takes precedence over weights and score if it is specified and the weight argument will be defined as "user".

score
A user-defined set of scores for each category. If this is not specified, it is assumed that score=1:L, where L is the number of categories. This is used with the weights argument to define the w matrix.

Details

Fortran code was written by Mark Clements based on the algorithms in Schouten (1982).
The output object is closely related to the Fortan code. Not all of the variance terms are currently used in the print, summary and plot methods.

Value

N Number of subjects
M Number of observers
L Number of categories
data Re-formatted X
w Weight matrix
schouten

kab  Kappas between each pair of observers
ka  Average kappas for each observer
kappa  Average kappa
pab,pa,ma,qab,qa,q,oab,eab,oa,ea,e,wa,wab  Working fields
varkab  Variances for kab
varka  Variances for ka
vark  Variance for the kappa
covkka  Covariance term between the overall average kappa and the average kappas for each observer
chi  Chi-squared statistics comparing the overall average kappa and the average kappa for each observer (df=1 under the null hypothesis)
pchi  P-values that the overall average kappa equals the average kappa for each observer
var0kab  Variance for kab under the null hypothesis
var0ka  Variance for ka under the null hypothesis
var0k  Variance for the overall average kappa under the null hypothesis
p0  P-value for kappa=0
p0a  P-values that the average kappa for a observer equals zero (i.e. ka=0)
weights  As input
X  As input
call  As per sys.call(), to allow for using update

See Also

magree, oconnell.

Examples

```r
## Weights matrix used by Schouten (1982)
w <- outer(1:5,1:5,function(x,y) ((x<=2 & y<=2) | (x>=3 & y>=3))+0)
fit <- schouten(landis,w=w) # user-defined weights
summary(fit) # Schouten (1982), Tables 2 and 5

## we can fit the same model with oconnell() or magree() using the score argument
magree(landis,score=c(1,1,2,2,2))

## plot of the average kappas by observer
plot(fit, type="kappa by observer")
```
Description

summary method for magree objects

Usage

```r
## S3 method for class 'magree'
summary(object, ...)
## S3 method for class 'oconnell'
summary(object, ci.transform = c("logit", "identity"), ci.p = 0.95, ...)
## S3 method for class 'schouten'
summary(object, ci.transform = c("logit", "identity"), ci.p = 0.95, ...)
```

Arguments

- `object`
- `ci.transform` transformation used to calculate the confidence intervals. Either "logit" for a logit transform or "identity" for no transform.
- `ci.p` p value for the confidence interval.
- `...`

Examples

```r
summary(magree(landis))
```
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