Package ‘ICCbin’

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Type Package
Title Facilitates Clustered Binary Data Generation, and Estimation of Intracluster Correlation Coefficient (ICC) for Binary Data
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Imports stats
Suggests lme4
Description Assists in generating binary clustered data, estimates of Intracluster Correlation coefficient (ICC) for binary response in 16 different methods, and 5 different types of confidence intervals.
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BugReports https://github.com/akhtarh/ ICCbin/issues
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R topics documented:

iccbin ................................................................. 2
rcbin ................................................................. 5
Index 7
Estimates Intracluster Correlation coefficients (ICC) and it’s confidence intervals (CI)

**Description**

Estimates Intracluster Correlation coefficients (ICC) in 16 different methods and it’s confidence intervals (CI) in 5 different methods given the data on cluster labels and outcomes

**Usage**

```r
iccbin(cid, y, data = NULL, method = c("aov", "aovs", "keq", "kpr", "keqs", "kprs", "stab", "ub", "fc", "mak", "peq", "pgp", "ppr", "rm", "lin", "sim"), ci.type = c("aov", "wal", "fc", "peq", "rm"), alpha = 0.05, kappa = 0.45, nAGQ = 1, M = 1000)
```

**Arguments**

- `cid` Column name indicating cluster id in the dataframe `data`
- `y` Column name indicating binary response in the dataframe `data`
- `data` A dataframe containing `cid` and `y`
- `method` The method to be used to compute ICC. A single or multiple methods can be used at a time. By default, all 16 methods will be used. See Details for more.
- `ci.type` Type of confidence interval to be computed. By default all 5 types will be reported. See Details for more
- `alpha` The significance level to be used while computing confidence interval. Default value is 0.05
- `kappa` Value of Kappa to be used in computing Stabilized ICC when the method `stab` is chosen. Default value is 0.45
- `nAGQ` An integer scaler, as in `glmer` function of package `lme4`, denoting the number of points per axis for evaluating the adaptive Gauss-Hermite approximation to the log-likelihood. Used when the method `lin` is chosen. Default value is 1
- `M` Number of Monte Carlo replicates used in ICC computation method `sim`. Default is 1000

**Details**

If in the dataframe, the cluster id (`cid`) is not a factor, it will be changed to a factor and a warning message will be given

If estimate of ICC in any method is outside the interval [0, 1], the estimate and corresponding confidence interval (if appropriate) will not be provided and warning messages will be produced

If the lower limit of any confidence interval is below 0 and upper limit is above 1, they will be replaced by 0 and 1 respectively and a warning message will be produced
Method `aov` computes the analysis of variance estimate of ICC. This estimator was originally proposed for continuous variables, but various authors (e.g., Elston, 1977) have suggested its use for binary variables.

Method `aovs` gives estimate of ICC using a modification of analysis of variance technique (see Fleiss, 1981).

Method `keq` computes moment estimate of ICC suggested by Kleinman (1973), uses equal weight $w_i = 1/k$, for each of $k$ clusters.

Method `kpr` computes moment estimate of ICC suggested by Kleinman (1973), uses weights proportional to cluster size $w_i = n_i/N$.

Method `keqs` gives a modified moment estimate of ICC with equal weights (keq) (see Kleinman, 1973).

Method `kprs` gives a modified moment estimate of ICC with weights proportional to cluster size (kpr) (see Kleinman, 1973).

Method `stab` provides a stabilized estimate of ICC proposed by Tamura and Young (1987).

Method `ub` computes moment estimate of ICC from an unbiased estimating equation (see Yamamoto and Yanagimoto, 1992).

Method `fc` gives Fleiss-Cuzick estimate of ICC (see Fleiss and Cuzick, 1979).

Method `mak` computes Mak’s estimate of ICC (see Mak, 1988).

Method `peq` computes weighted correlation estimate of ICC proposed by Karlin, Cameron, and Williams (1981) using equal weight to every pair of observations.

Method `pgp` computes weighted correlation estimate of ICC proposed by Karlin, Cameron, and Williams (1981) using equal weight to each cluster irrespective of size.

Method `ppr` computes weighted correlation estimate of ICC proposed by Karlin, Cameron, and Williams (1981) by weighting each pair according to the total number of pairs in which the individuals appear.

Method `rm` estimates ICC using resampling method proposed by Chakraborty and Sen (2016).

Method `lin` estimates ICC using model linearization proposed by Goldstein et al. (2002).

Method `sim` estimates ICC using Monte Carlo simulation proposed by Goldstein et al. (2002).

CI type `aov` computes confidence interval for ICC using Smith’s large sample approximation (see Smith, 1957).

CI type `wal` computes confidence interval for ICC using modified Wald test (see Zou and Donner, 2004).

CI type `fc` gives Fleiss-Cuzick confidence interval for ICC (see Fleiss and Cuzick, 1979; and Zou and Donner, 2004).

CI type `peq` estimates confidence interval for ICC based on direct calculation of correlation between observations within clusters (see Zou and Donner, 2004; and Wu, Crespi, and Wong, 2012).

CI type `rm` gives confidence interval for ICC using resampling method by Chakraborty and Sen (2016).
Value

estimates  A dataframe containing the name of methods used and corresponding estimates of Intracluster Correlation coefficients

ci  A dataframe containing names of confidence interval types and corresponding estimated confidence intervals

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References


See Also

rcbin

Examples

```r
bccdata <- rcbin(prop = .4, prvar = .2, noc = 30, csize = 20, csvar = .2, rho = .2)
iccbin(cid = cid, y = y, data = bccdata)
iccbin(cid = cid, y = y, data = bccdata, method = c("aov", "fc"), ci.type = "fc")
```
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See Also

iccbin

Examples

rcbin(prop = .4, prvar = .2, noc = 30, csize = 20, csvar = .2, rho = .2)
Index

iccbin, 2, 6
rcbin, 5, 5