# Package: oc (via r-universe)

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**Depends** R (>= 2.3.1), pscl (>= 0.59)

**Description** Estimates optimal classification (Poole 2000) <doi:10.1093/oxfordjournals.pan.a029814> scores from roll call votes supplied though a 'rollcall' object from package 'pscl'.

**License** GPL-2

**URL** https://legacy.voteview.com/oc_in_R.htm, https://github.com/wmay/oc

**BugReports** https://github.com/wmay/oc/issues

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oc *Optimal Classification Roll Call Scaling*

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## Description

oc is the function that takes a rollcall object and estimates nonmetric Optimal Classification scores with them.

## Usage

```
oc(rcObject, dims=2, minvotes=20, lop=0.025, polarity, verbose=FALSE)
```

## Arguments

| | |
|---|---|
| rcObject | An object of class rollcall, from Simon Jackman's pscl package. |
| 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. |
| 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 OCobject, with elements as follows:

legislators — data frame, containing all data from the old perf25.dat file about legislators. For a typical ocObject run with an ORD file read using readKH, it will contain the following:

- stateState name of legislator.
- icpsrStateICPSR state code of legislator.
- cdCongressional District number.
- icpsrLegisICPSR code of legislator.
- partyParty of legislator.
- partyCodeICPSR party code of legislator.
- rankRank ordering of legislator on the first dimension, from lowest to highest.
- correctYeaPredicted Yeas and Actual Yeas.
- wrongYeaPredicted Yeas and Actual Nays.
- wrongNayPredicted Nays and Actual Yeas.
- correctNayPredicted Nays and Actual Nays.
- volumeMeasure of the legislator's polytope size.
- coord1DFirst dimension OC score, with all subsequent dimensions numbered similarly.

rollcalls — data frame, containing all data from the old perf21.dat file about bills. For a typical OCobject object run with an ORD file read using readKH, it will contain the following:

- correctYeaPredicted Yeas and Actual Yeas.
- wrongYeaPredicted Yeas and Actual Nays.
- wrongNayPredicted Nays and Actual Yeas.
- correctNayPredicted Nays and Actual Nays.
- PREProportional Reduction In Error.
- normvector1DFirst dimension of the unit normal vector, with all subsequent dimensions numbered similarly.
- midpointsThe projection of the normal vector needed to get the midpoint.

dimensions — integer, number of dimensions estimated.

eigenvalues — A vector of roll call eigenvalues.

fits — A vector of length 2 with the classic measures of fit, containing the percent correct classification and the APRE.

## Author(s)

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James Lo <lojames@usc.edu>

Royce Carroll <rcarroll@rice.edu>

## References

Keith Poole. 2000. 'Non-parametric Unfolding of Binary Choice Data.' Political Analysis, 8(3):211-237

Keith Poole. 2005. 'Spatial Models of Parliamentary Voting.' Cambridge: Cambridge University Press.

Keith Poole. https://legacy.voteview.com/

## See Also

'plot.OCobject','summary.OCobject'.

## Examples

```
    #This data file is the same as reading file using:
    ## Not run:
    sen90 <- readKH("https://voteview.com/static/data/out/votes/S090_votes.ord")

## End(Not run)
    #All ORD files can be found on voteview.com
    data(sen90)
    summary(sen90)

 #Small executable example
 sen90.1d <- oc(sen90,dims=1,polarity=c(7))

    #Output file identical to one produced by command below
    ## Not run:
    sen90oc <- oc(sen90,dims=2,polarity=c(7,2))

## End(Not run)
    data(sen90oc)
    summary(sen90oc)
    plot(sen90oc)
```

plot.OCangles *Optimal Classification Cutting Line Angles Plot*

## Description

plot.angles reads an Optimal Classification object and plots a histogram of the angles of the cutlines for two dimensions. plot.angles does not work for one-dimensional OCobject objects.

## Usage

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

## Arguments

| | |
|---|---|
| x | an OCobject 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)

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Jeffrey Lewis <jblewis@ucla.edu>

James Lo <lojames@usc.edu>

Royce Carroll <rcarroll@rice.edu>

## See Also

'oc', 'plot.OCcoords', 'plot.OCskree', 'plot.OCcutlines', 'plot.OCobject'

## Examples

```
    #This data file is the same as that obtained using:
    ## Not run:
    data(sen90)
    sen90oc <- oc(sen90,dims=2,polarity=c(7,2))

## End(Not run)

    data(sen90oc)
    summary(sen90oc)
    plot.OCangles(sen90oc)
```

---

`plot.OCcoords` *Optimal Classification Coordinate Plot*

---

## Description

`plot.coords` reads an Optimal Classification 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 Optimal Classification coordinates, and options to select non-party attributes of legislators are included. For a 1D `OCobject` object, Optimal Classification ranks are plotted against themselves, so they appear on a straight line.

## Usage

```
## S3 method for class 'OCcoords'
plot(x, main.title="OC 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` | an `OCobject` 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 `OCobject\$legislators`. `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)

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## See Also

'oc', 'plot.OCskree', 'plot.OCangles', 'plot.OCcutlines', 'plot.OCobject'

## Examples

```
    #This data file is the same as that obtained using:
    ## Not run:
    data(sen90)
    sen90oc <- oc(sen90,dims=2,polarity=c(7,2))

## End(Not run)

    data(sen90oc)
    summary(sen90oc)
    plot.OCcoords(sen90oc)
```

---

# plot.OCcutlines *Optimal Classification Cutline Plot*

---

## Description

plot.cutlines reads an Optimal Classification 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 Optimal Classification coordinates. Only cutlines that are constrained to have midpoints lying in a unit circle are included. plot.cutlines does not work for 1D OCobject objects.

## Usage

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

## Arguments

| | |
|---|---|
| x | an OCobject 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

'oc', 'plot.OCcoords', 'plot.OCskree', 'plot.OCangles', 'plot.OCobject'

## Examples

```
    #This data file is the same as that obtained using:
    ## Not run:
    data(sen90)
    sen90oc <- oc(sen90,dims=2,polarity=c(7,2))

## End(Not run)

    data(sen90oc)
    summary(sen90oc)
    plot.OCcutlines(sen90oc)
```

plot.OCobject *Optimal Classification Summary Plot*

## Description

plot.OCobject reads an Optimal Classification object in two user-specified dimensions and plots the coordinates, cutting lines, a Coombs mesh, and a Skree plot. For one-dimensional OCobject objects, it plots a one-dimensional coordinate plot along with a Skree plot.

## Usage

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

## Arguments

| | |
|---|---|
| x | an OCobject 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 an OCobject 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

'oc', 'plot.OCcoords', 'plot.OCskree', 'plot.OCangles', 'plot.OCcutlines'

## Examples

```
    #This data file is the same as that obtained using:
    ## Not run:
    data(sen90)
    sen90oc <- oc(sen90,dims=2,polarity=c(7,2))

## End(Not run)

    data(sen90oc)
    summary(sen90oc)
    plot(sen90oc)
```

plot.OCskree *Optimal Classification Skree Plot*

## Description

plot.skree is the function that takes an Optimal Classification object and plots a Skree plot. Skree plots show the dimensionality of the voting by showing the sizes of the eigenvalues.

## Usage

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

## Arguments

| | |
|---|---|
| x | an OCobject 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 Skree plot, showing the first 20 eigenvalues.

## Author(s)

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James Lo <lojames@usc.edu>

Royce Carroll <rcarroll@rice.edu>

## See Also

'oc', 'plot.OCcoords', 'plot.OCangles', 'plot.OCcutlines', 'plot.OCobject'

## Examples

```
    #This data file is the same as that obtained using:
    ## Not run:
    data(sen90)
    sen90oc <- oc(sen90,dims=2,polarity=c(7,2))

## End(Not run)
    data(sen90oc)
    summary(sen90oc)
    plot.OCskree(sen90oc)
```

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.
- `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)

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James Lo <lojames@usc.edu>

Royce Carroll <rcarroll@rice.edu>

## Source

Voteview team. 2017. *90th Senate Roll Call Vote Data*. https://voteview.com/static/data/out/votes/S090_votes.ord.

## See Also

'oc'.

## Examples

```
    #This data file is the same as reading file using:
    ## Not run:
    sen90 <- readKH("https://voteview.com/static/data/out/votes/S090_votes.ord")

## End(Not run)
    data(sen90)
    summary(sen90)

    #Output file identical to one produced by command below
    ## Not run:
    sen90oc <- oc(sen90,dims=2,polarity=c(7,2))

## End(Not run)
    data(sen90oc)
    summary(sen90oc)
    plot(sen90oc)
```

---

# sen90oc *90th U.S. Senate Ideal Points via Optimal Classification*

---

## Description

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

## Usage

```
data(sen90oc)
```

## Value

An object of class `OCobject`, with elements as follows:

`legislators` data frame, containing all data from the old `perf25.dat` file about legislators. For a typical `ocObject` 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.
- `rank`Rank ordering of legislator on the first dimension, from lowest to highest.
- `correctYea`Predicted Yeas and Actual Yeas.
- `wrongYea`Predicted Yeas and Actual Nays.
- `wrongNay`Predicted Nays and Actual Yeas.
- `correctNay`Predicted Nays and Actual Nays.
- `volume`Measure of the legislator's polytope size.
- `coord1D`First dimension OC score, with all subsequent dimensions numbered similarly.

`rollcalls` data frame, containing all data from the old `perf21.dat` file about bills. For a typical `OCobject` 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.
- `PRE`Proportional Reduction In Error.
- `normvector1D`First dimension of the unit normal vector, with all subsequent dimensions numbered similarly.
- `midpoints`The projection of the normal vector needed to get the midpoint.

`dimensions` integer, number of dimensions estimated.

`eigenvalues` A vector of roll call eigenvalues.

`fits` A vector of length 2 with the classic measures of fit, containing the percent correct classification and the APRE.

## Author(s)

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James Lo <lojames@usc.edu>

Royce Carroll <rcarroll@rice.edu>

## Source

Voteview Team. 2017. *90th Senate Roll Call Vote Data*. https://voteview.com/static/data/out/votes/S090_votes.ord.

## See Also

'oc', 'plot.OCcoords', 'plot.OCskree', 'plot.OCangles', 'plot.OCcutlines', 'plot.OCobject'

## Examples

```
    #This data file is the same as that obtained using:
    ## Not run:
    data(sen90)
    sen90oc <- oc(sen90,dims=2,polarity=c(7,2))

## End(Not run)

    data(sen90oc)
    summary(sen90oc)
    plot(sen90oc)
```

---

# summary.OCobject *Optimal Classification Summary*

---

## Description

`summary.OCobject` reads an Optimal Classification object and prints a summary.

## Usage

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

## Arguments

| | |
|---|---|
| `object` | an `OCobject` 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 `OCobject` object.

## Author(s)

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Jeffrey Lewis <jblewis@ucla.edu>

James Lo <lojames@usc.edu>

Royce Carroll <rcarroll@rice.edu>

## See Also

'oc', 'plot.OCcoords', 'plot.OCskree', 'plot.OCangles', 'plot.OCcutlines', 'plot.OCobject'

## Examples

```
    #This data file is the same as that obtained using:
    ## Not run:
    data(sen90)
    sen90oc <- oc(sen90,dims=2,polarity=c(7,2))

## End(Not run)

    data(sen90oc)
    summary(sen90oc)
    plot(sen90oc)
```

---

# 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 https://legacy.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)

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James Lo <lojames@usc.edu>

Royce Carroll <rcarroll@rice.edu>

## Source

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

## See Also

'oc'.

## Examples

```
#The same data set can be obtained from downloading the UN.csv
#file from legacy.voteview.com and reading it as follows:
## Not run:
UN<-read.csv("UN.csv",header=FALSE,strip.white=TRUE)

## End(Not run)

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="legacy.voteview.com")

# Not Run
## Not run:
result<-oc(rc,polarity=1,dims=1)
plot(result)
summary(result)

## End(Not run)
```

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