Package 'iaQCA'

December 31, 2015

Title The Irvine Robustness Assessment for Qualitative Comparative
Analysis

Version 0.8.9.0

Description Test the robustness of a user's QCA solutions to randomness, us-
ing iraQCA. iaQCA is packaged with the irrQCA function, which provides recommenda-
tions for improving QCA solutions to reach typical significance levels.

Depends R (>= 3.2.3), QCA, QCAGUI, bootstrap

License GPL-2

LazyData true

NeedsCompilation no

Author C. Ben Gibson [aut, cre],
Burrel Vann Jr [aut]

Maintainer C. Ben Gibson <cbgibson@uci.edu>

R topics documented:

---

conf.table   *Configuration Table*

Description

Internal function; calculates via logistic regression the output of Irvine Recommendation

Usage

```
conf.table(data, ncut = 4)
```

Arguments

data	name of the model object; the table of solutions for an application of QCA. Default set to data.
ncut	configurational n levels for inclusion. Default set to ncut=4

Value

The output of the Irvine Recommendation #'

---

iaQCA	*The Irvine Robustness Assessment for Qualitative Comparative Analysis*

Description

iaQCA is a package used to test the robustness of QCA solutions to randomness, and suggests alternative consistency score and minimum inclusionary thresholds to reach standard significance levels (i.e. $p = .05, 01, .001$).

Details

The iaQCA package builds on the QCA package already available (Thiem and Dusa 2013) by suggesting appropriate cutoff levels to ameliorate randomness in QCA solutions. These suggestions, however, should be augmented by a researcher's own case-oriented knowledge such that, where appropriate, the researcher should provide reasoning for why the iaQCA suggestions do not hold up to their own knowledge of specific cases (Ragin 2014[2008]).

The iaQCA package comes prepackaged with the iraQCA and irrQCA functions. The function iraQCA takes the user's QCA solutions, simulates thousands of random data sets using the margins of these solutions, and caculates a "solutions proportion of randomness" point-estimate and confidence interval from these random data. This result demonstrates how robust a given set of QCA solutions are to randomness. Based on the iraQCA result, the user may chose to improve the solutions by minimizing randomness. Using irrQCA, the user will provided with recommendations for improving their solutions to reach standar significance levels.

For more information about QCA, visit the COMPASSS website at http://www.compasss.org or check out the Wikipedia entry for QCA at https://en.wikipedia.org/wiki/Qualitative_comparative_analysis.

The software citation for iaQCA can be retrieved by using the command citation("iaQCA") after loading the package.

Author(s)

C. Ben Gibson
Department of Sociology
University of California, Irvine
<cbgibson@uci.edu>

Burrel Vann Jr
Department of Sociology
University of California, Irvine
<bvann@uci.edu>

Maintainer:
C. Ben Gibson

References

Ragin, Charles C. 2014[2008]. *Redesigning Social Inquiry: Fuzzy Sets and Beyond*. Chicago: University of Chicago Press.

Thiem, Alrik, and Adrian Dusa. 2013b. "QCA: A Package for Qualitative Comparative Analysis." *The R Journal* 5 (1):87-97. URL: http://journal.r-project.org/archive/2013-1/thiem-dusa.pdf.

Thiem, Alrik, and Adrian Dusa. 2013c. *Qualitative Comparative Analysis with R: A User's Guide*. New York: Springer.

---

iraQCA   *Irvine Robustness Assessment*

Description

This function performs the the Irvine Assessment for QCA (iraQCA) on a given QCA model object.

Usage

```
iraQCA(mod, sim = 2000, include = c(""), row.dom = F, omit = c(),
  dir.exp = c())
```

Arguments

mod	name of the QCA eqmcc model object.
sim	the number of simulations the iraQCA function should run. Default set to sim=2000.
include	[from QCA/QCAGUI package] "A vector of additional output function values to be included in the minimization." Default set to include=c("").
row.dom	[from QCA/QCAGUI package] "Logical, impose row dominance as constraint on solution to eliminate dominated inessential prime implicants." Default set to F.
omit	[from QCA/QCAGUI package] "A vector of configuration index values or matrix of configurations to be omitted from minimization." Default set to omit=c().
dir.exp	[from QCA/QCAGUI package] "A vector of directional expectations for deriving intermediate solutions." Default set to dir.exp=c().

Value

After some time, this function returns the probability that the data will return a random result given the parameters set by the researcher in the model (configurational n threshold, consistency score threshold, etc), as well a confidence interval around this value. This value is interpreted similarly to a p-value, i.e. a .05 value coincides with a 95% "confidence level."

Examples

```
data(rallies)
P<-rallies$P
R<-rallies$R
C<-rallies$C
U<-rallies$U

qca.data<-data.frame(P,R,C,U)
truth<-truthTable(qca.data,outcome="P",sort.by="incl",incl.cut1=0.7,show.cases=TRUE)
truth
mod1 <- eqmcc(truth,details=TRUE,show.cases=TRUE)
mod1

iraQCA(mod1,sim=5)
```

---

irrQCA   *Irvine Robustness Recommendation*

Description

Provides recommendations for consistency score and configurational n thresholds to attain a desired level of confidence in a QCA algorithm application.

Usage

```
irrQCA(qca.data, outcome = "OUT", type = "crisp", inclcut = "",
  ncut = 2, neg.out = F, sim = 10, verbose = T)
```

Arguments

qca.data	the QCA data frame.
outcome	the outcome variable in the QCA data frame of causal conditions; "OUT" is the outcome variable for an application of QCA.
type	type of QCA application, "crisp" or "fuzzy" sets. Default set to type = "crisp".
inclcut	range of consistency scores for inclusion. If not specified, this defaults to seq(from = 0.5, to = 1,
ncut	configurational n levels to simulate. Can be altered to give options for the range of minimum to maximum ncut value that the truth table yields, by naming the the truth table object (e.g. truth) and calling the minimum and maximum number of cases, using ncut=min(truthttn):max(truthttn) identified by the truth table. Default set to ncut=2.
neg.out	[from QCA/QCAGUI package] "Logical, use negation of outcome (ignored if data is a truth table object)." Default set to neg.out=F.
sim	number of simulations to run for each combination of parameters. The final number of simulations is length(inclcut)*length(ncut)*sim*2. Default set to sim=10.
verbose	prints the system time used to run the simulation and the percent complete. Default set to verbose=T.

Value

Significance levels reached (.10,.05, .01, .001) when specifying a combination of inclcut, ncut, and neg.out in a QCA model.

Examples

```
data(rallies)
P<-rallies$P
R<-rallies$R
C<-rallies$C
U<-rallies$U

qca.data<-data.frame(P,R,C,U)
truth<-truthTable(qca.data,outcome="P",sort.by="incl",incl.cut1=0.7,show.cases=TRUE)
truth
mod1 <- eqmcc(truth,details=TRUE,show.cases=TRUE)
mod1

irrQCA(qca.data,outcome="P",ncut=1,sim=1)
```

---

rallies	*Tea Party Rallies in Florida Counties*

Description

This data set gives Census, voting, religion, and Tea Party organization and rallies for 67 counties in Florida.

Usage

```
rallies
```

Format

A matrix containing 67 observations and 13 variables.

Source

Subset of data created by Rory McVeigh, Kraig Beyerlein, Burrel Vann Jr., and Priyamvada Trivedi

References

McVeigh, Rory, Kraig Beyerlein, Burrel Vann Jr., and Priyamvada Trivedi. "Educational Segregation, Tea Party Organizations, and Battles over Distributive Justice." *American Sociological Review 79*: 630-652.

---

sim.iraQCA   *Simulation Application*

Description

Internal function to calculate the Irvine Recommendation.

Usage

```
sim.iraQCA(qca.data, outcome = "OUT", conditions = c(""), sim = 10,
  ncut = 2, type = "crisp", inclcut = "", neg.out = F, verbose = T)
```

Arguments

qca.data	the data frame of causal conditions.
outcome	the outcome variable (object name) in the QCA data frame of causal conditions; "OUT" is the outcome variable for an application of QCA. Default set to outcome="OUT".
conditions	a set of causal conditions. Default set to conditions=c("")
sim	number of simulations to run. Default set to sim=10.
ncut	configurational n levels for inclusion. Default set to ncut=2.
type	type of QCA application, "crisp" or "fuzzy" sets. Default set to type = "crisp".
inclcut	minimum sufficiency score for inclusion. Default set to inclcut="".
neg.out	[from QCA/QCAGUI package] "Logical, use negation of outcome (ignored if data is a truth table object)." Default set to neg.out=F.
verbose	prints the system time used to run the simulation and the percent complete. Default set to verbose=T.

Value

Simulation information later passed on to conf.table.

Index