Package 'wnominate'

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Title Roll Call Analysis Software

Author Keith Poole <ktpoole@uga.edu>, Jeffrey Lewis <jblewis@ucla.edu>, James Lo <lojames@usc.edu> and Royce Carroll <rcarroll@rice.edu>

Maintainer Jeffrey B. Lewis <jblewis@ucla.edu>

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Description
Estimates Poole and Rosenthal's (1985 <doi:10.2307/2111172>, 1991 <doi:10.2307/2111445>) W-NOMINATE scores from roll call votes supplied though a 'rollcall' object from the 'pscl' package.

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Contents

`generateTestData` *Test Data Generator for W-NOMINATE*

Description

`generateTestData` is the function that generates a `rollcall` object used to test `wnominate`. The description of the result below is copied from the documentation of package `pscl`, written by Simon Jackman.

Usage

```
generateTestData(legislators=20, rcVotes=100,
            yea=matrix(runif(rcVotes,min=-0.2,max=0.7),nrow=rcVotes),
            nay=matrix(runif(rcVotes,min=-0.7,max=0.2),nrow=rcVotes),
            ideal=matrix(rnorm(legislators),nrow=legislators),
            Beta=15, dimweight=0.5,normal=1, seed = NULL, utility='nominate')
```

Arguments

`legislators`	integer, number of Legislators ('n').
`rcVotes`	integer, number of roll calls ('m').
`yea`	an m x d matrix of yea locations, where 'd' are the number of dimensions.
`nay`	an m x d matrix of no locations, where 'd' are the number of dimensions.
`ideal`	an n x d matrix of legislator ideal points.
`Beta`	scalar giving beta parameter from W-NOMINATE.
`dimweight`	d x 1 vector of dimension weights.
`normal`	integer, '1' generates data using normal probabilities, any other value generates data using logistic probabilities.
`seed`	a single value, interpreted as an integer, used to set the seed. If seed is NULL, current seed is used.
`utility`	String set to either "nominate" or "qn". 'nominate' allows NOMINATE logit or probit utilities, while "qn" allows for quadratic normal utilities to be used when generating the roll call matrix.

Value

An object of class `rollcall`

`votes`	n x m vote matrix in 0/1/NA format.
`n`	integer, number of legislators.
`m`	integer, number of roll call votes.

lopsided	logical vector of length m indicating dropped vote. This is recomputed in wnominate and is never used.
legis.data	matrix, user-supplied data on legislators, containing data from an ORD file. Legislator names are rownames to this matrix.
vote.data	user-supplied data on rollcall votes, set to NULL.
desc	user-supplied description, set to NULL.

Author(s)

Keith Poole <ktpoole@uga.edu>

Jeffrey Lewis <jblewis@ucla.edu>

James Lo <lojames@usc.edu>

Royce Carroll <rcarroll@rice.edu>

See Also

'wnominate', 'nomprob'.

Examples

```
dat<-generateTestData()
result<-wnominate(dat,polarity=c(1,2))
summary(result)
plot(result)
```

---

nomprob *NOMINATE Probability Matrix Generator*

Description

nomprob takes estimates from the W-NOMINATE model and returns a matrix of yea choice probabilities. It is used to generate a test rollcall object using generateTestData.

Usage

```
nomprob(yea, nay, ideal, Beta, dimweight, normal=1)
```

Arguments

For items below, m is the number of roll calls, n the number of legislators, and d the number of dimensions.

yea	m x d matrix of yea locations.
nay	m x d matrix of no locations.
ideal	n x d matrix of legislator ideal points.
Beta	scalar giving beta parameter from W-NOMINATE. Usually set to 15.

dimweight	d x 1 vector of dimension weights. Usually set to 0.5.
normal	integer, '1' generates data using normal probabilities, any other value generates data using logistic probabilities.

Value

An n x m matrix of probabilities giving the probability of yea for each of n legislators on each of m votes

Author(s)

Keith Poole <ktpoole@uga.edu>

Jeffrey Lewis <jblewis@ucla.edu>

James Lo <lojames@usc.edu>

Royce Carroll <rcarroll@rice.edu>

See Also

'generateTestData' and 'wnominate'.

Examples

```
yp <- matrix(rep(0,10),nrow=10)
np <- matrix(rep(0.1,10),nrow=10)
ideal <- matrix(rep(0,10),nrow=10)
nomprob(yp,np,ideal,15,0.5)    #a matrix of yea probabilities
```

---

plot.angles *W-NOMINATE Cutting Line Angles Plot*

Description

plot.angles reads a W-NOMINATE object and plots a histogram of the angles of the cutlines for two dimensions. plot.angles does not work for one-dimensional W-NOMINATE objects.

Usage

```
## S3 method for class 'angles'
plot(x, main.title="Cutting Line Angles",
        x.title="Angle in Degrees", y.title="Count",
        dims=c(1,2), ...)
```

Arguments

x	a wnominate output object.
main.title	string, coordinate plot title.
x.title	string, x-axis label.
y.title	string, y-axis label.
dims	vector of length 2, specifying the dimensions to be plotted.
...	other arguments to hist.

Value

A cutting line angle plot.

Author(s)

Keith Poole <ktpoole@uga.edu>

Jeffrey Lewis <jblewis@ucla.edu>

James Lo <lojames@usc.edu>

Royce Carroll <rcarroll@rice.edu>

See Also

'wnominate', 'plot.coords', 'plot.scree', 'plot.cutlines', 'plot.nomObject'

Examples

```
#This data file is the same as that obtained using:
#data(sen90)
#sen90wnom<-wnominate(sen90,polarity=c(2,5))
data(sen90wnom)

summary(sen90wnom)
plot.angles(sen90wnom)
plot(sen90wnom)
```

---

plot.coords *W-NOMINATE Coordinate Plot*

Description

plot.coords reads a W-NOMINATE object in 2 user-specified dimensions and plots the coordinates of each member, applying separate colors and shapes to each party by default. A unit circle is included to emphasize the constraints on the W-NOMINATE coordinates, and options to select non-party attributes of legislators are included. For a 1D W-WNOMINATE object, W-NOMINATE scores are plotted against their ranks.

Usage

```
## S3 method for class 'coords'
plot(x, main.title="W-NOMINATE Coordinates",
    d1.title="First Dimension", d2.title="Second Dimension", dims=c(1,2),
    plotBy="party", color=TRUE, shape=TRUE, cutline=NULL, Legend=TRUE,
    legend.x=0.8, legend.y=1, ...)
```

Arguments

x	a wnominate output object.
main.title	string, coordinate plot title.
d1.title	string, x-axis label.
d2.title	string, y-axis label.
dims	vector of length 2, specifying the dimensions to be plotted.
plotBy	string, name of a variable in nomObject\$data. plot.coords will plot coordinates using this variable as a selector.
color	logical, marks different groups specified by plotBy using different colors if TRUE.
shape	logical, marks different groups specified by plotBy using different shapes if TRUE.
cutline	vector, selects roll calls by row number for which a cutting line is desired.
Legend	logical, include a generic legend.
legend.x	numeric, corresponds to the 'x' argument of legend().
legend.y	numeric, corresponds to the 'y' argument of legend().
...	other arguments to symbols.

Value

A coordinate plot.

Author(s)

Keith Poole <ktpoole@uga.edu>

Jeffrey Lewis <jblewis@ucla.edu>

James Lo <lojames@usc.edu>

Royce Carroll <rcarroll@rice.edu>

See Also

'wnominate', 'plot.scree', 'plot.cutlines', 'plot.angles', 'plot.nomObject'

Examples

```
#This data file is the same as that obtained using:
#data(sen90)
#sen90wnom<-wnominate(sen90,polarity=c(2,5))
data(sen90wnom)

summary(sen90wnom)
plot.coords(sen90wnom)
plot(sen90wnom)
```

`plot.cutlines` *W-NOMINATE Cutline Plot*

Description

`plot.cutlines` reads a W-NOMINATE object and plots the cutting line of a specified proportion of all votes along two user-specified dimensions. The default is to plot 50 cutting lines. This is also known as a Coombs mesh. A unit circle is included to emphasize the constraints on the W-NOMINATE coordinates. Only cutlines that are constrained to have midpoints lying in a unit circle are included. `plot.cutlines` does not work for 1D W-NOMINATE objects.

Usage

```
## S3 method for class 'cutlines'
plot(x, main.title="Cutting Lines",
        d1.title="First Dimension", d2.title="Second Dimension",
        lines=50,dims=c(1,2),lwd=2, ...)
```

Arguments

`x`	a `wnominate` output object.
`main.title`	string, coordinate plot title.
`d1.title`	string, x-axis label.
`d2.title`	string, y-axis label.
`lines`	numeric, number of non-constrained cutlines to be plotted. If this number exceeds to total number of cutlines, then all cutlines are plotted.
`dims`	numeric vector of length 2, specifying dimensions to be plotted.
`lwd`	numeric, line width.
`...`	other arguments to `symbols`.

Value

A Coombs mesh.

Author(s)

Keith Poole <ktpoole@uga.edu>

Jeffrey Lewis <jblewis@ucla.edu>

James Lo <lojames@usc.edu>

Royce Carroll <rcarroll@rice.edu>

See Also

'wnominate', 'plot.coords', 'plot.scree', 'plot.angles', 'plot.nomObject'

Examples

```
#This data file is the same as that obtained using:
#data(sen90)
#sen90wnom<-wnominate(sen90,polarity=c(2,5))
data(sen90wnom)

summary(sen90wnom)
plot.cutlines(sen90wnom)
plot(sen90wnom)
```

---

plot.nomObject *W-NOMINATE Summary Plot*

Description

`plot.nomObject` reads a W-NOMINATE object in two user-specified dimensions and plots the coordinates, cutting lines, a Coombs mesh, and a Skree plot. For 1-dimensional W-NOMINATE objects, it plots the coordinates against the ranks along with a Skree plot.

Usage

```
## S3 method for class 'nomObject'
plot(x, dims=c(1,2), ...)
```

Arguments

`x`	a `wnominate` output object.
`dims`	a vector of length 2, specifying the two dimensions to be plotted.
`...`	other arguments do nothing and are not passed to any plot functions.

Value

A summary plot of a `wnominate` object.

Author(s)

Keith Poole <ktpoole@uga.edu>

Jeffrey Lewis <jblewis@ucla.edu>

James Lo <lojames@usc.edu>

Royce Carroll <rcarroll@rice.edu>

See Also

'wnominate', 'plot.coords', 'plot.scree', 'plot.angles', 'plot.cutlines', 'plot.nomObject'

Examples

```
#This data file is the same as that obtained using:
#data(sen90)
#sen90wnom<-wnominate(sen90,polarity=c(2,5))
data(sen90wnom)

summary(sen90wnom)
plot(sen90wnom)
```

---

plot.scree *W-NOMINATE Scree Plot*

Description

plot.scree is the function that takes a W-NOMINATE object and plots a Scree plot. Scree plots show the dimensionality of the voting by showing the sizes of the eigenvalues.

Usage

```
## S3 method for class 'scree'
plot(x, main.title="Scree Plot", x.title="Dimension",
        y.title="Eigenvalue", ...)
```

Arguments

x	a wnominate output object.
main.title	string, Skree plot title.
x.title	string, x-axis label.
y.title	string, y-axis label.
...	other arguments to plot.

Value

A Scree plot, showing the first 20 eigenvalues.

Author(s)

Keith Poole <ktpoole@uga.edu>

Jeffrey Lewis <jblewis@ucla.edu>

James Lo <lojames@usc.edu>

Royce Carroll <rcarroll@rice.edu>

See Also

'wnominate', 'plot.coords', 'plot.cutlines', 'plot.angles', 'plot.nomObject'

Examples

```
#This data file is the same as that obtained using:
#data(sen90)
#sen90wnom<-wnominate(sen90,polarity=c(2,5))
data(sen90wnom)

summary(sen90wnom)
plot.scree(sen90wnom)
plot(sen90wnom)
```

---

qnprob *Qudaratic Normal Probability Matrix Generator*

Description

qnprob takes estimates from the Quadratic Normal model and returns a matrix of yeah choice probabilities. It is used to generate a test rollcall object using generateTestData. The function is set up to take identical arguments to nomprob, which explains why many of the arguments do not do anything.

Usage

```
qnprob(yea,nay,ideal,Beta,dimweight,normal=1)
```

Arguments

For items below, m is the number of roll calls, n the number of legislators, and d the number of dimensions.

yea	m x d matrix of yeah locations.
nay	m x d matrix of no locations.
ideal	n x d matrix of legislator ideal points.
Beta	Ignored.
dimweight	Ignored.
normal	integer, '1' generates data using normal probabilities, any other value generates data using logistic probabilities.

Value

An n x m matrix of probabilities giving the probability of yea for each of n legislators on each of m votes

Author(s)

Keith Poole <ktpoole@uga.edu>

Jeffrey Lewis <jblewis@ucla.edu>

James Lo <lojames@usc.edu>

Royce Carroll <rcarroll@rice.edu>

See Also

'generateTestData' and 'wnominate'.

Examples

```
yp <- matrix(rep(0,10),nrow=10)
np <- matrix(rep(0.1,10),nrow=10)
ideal <- matrix(rep(0,10),nrow=10)
qnprob(yp,np,ideal,15,0.5)    #a matrix of yea probabilities
```

---

sen90 *90th U.S. Senate Roll Call Vote Matrix*

Description

This dataframe contains a matrix of votes cast by U.S. Senators in the 90th Congress. The data are formatted consistent with the `rollcall` object format in Simon Jackman's `pscl` package.

Usage

```
data(sen90)
```

Value

The dataframe contains roll call data for all Senators in the 90th Senate. The data is formatted as a `rollcall` object with the following elements.

`votes` data frame, containing all data from the old `nom31.dat` file about legislators. For a typical W-NOMINATE object run with an ORD file read using `readKH`, it will contain the following:

- `state` State name of legislator.
- `icpsrState` ICPSR state code of legislator.
- `cd` Congressional District number.

- icpsrLegis ICPSR code of legislator.
- party Party of legislator.
- partyCode ICPSR party code of legislator.

codes — list of four vectors. yea shows the codes in votes that are yea votes, 'nay' shows nay codes, notInLegis shows absences, and missing shows the missing codes.

n — numeric, number of legislators

m — numeric, number of roll calls

legis.data — data frame, containing the following information on legislators:

- state State name of legislator. s
- icpsrState ICPSR state code of legislator.
- cd Congressional District number.
- icpsrLegis ICPSR code of legislator.
- party Party of legislator.
- partyCode ICPSR party code of legislator.

vote.data — null, would otherwise be a data frame containing data on the votes.

desc — null, would otherwise be a string describing the data set.

source — string, describing where data set was read from.

Author(s)

Keith Poole <ktpoole@uga.edu>

Jeffrey Lewis <jblewis@ucla.edu>

James Lo <lojames@usc.edu>

Royce Carroll <rcarroll@rice.edu>

Source

Keith Poole. 2005. *90th Senate Roll Call Vote Data*. https://www.voteview.com/.

See Also

'wnominate'.

Examples

```
#This data file is the same as reading file using:
#sen90 <- readKH("ftp://voteview.com/sen90kh.ord")
#All ORD files can be found on www.voteview.com
data(sen90)

summary(sen90)
#sen90wnom <- wnominate(sen90,polarity=c(2,5))
#'sen90wnom' is the same nomObject as found in
data(sen90wnom)
summary(sen90wnom)
plot(sen90wnom)
```

sen90wnom *90th U.S. Senate Ideal Points*

Description

This dataframe contains the estimated ideal points of the 90th U.S Senate using `wnominate`. Although it can easily be obtained from calling the example in `wnominate`, it is included here to facilitate illustration of the examples for the plot and summary functions.

Usage

```
data(sen90wnom)
```

Value

An object of class `nomObject`, which in this documentation is also referred to as a W-NOMINATE object.

`legislators` data frame, containing all data from the old `nom33.dat` file about legislators. For a typical W-NOMINATE object run with an ORD file read using `readKH`, it will contain the following:

- `state` State name of legislator.
- `icpsrState` ICPSR state code of legislator.
- `cd` Congressional District number.
- `icpsrLegis` ICPSR code of legislator.
- `party` Party of legislator.
- `partyCode` ICPSR party code of legislator.
- `correctYea` Predicted Yeas and Actual Yeas.
- `wrongYea` Predicted Yeas and Actual Nays.
- `wrongNay` Predicted Nays and Actual Yeas.
- `correctNay` Predicted Nays and Actual Nays.
- `GMP` Geometric Mean Probability.
- `PRE` Proportional Reduction In Error.
- `coord1D` First dimension W-NOMINATE score, with all subsequent dimensions numbered similarly.
- `se1D` Bootstrapped standard error of first dimension W-NOMINATE score, with all subsequent dimensions numbered similarly. This will be empty if trials is set below 4.
- `corr.1` Covariance between first and second dimension W-NOMINATE score, with all subsequent dimensions numbered similarly.

`rollcalls` data frame, containing all data from the old `nom33.dat` file about bills. For a typical W-NOMINATE object run with an ORD file read using `readKH`, it will contain the following:

- `correctYea` Predicted Yeas and Actual Yeas.

- wrongYea Predicted Yeas and Actual Nays.
- wrongNay Predicted Nays and Actual Yeas.
- correctNay Predicted Nays and Actual Nays.
- GMP Geometric Mean Probability.
- PRE Proportional Reduction In Error.
- spread1D First dimension W-NOMINATE spread, with all subsequent dimensions numbered similarly.
- midpoint1D First dimension W-NOMINATE midpoint, with all subsequent dimensions numbered similarly.

dimensions	integer, number of dimensions estimated.
eigenvalues	A vector of roll call eigenvalues.
beta	The beta value used in the final iteration.
weights	A vector of weights used in each iteration.
fits	A vector of length 3*dimensions with the classic measures of fit. In order, it contains the correct classifications for each dimension, the APREs for each dimension, and the overall GMPs for each dimension.

Author(s)

Keith Poole <ktpoole@uga.edu>

Jeffrey Lewis <jblewis@ucla.edu>

James Lo <lojames@usc.edu>

Royce Carroll <rcarroll@rice.edu>

Source

Keith Poole. 2005. *90th Senate Roll Call Vote Data*. https://www.voteview.com/.

See Also

'wnominate'.

Examples

```
#This data file is the same as reading file using:
#sen90 <- readKH("ftp://voteview.com/sen90kh.ord")
#All ORD files can be found on www.voteview.com
data(sen90)

summary(sen90)
#sen90wnom <- wnominate(sen90,polarity=c(2,5))
#'sen90wnom' is the same nomObject as found in
data(sen90wnom)
summary(sen90wnom)
plot(sen90wnom)
```

summary.nomObject *W-NOMINATE Summary*

Description

summary.nomObject reads a W-NOMINATE object and prints a summary.

Usage

```
## S3 method for class 'nomObject'
summary(object,verbose=FALSE, ...)
```

Arguments

object	a wnominate output object.
verbose	logical, includes all ideal points if TRUE, otherwise only returns the first 10 legislators.
...	other arguments do nothing and are not passed to any functions.

Value

A summary of a wnominate object. Correct classification, APRE, and GMP are reported separately for each dimension.

Author(s)

Keith Poole <ktpoole@uga.edu>

Jeffrey Lewis <jblewis@ucla.edu>

James Lo <lojames@usc.edu>

Royce Carroll <rcarroll@rice.edu>

See Also

'wnominate', 'plot.coords', 'plot.scree', 'plot.angles', 'plot.cutlines', 'plot.nomObject'

Examples

```
#This data file is the same as that obtained using:
#data(sen90)
#sen90wnom<-wnominate(sen90,polarity=c(2,5))
data(sen90wnom)
summary(sen90wnom)
plot(sen90wnom)
```

UN *United Nations Vote Data*

Description

This data frame contains votes from the first three sessions of the United Nations. The same data can also be downloaded as a CSV file from www.voteview.com. The object of this data set is to provide an example of how one might use the W-NOMINATE package on a set of roll call votes not already stored in ORD format.

Usage

```
data(UN)
```

Value

This data frame contains votes from the first three sessions of the United Nations. The first column are country names, while the second column indicates membership in the former Warsaw Pact (used as a 'party' variable). Yeas are coded 1, 2, and 3, nays are coded 4, 5, and 6, missing votes are coded 7, 8, and 9, and not being in the General Assembly is coded as a 0.

Author(s)

Keith Poole <ktpoole@uga.edu>

Jeffrey Lewis <jblewis@ucla.edu>

James Lo <lojames@usc.edu>

Royce Carroll <rcarroll@rice.edu>

Source

Keith Poole. 2005. *UN Vote Data*. https://legacy.voteview.com/.

See Also

'wnominate'.

Examples

```
#The same data set can be obtained from downloading the UN.csv
#file from www.voteview.com and reading it as follows:
#UN<-read.csv("C:/UN.csv",header=FALSE,strip.white=TRUE)

data(UN)
UN<-as.matrix(UN)
UN[1:5,1:6]

UNnames<-UN[,1]
legData<-matrix(UN[,2],length(UN[,2]),1)
```

```
colnames(legData)<-"party"
UN<-UN[,-c(1,2)]

rc <- rollcall(UN, yea=c(1,2,3), nay=c(4,5,6),
missing=c(7,8,9),notInLegis=0, legis.names=UNnames,
legis.data=legData,
desc="UN Votes",
source="www.voteview.com")

# Not run
#result<-wnominate(rc,polarity=c(1,1))
#plot(result)
#summary(result)
```

`wnominate` *W-NOMINATE Roll Call Scaling*

Description

`wnominate` is the function that takes a `rollcall` object and estimates Poole and Rosenthal W-NOMINATE scores with them.

Usage

```
wnominate(rcObject, ubeta=15, uweights=0.5, dims=2, minvotes=20,
        lop=0.025,trials=3, polarity, verbose=FALSE)
```

Arguments

`rcObject`	An object of class `rollcall`, from Simon Jackman's `pscl` package.
`ubeta`	integer, beta parameter for NOMINATE. It is strongly recommended that you do not change the default.
`uweights`	integer, weight parameter for NOMINATE. It is strongly recommended that you do not change the default.
`dims`	integer, number of dimensions to estimate. Must be nonnegative and cannot exceed 10 dimensions.
`minvotes`	minimum number of votes a legislator must vote in for them to be analyzed.
`lop`	A proportion between 0 and 1, the cut-off used for excluding lopsided votes, expressed as the proportion of non-missing votes on the minority side. The default, `lop=0.025`, eliminates votes where the minority is smaller than 2.5 overwrites the `lopsided` attribute in the RC object inputted.
`trials`	integer, number of bootstrap trials for standard errors. Any number set below 4 here will not return any standard errors. Setting this number to be large will slow execution of W-NOMINATE considerably.

`polarity` a vector specifying the legislator in the data set who is conservative on each dimension. For example, `c(3,5)` indicates legislator 3 is conservative on dimension 1, and legislator 5 is conservative on dimension 2. Alternatively, polarity can be specified as a string for legislator names found in `legis.names` (ie. `c("Bush", "Gore")`) if every legislative name in the data set is unique. Finally, polarity can be specified as a list (ie. `list("cd",c(4,5))`) where the first list item is a variable from the roll call object's `legis.data`, and the second list item is a conservative legislator on each dimension as specified by the first list item. `list("cd",c(4,5))` thus specifies the legislators with congressional district numbers of 4 and 5.

`verbose` logical, indicates whether bills and legislators to be deleted should be printed while data is being checked before ideal points are estimated.

Value

An object of class `nomObject`, which in this documentation is also referred to as a W-NOMINATE object.

`legislators` data frame, containing all data from the old `nom31.dat` file about legislators. For a typical W-NOMINATE object run with an ORD file read using `readKH`, it will contain the following:

- `state` State name of legislator.
- `icpsrState` ICPSR state code of legislator.
- `cd` Congressional District number.
- `icpsrLegis` ICPSR code of legislator.
- `party` Party of legislator.
- `partyCode` ICPSR party code of legislator.
- `correctYea` Predicted Yeas and Actual Yeas.
- `wrongYea` Predicted Yeas and Actual Nays.
- `wrongNay` Predicted Nays and Actual Yeas.
- `correctNay` Predicted Nays and Actual Nays.
- `GMP` Geometric Mean Probability.
- `CC` Correct Classification.
- `coord1D` First dimension W-NOMINATE score, with all subsequent dimensions numbered similarly.
- `se1D` Bootstrapped standard error of first dimension W-NOMINATE score, with all subsequent dimensions numbered similarly. This will be empty if trials is set below 4.
- `corr.1` Covariance between first and second dimension W-NOMINATE score, with all subsequent dimensions numbered similarly.

`rollcalls` data frame, containing all data from the old `nom33.dat` file about bills. For a typical W-NOMINATE object run with an ORD file read using `readKH`, it will contain the following:

- `correctYea` Predicted Yeas and Actual Yeas.
- `wrongYea` Predicted Yeas and Actual Nays.

- `wrongNay` Predicted Nays and Actual Yeas.
- `correctNay` Predicted Nays and Actual Nays.
- `GMP` Geometric Mean Probability.
- `PRE` Proportional Reduction In Error.
- `spread1D` First dimension W-NOMINATE spread, with all subsequent dimensions numbered similarly.
- `midpoint1D` First dimension W-NOMINATE midpoint, with all subsequent dimensions numbered similarly.

`dimensions` integer, number of dimensions estimated.

`eigenvalues` A vector of roll call eigenvalues.

`beta` The beta value used in the final iteration.

`weights` A vector of weights used in each iteration.

`fits` A vector of length 3*dimensions with the classic measures of fit. In order, it contains the correct classifications for each dimension, the APREs for each dimension, and the overall GMPs for each dimension.

Author(s)

Keith Poole <ktpoole@uga.edu>

Jeffrey Lewis <jblewis@ucla.edu>

James Lo <lojames@usc.edu>

Royce Carroll <rcarroll@rice.edu>

References

Keith Poole and Howard Rosenthal. 1997. 'Congress: A Political-Economic History of Roll Call Voting.' New York: Oxford University Press.

Jeffrey Lewis. https://voteview.com/

Keith Poole, Jeffrey Lewis, James Lo, and Royce Carroll. 2011. 'Scaling Roll Call Votes with WNOMINATE in R.' Journal of Statistical Software, 42(14), 1-21. https://www.jstatsoft.org/v42/i14/

See Also

'generateTestData','plot.nomObject','summary.nomObject'.

Examples

```
#This data file is the same as reading file using:
#sen90 <- readKH("ftp://voteview.com/sen90kh.ord")
#All ORD files can be found on www.voteview.com
data(sen90)

summary(sen90)
#sen90wnom <- wnominate(sen90,polarity=c(2,5))
#'sen90wnom' is the same nomObject as found in
```

```
data(sen90wnom)
summary(sen90wnom)
plot(sen90wnom)
```

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