Package 'irrICC'

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Type Package

Title Intraclass Correlations for Quantifying Inter-Rater Reliability

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Description Calculates various intraclass correlation coefficients used to quantify
inter-rater and intra-rater reliability. The assumption here is that the raters produced quantitative ratings. Most of the statistical procedures implemented
in this package are described in details in Gwet, K.L. (2014, ISBN:978-0970806284): ``Handbook of Inter-Rater Reliability,'' 4th edition,
Advanced Analytics, LLC.

License GPL (>= 2)

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| `ci.ICC1a` | *Confidence Interval of Intraclass Correlation Coefficient (ICC) under ANOVA Model 1A.* |

Description

This function computes the lower and upper confidence bounds associated with the ICC under the one-factor ANOVA model where each subject may be rated by a different group of raters.

Usage

```
ci.ICC1a(ratings, conflev = 0.95)
```

Arguments

ratings	This is a data frame containing 3 columns or more. The first column contains subject numbers (there could be duplicates if a subject was assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.
conflev	This is the optional confidence level associated with the confidence interval. If not specified, the default value will be 0.95, which is the most commonly-used valuee in the literature.

Value

This function returns a vector containing the lower confidence (lcb) and the upper confidence bound (ucb).

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 8, section 8.3.1, equations 8.3.1 and 8.3.2. Advanced Analytics, LLC.

Examples

```
#iccdata3 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata3 #see what the iccdata3 dataset looks like
ci.ICC1a(iccdata3)
```

---

ci.ICC1b	*Confidence Interval of Intraclass Correlation Coefficient (ICC) under ANOVA Model 1B.*

Description

This function computes the lower and upper confidence bounds associated with the ICC under the one-factor ANOVA model where each rater may rate a different group of subjects.

Usage

```
ci.ICC1b(ratings, conflev = 0.95)
```

Arguments

ratings	This is a data frame containing 3 columns or more. The first column contains subject numbers (there could be duplicates if a subject was assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.
conflev	This is the optional confidence level associated with the confidence interval. If not specified, the default value will be 0.95, which is the most commonly-used valuee in the literature.

Value

This function returns a vector containing the following the lower confidence (lcb) and the upper confidence bound (ucb).

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 8, section 8.3.4, equations 8.3.5 and 8.3.6. Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata3 dataset looks like
ci.ICC1b(iccdata1)
```

| ci.ICC2a.inter | *Confidence Interval of ICCa(2,1), a measure of intra-rater reliability under Model 2 with interaction.* |

Description

This function computes the confidence interval of the Intraclass Correlation Coefficient ICCa(2,1) under the random factorial ANOVA model with subject-rater interaction. ICCa(2,1) is formulated as a measure of intra-rater reliability coefficient. This function computes the lower and upper confidence bounds of the confidence interval.

Usage

```
ci.ICC2a.inter(dfra, conflev = 0.95)
```

Arguments

dfra	This is a data frame containing 3 columns or more. The first column contains subject numbers (there could be duplicates if a subject was assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.
conflev	This is the optional confidence level associated with the confidence interval. If not specified, the default value will be 0.95, which is the most commonly-used valuee in the literature.

Value

This function returns a vector containing the lower confidence (lcb) and the upper confidence bound (ucb).

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 9, section 9.3.2, equations 9.3.7 and 9.3.8. Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
ci.ICC2a.inter(iccdata1)
ci.ICC2a.inter(iccdata1)$ucb #this only gives the upper confidence bound
ci.ICC2a.inter(iccdata1,0.90) #this gives you the 90% confidence interval
```

---

ci.ICC2a.nointer	*Confidence Interval of ICCa(2,1) under Model 2 without subject-rater interaction.*

Description

This function computes the confidence interval associated with the Intraclass Correlation Coefficient (ICC) formulated as a measure of Intra-Rater Reliability under the random factorial ANOVA model (Model 2) without subject-rater interaction. This function produces the lower and upper confidence bounds.

Usage

```
ci.ICC2a.nointer(dfra, conflev = 0.95)
```

Arguments

dfra   This is a data frame containing 3 columns or more. The first column contains subject numbers (there could be duplicates if a subject was assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.

conflev   This is the optional confidence level associated with the confidence interval. If not specified, the default value will be 0.95, which is the most commonly-used valuee in the literature.

Value

This function returns a vector containing the lower confidence (lcb) and the upper confidence bound (ucb).

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 9, section 9.5.1, equations 9.5.11 and 9.5.12,page 259. Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
ci.ICC2a.nointer(iccdata1)
```

---

ci.ICC2r.inter	*Confidence Interval of ICC(2,1) under ANOVA Model 2 with Interaction.*

Description

This function computes the confidence interval associated with the Intraclass Correlation Coefficient (ICC) used as a measure of inter-rater reliability, under the Random Factorial ANOVA model with interaction. It produces the lower and upper confidence bounds.

Usage

```
ci.ICC2r.inter(dfra, conflev = 0.95)
```

Arguments

dfra	This is a data frame containing 3 columns or more. The first column contains subject numbers (there could be duplicates if a subject was assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.
conflev	This is the optional confidence level associated with the confidence interval. If not specified, the default value will be 0.95, which is the most commonly-used valuee in the literature.

Value

This function returns a vector containing the lower confidence (lcb) and the upper confidence bound (ucb).

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 9, section 9.3.1, equations 9.3.1 and 9.3.2. Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
ci.ICC2r.inter(iccdata1)
```

---

ci.ICC2r.nointer   *Confidence Interval of the ICC(2,1) under Model 2 without subject-rater interaction*

Description

This function computes the confidence interval associateed with the Intraclass Correlation Coefficient (ICC) used as a measure of inter-rater reliability, under the random factorial ANOVA model (Model 2) with no subject-rater interaction. This function computes the lower and upper confidence bounds.

Usage

```
ci.ICC2r.nointer(dfra, conflev = 0.95)
```

Arguments

dfra   This is a data frame containing 3 columns or more. The first column contains
                subject numbers (there could be duplicates if a subject was assigned multiple
                ratings) and each of the remaining columns is associated with a particular rater
                and contains its numeric ratings.

conflev   This is the optional confidence level associated with the confidence interval. If
                not specified, the default value will be 0.95, which is the most commonly-used
                valuee in the literature.

Value

This function returns a vector containing the lower confidence (lcb) and the upper confidence bound (ucb).

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 9, section 9.5.1, equations 9.5.7 and 9.5.8 for inter-rater reliability coefficients. Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
ci.ICC2r.nointer(iccdata1)
```

---

ci.ICC3a.inter   *Confidence Interval of ICCa(3,1), a measure of intra-rater reliability under MOdel 3.*

Description

This function computes the confidence interval of the Intraclass Correlation Coefficient ICCa(3,1) under the mixed factorial ANOVA model (Model 3) with subject-rater interaction. ICCa(3,1) is formulated as a measure of intra-rater reliability coefficient. This function computes the lower and upper confidence bounds of the confidence interval.

Usage

```
ci.ICC3a.inter(dfra, conflev = 0.95)
```

Arguments

dfra   This is a data frame containing 3 columns or more. The first column contains subject numbers (there could be duplicates if a subject was assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.

conflev   This is the optional confidence level associated with the confidence interval. If not specified, the default value will be 0.95, which is the most commonly-used valuee in the literature.

Value

This function returns a vector containing the lower confidence (lcb) and the upper confidence bound (ucb).

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 10, section 10.3.2, equations 10.3.10 and 10.3.11. Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
ci.ICC3a.inter(iccdata1)
ci.ICC3a.inter(iccdata1)$ucb #this only gives the upper confidence bound
ci.ICC3a.inter(iccdata1,0.90) #this gives you the 90% confidence interval
```

---

ci.ICC3r.inter	*Confidence Interval of ICC(3,1) under ANOVA Model 3 with Interaction.*

Description

This function computes the confidence interval associated with the Intraclass Correlation Coefficient (ICC) as a measure of inter-rater reliability under the mixed factorial ANOVA model with interaction. It produces the lower and upper confidence bounds.

Usage

```
ci.ICC3r.inter(dfra, conflev = 0.95)
```

Arguments

dfra
: This is a data frame containing 3 columns or more. The first column contains subject numbers (there could be duplicates if a subject was assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.

conflev
: This is the optional confidence level associated with the confidence interval. If not specified, the default value will be 0.95, which is the most commonly-used valuee in the literature.

Value

This function returns a vector containing the lower confidence (lcb) and the upper confidence bound (ucb).

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 10, section 10.3.1, equations 10.3.1 and 10.3.2. Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
ci.ICC3r.inter(iccdata1)
ci.ICC3r.inter(iccdata1)$ucb #to get upper confidence bound only
```

---

ci.ICC3r.nointer   *Confidence Interval of the ICC(3,1) under Model 3 without subject-*
                                    rater interaction

Description

This function computes the confidence interval associateed with the Intraclass Correlation Coefficient (ICC) used as a measure of inter-rater reliability, under the mixed factorial ANOVA model (Model 3) with no subject-rater interaction. This function computes the lower and upper confidence bounds.

Usage

```
ci.ICC3r.nointer(dfra, conflev = 0.95)
```

Arguments

dfra   This is a data frame containing 3 columns or more. The first column contains
                subject numbers (there could be duplicates if a subject was assigned multiple
                ratings) and each of the remaining columns is associated with a particular rater
                and contains its numeric ratings.

conflev   This is the optional confidence level associated with the confidence interval. If
                not specified, the default value will be 0.95, which is the most commonly-used
                valuee in the literature.

Value

This function returns a vector containing the lower confidence (lcb) and the upper confidence bound (ucb).

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 10, section 10.3.1, equations 10.3.6 and 10.3.7, Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
ci.ICC3r.nointer(iccdata1)
```

---

icc1a.fn   *Intraclass Correlation Coefficient (ICC) under ANOVA Model 1A.*

Description

This ICC is associated with the one-factor ANOVA model where each subject could be rated by a different group of raters. This ICC represents a measure of inter-rater reliability among all raters involved in the experiment.

Usage

```
icc1a.fn(ratings)
```

Arguments

ratings   This is a data frame containing 3 columns or more. The first column contains subject numbers (there could be duplicates if a subject was assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.

Value

This function returns a list containing the following 9 values: 1. sig2s: the subject variance component. 2. sig2e: the error variance component. 3. icc1a: the ICC/inter-rater reliability coefficient 4. n: the number of subjects. 5. r: the number of raters. 6. max.rep: the maximum number of ratings per subject. 7. min.rep: the minimum number of ratings per subjects. 8. M: the total number of ratings for all subjects and raters. 9. ov.mean: the overall mean rating.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* - Equation #8.1.3, chapter 8. Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
icc1a.fn(iccdata1)
coeff <- icc1a.fn(iccdata1)$icc1a
coeff
```

---

icc1b.fn   *Intraclass Correlation Coefficient (ICC) under ANOVA Model 1B.*

Description

This ICC is associated with the one-factor ANOVA model where each rater may rate a different group of subjects. This ICC represents a global measure of intra-rater reliability coefficient for all raters involved in the experiment.

Usage

```
icc1b.fn(ratings)
```

Arguments

ratings   This is a data frame containing 3 columns or more. The first column contains subject numbers (there could be duplicates in subject numbers if a subject was rated multiple times) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.

Value

This function returns a list containing the following 9 values: 1. sig2r: the rater variance component. 2. sig2e: the error variance component. 3. icc1b: the ICC/intra-rater reliability coefficient 4. n: the number of subjects. 5. r: the number of raters. 6. max.rep: the maximum number of ratings per subject. 7. min.rep: the minimum number of ratings per subjects. 8. M: the total number of ratings for all subjects and raters. 9. ov.mean: the overall mean rating.

References

See equation 8.2.4 of chapter 8 in Gwet, 2014: Handbook of Inter-Rater Reliability - 4th ed.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
icc1b.fn(iccdata1)
coeff <- icc1b.fn(iccdata1)$icc1b #this only gives you the ICC coefficient
coeff
```

---

icc2.inter.fn	*Intraclass Correlation Coefficients ICC(2,1) & ICCa(2,1) under the Random Factorial ANOVA Model with Interaction.*

Description

This functions computes 2 ICC estimates for the inter-rater reliability and intra-rater reliability coefficients. It requires some subjects to have multiple ratings and assumes the ANOVA model was specified with interaction.

Usage

```
icc2.inter.fn(ratings)
```

Arguments

ratings   This is a data frame containing 3 columns or more. The first column contains subject numbers (some duplicates are expected, as some subject are assumed to have assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.

Value

This function returns a list containing the following 12 values: 1. sig2s: the subject variance component. 2.sig2r: the rater variance component 3. sig2e: the error variance component. 4. sig2sr: the subject-rater interaction variance component. 5. icc2r: ICC as a measure of inter-rater relliability. 6. icc2a: ICC as a measure of intra-rater reliability. 7. n: the number of subjects. 8. r: the number of raters. 9. max.rep: the maximum number of ratings per subject. 10. min.rep: the minimum number of ratings per subjects. 11. M: the total number of ratings for all subjects and raters. 12. ov.mean: the overall mean rating.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* - Equation #9.2.3 of chapter 9, pages 231-232 (for the inter-rater reliability ICC(2,1)), and Equation #9.2.10 of chapter 9, page 236 (for the intra-rater reliability), Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
icc2.inter.fn(iccdata1)
coeff <- icc2.inter.fn(iccdata1)$icc2r #this only gives you the ICC coefficient
coeff
```

icc2.nointer.fn	*Intraclass Correlation Coefficients ICC(2,1) and ICCa(2,1) under ANOVA Model 2 without interaction.*

Description

This function computes 2 Intraclass Correlation Coefficients (ICC) ICC(2,1) and ICCa(2,1) under the random factorial ANOVA model (Model 2) without any subject-rater interaction. ICC(2,1) is formulated as a measure of inter-rater reliability and ICCa(2,1) as a measure of intra-rater reliability.

Usage

```
icc2.nointer.fn(ratings)
```

Arguments

ratings   This is a data frame containing 3 columns or more. The first column contains subject numbers (some duplicates are expected, as some subject are assumed to have assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.

Value

This function returns a list containing the following 11 values:
1. sig2s: the subject variance component.
2.sig2r: the rater variance component
3. sig2e: the error variance component.
4. icc2r: ICC as a measure of inter-rater relliability.
5. icc2a: ICC as a measure of intra-rater reliability.
6. n: the number of subjects.
7. r: the number of raters.
8. max.rep: the maximum number of ratings per subject.
9. min.rep: the minimum number of ratings per subjects.
10. M: the total number of ratings for all subjects and raters.
11. ov.mean: the overall mean rating.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* - Equations 9.5.2 and 9.5.3 of chapter 9, page 258. Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
icc2.nointer.fn(iccdata1)
coeff <- icc2.nointer.fn(iccdata1)$icc2r #this only gives you the ICC coefficient
coeff
```

---

icc3.inter.fn	*Intraclass Correlation Coefficients (ICC) under the Mixed Factorial ANOVA model with Interaction.*

Description

This function computes 2 ICC estimates ICC(3,1) and ICCa(3,1) as measures of inter-rater reliability and intra-rater reliability coefficients under Model 3. It is the the mixed factorial ANOVA model with interaction. Some subjects are expected to have multiple ratings and due to the assumed interaction effect.

Usage

```
icc3.inter.fn(dfra)
```

Arguments

dfra   This is a data frame containing 3 columns or more. The first column contains subject numbers (some duplicates are expected, as some subject are assumed to have assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.

Value

This function returns a list containing the following 12 values: 1. sig2s: the subject variance component. 2.sig2r: the rater variance component 3. sig2e: the error variance component. 4. sig2sr: the subject-rater interaction variance component. 5. icc2r: ICC as a measure of inter-rater relliability. 6. icc2a: ICC as a measure of intra-rater reliability. 7. n: the number of subjects. 8. r: the number of raters. 9. max.rep: the maximum number of ratings per subject. 10. min.rep: the minimum number of ratings per subjects. 11. M: the total number of ratings for all subjects and raters. 12. ov.mean: the overall mean rating.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* - Equation #10.2.9 of chapter 10, page 279 (for the inter-rater reliability ICC(3,1)), and Equation #10.2.10 of chapter 10, page 279 (for the intra-rater reliability ICCa(3,1)), Advanced Analytics, LLC.

Examples

```
#iccdata2 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata2 #see what the iccdata2 dataset looks like
icc3.inter.fn(iccdata2[,2:6]) #Here, you must omit the first column
coeff <- icc3.inter.fn(iccdata2[,2:6])$icc2a #this gives you intra-rater reliability coefficient
coeff
```

---

icc3.nointer.fn   *Intraclass Correlation Coefficients ICC(3,1) and ICCa(3,1) under ANOVA Model 3 without interaction.*

Description

This function computes 2 Intraclass Correlation Coefficients ICC(3,1) and ICCa(3,1) under the mixed factorial ANOVA model (Model 3) without any subject-rater interaction. ICC(3,1) is formulated as a measure of inter-rater reliability and ICCa(3,1) as a measure of intra-rater reliability.

Usage

```
icc3.nointer.fn(dfra)
```

Arguments

dfra   This is a data frame containing 3 columns or more. The first column contains subject numbers (some duplicates are expected, as some subject are assumed to have assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.

Value

This function returns a list containing the following 11 values:
1. sig2s: the subject variance component.
2. sig2e: the error variance component.
3. icc2r: ICC as a measure of inter-rater relliability.
4. icc2a: ICC as a measure of intra-rater reliability.
5. n: the number of subjects. 6. r: the number of raters.
7. max.rep: the maximum number of ratings per subject.
8. min.rep: the minimum number of ratings per subjects.
9. M: the total number of ratings for all subjects and raters.
10. ov.mean: the overall mean rating.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* - Equation 10.2.16 of chapter 10, Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
icc3.nointer.fn(iccdata1)
coeff <- icc3.nointer.fn(iccdata1)$icc2r #this only gives you the ICC coefficient
coeff
```

---

iccdata1	*Scores assigned by 4 judges to 5 targets/subjects.*

Description

This dataset contains data from a reliability experiment where 4 judges scored 5 subjects on a continuous scale. Some of these 5 subjects were rated multiple times. Subject 1 for example was rated 3 times by judges 1, 3 and 4, and twice by judge 2. This explains the number of records being larger than the number of subjects.

Usage

    iccdata1

Format

This dataset has 12 rows (for the 5 subjects) and 5 columns. All 5 columns are mandatory when using the ICC functions of this package. None of the 4 judges scored all 5 subjects. Judge 4 for example did not score subject 3. Moreover, the subjects scored by all judges did not receive the same number of ratings. Therefore, some missing ratings in the form of "NA" appear in the columns associated with the remaining all judges.

Target This variable represents the target or subject number and may contain duplicate value to indicate multiple ratings assigned to the same subjects by the same judge

J1 All ratings from judge 1

J2 All ratings from judge 2

J3 All ratings from judge 3

J4 All ratings from judge 4

Source

Gwet, K.L. (2014) *Handbook of Inter-Rater Reliability*, 4th Edition. Advanced Analytics, LLC.

---

iccdata2	*Scores assigned by 4 judges to 5 targets/subjects distributed in 2 groups A and B.*

Description

This dataset contains data from a reliability experiment where 4 judges scored 5 subjects on a continuous scale. The 5 subjects are distributed across 2 groups named A and B. Moreover, each of the 4 judges assigned 3 ratings to each subject on separate occasions.

Usage

```
iccdata2
```

Format

This dataset has 15 rows (for the 5 subjects) and 6 columns. Only the last 5 columns are mandatory when using the ICC functions of this package.

Group Group number

Target This variable represents the target or subject number and may contain duplicate value to indicate multiple ratings assigned to the same subjects by the same judge

J1 All ratings from judge 1

J2 All ratings from judge 2

J3 All ratings from judge 3

J4 All ratings from judge 4

Source

Gwet, K.L. (2014) *Handbook of Inter-Rater Reliability*, 4th Edition. Advanced Analytics, LLC.

---

iccdata3   *Scores assigned by 3 raters to 4 subjects.*

Description

This small dataset contains data from a reliability experiment where 3 raters scored 4 subjects on a continuous scale. All raters rated each subject once.

Usage

```
iccdata3
```

Format

This dataset has 4 rows (for the 4 subjects) and 4 columns. All 4 columns are mandatory when using the ICC functions of this package. Rater3 only rated 2 of the 4 subjects (i.e. subjects 2 and 3), while each of the other raters rated all 4 subjects. Therefore, some missing ratings in the form of "NA" appear in the column associated with the Rater3.

Subject This variable represents the target or subject number and may contain duplicate value to indicate multiple ratings assigned to the same subjects by the same judge

Rater1 All ratings from judge 1

Rater2 All ratings from judge 2

Rater3 All ratings from judge 3

Source

Gwet, K.L. (2014) *Handbook of Inter-Rater Reliability*, 4th Edition. Advanced Analytics, LLC.

---

mse1a.fn *Mean of Squares for Errors (MSE) under ANOVA Model 1A.*

Description

This MSE is associated with the one-factor ANOVA model where each subject could be rated by a different group of raters. This MSE is used for calculating confidence intervals and p-values associated with the inter-rater reliability coefficient.

Usage

```
mse1a.fn(dfra)
```

Arguments

dfra This is a data frame containing 3 columns or more. The first column contains subject numbers (there could be duplicates if a subject was assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.

Value

This function returns a vector containing the following 3 values: 1. mse: the MSE. 2. M: The total number of ratings from all raters and subjects. 3. n: The number of subjects that participated in the experiment.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 8, section 8.3.1. Advanced Analytics, LLC.

---

mse1b.fn *Mean of Squares for Errors (MSE) under ANOVA Model 1B.*

Description

This MSE is associated with the one-factor ANOVA model where each rater may rate a different group of subjects. This MSE is used for calculating confidence intervals and p-values associated with the intra-rater reliability coefficient.

Usage

```
mse1b.fn(dfra)
```

Arguments

dfra
This is a data frame containing 3 columns or more. The first column contains subject numbers (there could be duplicates if a subject was assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.

Value

This function returns a vector containing the following 3 values: 1. mse: the MSE. 2. M: The total number of ratings from all raters and subjects. 3. n: The number of subjects that participated in the experiment.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 8, section 8.3.3. Advanced Analytics, LLC.

---

mse2.inter.fn *Mean of Squares for Errors (MSE) under ANOVA Models 2 & 3 with interaction.*

Description

This function can be used to compute the MSE under the random (Model 2) and mixed (Model 3) efffects ANOVA model with interaction. This MSE is needed for calculating confidence intervals and p-values associated with the inter-rater and intra-rater reliability coefficients.

Usage

```
mse2.inter.fn(dfra)
```

Arguments

dfra
This is a data frame containing 3 columns or more. The first column contains subject numbers (there could be duplicates if a subject was assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 9, section 9.3.1 and chapter 10, section 10.3.1. Advanced Analytics, LLC.

---

mse2.nointer.fn	*Mean of Squares for Errors (MSE) under Models 2 & 3 without replication*

Description

This function computes the MSE for both the random factorial (Model 2) and mixed factorial (Model 3) without subject-rater Interaction. This MSE is used for calculating confidence intervals and p-values associated with the inter-rater and intra-rater reliability coefficients.

Usage

```
mse2.nointer.fn(dfra)
```

Arguments

dfra   This is a data frame containing 3 columns or more. The first column contains
            subject numbers (there could be duplicates if a subject was assigned multiple
            ratings) and each of the remaining columns is associated with a particular rater
            and contains its numeric ratings.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 10, section 10.3.1, Advanced Analytics, LLC.

---

msi2.fn	*Mean of Squares for Interaction (MSI) under ANOVA Models 2 & 3 with interaction.*

Description

This function computes the MSI under both the random factorial (Model 2) and mixed factorial (Model 3) ANOVA model with subject-rater interaction. This MSI is used for calculating confidence intervals and p-values associated with the inter-rater and intra-rater reliability coefficients. coefficients under both models 2 and 3.

Usage

```
msi2.fn(dfra)
```

Arguments

dfra   This is a data frame containing 3 columns or more. The first column contains
            subject numbers (there could be duplicates if a subject was assigned multiple
            ratings) and each of the remaining columns is associated with a particular rater
            and contains its numeric ratings.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 9, section 9.3.1 and chapter 10, section 10.3.1. Advanced Analytics, LLC.

---

msr1b.fn	*Mean of Squares for Raters (MSR) under ANOVA Model 1B.*

Description

This MSR is associated with the one-factor ANOVA model where each rater may rate a different group of subjects. This MSR is used for calculating confidence intervals and p-values associated with the intra-rater reliability coefficient.

Usage

```
msr1b.fn(dfra)
```

Arguments

dfra   This is a data frame containing 3 columns or more. The first column contains subject numbers (there could be duplicates if a subject was assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.

Value

This function returns a vector containing 2 values: 1. msr: the MSR. 2. r: The number of raters that participated in the experiment.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 8, section 8.3.4. Advanced Analytics, LLC.

---

msr2.fn	*Mean of Squares for Raters (MSR) under ANOVA Model 2 with or without interaction.*

Description

This function computes the MSR under the random factorial ANOVA model (MOdel 2). It can be used whether or not the subject-rater interaction is assumed. The MSR is used for calculating confidence intervals and p-values associated with the inter-rater and intra-rater reliability coefficients under model 2.

Usage

```
msr2.fn(dfra)
```

Arguments

dfra   This is a data frame containing 3 columns or more. The first column contains subject numbers (there could be duplicates if a subject was assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 9, section 9.3.1, Advanced Analytics, LLC.

---

mss1a.fn   *Mean of Squares for Subjects (MSS) under ANOVA Model 1A.*

Description

This MSS is associated with the one-factor ANOVA model where each subject may be rated a different group of raters. This MSS is used for calculating confidence intervals and p-values associated with the inter-rater reliability coefficient.

Usage

```
mss1a.fn(dfra)
```

Arguments

dfra   This is a data frame containing 3 columns or more. The first column contains subject numbers (there could be duplicates if a subject was assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.

Value

This function returns a vector containing the following 2 values: 1. mss: the MSS. 2. n: The number of subjects.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 8, section 8.3.1. Advanced Analytics, LLC.

---

mss2.fn   *Mean of Squares for Subjects (MSS) under ANOVA Models 2 and 3,*
                                     with or without interaction.

Description

This function computes the MSS under the random factorial (Model 2) and mixed factorial (Model 3) ANOVA model. The MSS is used for calculating confidence intervals and p-values associated with the inter-rater and intra-rater reliability coefficients.

Usage

```
mss2.fn(dfra)
```

Arguments

dfra   This is a data frame containing 3 columns or more. The first column contains
                subject numbers (there could be duplicates if a subject was assigned multiple
                ratings) and each of the remaining columns is associated with a particular rater
                and contains its numeric ratings.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 9, section 9.3.1 and chapter 10, section 10.3.1. Advanced Analytics, LLC.

---

pval.ICC1a   *P-value of the ICC under ANOVA Model 1A for the specific null values*
                                     0,0.1,0.3,0.5,0.7,0.9.

Description

This function computes the p-value associated with the Intraclass Correlation Coefficient (ICC) under the one-factor ANOVA model where each subject may be rated by a different group of raters.

Usage

```
pval.ICC1a(ratings)
```

Arguments

ratings   This is a data frame containing 3 columns or more. The first column contains
                subject numbers (there could be duplicates if a subject was assigned multiple
                ratings) and each of the remaining columns is associated with a particular rater
                and contains its numeric ratings.

Value

This function returns a vector containing 6 p-values associated with the 6 null values 0,0.1,0.3,0.5,0.7,0.9.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 8, section 8.3.2, equation 8.3.4. Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
pval.ICC1a(iccdata1)
```

---

pval.ICC1b *P-value of the ICC under ANOVA Model 1B for the specific null values 0,0.1,0.3,0.5,0.7,0.9.*

Description

This function computes the p-value associated with the Intraclass Correlation Coefficient (ICC) under the one-factor ANOVA model where each rater may rate a different group of subject.

Usage

```
pval.ICC1b(ratings)
```

Arguments

ratings   This is a data frame containing 3 columns or more. The first column contains subject numbers (there could be duplicates if a subject was assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.

Value

This function returns a vector containing 6 p-values associated with the 6 null values 0,0.1,0.3,0.5,0.7,0.9.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 8, section 8.3.5, equation 8.3.8. Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
pval.ICC1b(iccdata1)
```

---

pval.ICC2r.inter   *P-values of ICC(2,1) under Model 2 with subject-rater interaction, for 6 specific null values.*

Description

This function computes 6 p-values for the Intraclass Correlation Coefficient (ICC) used as a measure of inter-rater reliability under the random factorial ANOVA model (Model 2) with subject-rater interaction. Each of the 6 p-values is associated with one of the null values 0,0.1,0.3,0.5,0.7,0.9.

Usage

```
pval.ICC2r.inter(dfra)
```

Arguments

dfra   This is a data frame containing 3 columns or more. The first column contains subject numbers (there could be duplicates if a subject was assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.

Value

This function returns a vector containing 6 p-values associated with the 6 null values 0,0.1,0.3,0.5,0.7,0.9.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 9, section 9.3.1, equation 9.3.6. Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
pval.ICC2r.inter(iccdata1)
```

---

pvals.ICC1a   *P-value of the ICC under ANOVA Model 1A for arbitrary null values.*

Description

This function computes the p-value associated with the Intraclass Correlation Coefficient (ICC) under the one-factor ANOVA model where each subject may be rated by a different group of raters.

Usage

```
pvals.ICC1a(ratings, rho.zero = 0)
```

Arguments

ratings   This is a data frame containing 3 columns or more. The first column contains
                 subject numbers (there could be duplicates if a subject was assigned multiple
                 ratings) and each of the remaining columns is associated with a particular rater
                 and contains its numeric ratings.

rho.zero   This is an optional parameter that represents a vector containing an arbitrary
                 number of null values between 0 and 1 for which a p-value will be calculated. If
                 not specified then its defauklt value will be 0.

Value

This function returns a vector containing p-values associated with the null values specified in the
parameter rho.zero.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 8, section 8.3.2, equation
8.3.4. Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
pvals.ICC1a(iccdata1,c(0,0.17,0.22,0.35))
```

---

pvals.ICC1b   *P-value of the ICC under ANOVA Model 1B for arbitrary null values.*

Description

This function computes the p-value associated with the Intraclass Correlation Coefficient (ICC)
under the one-factor ANOVA model where each rater may rate a different group of subjects.

Usage

```
pvals.ICC1b(ratings, gam.zero = 0)
```

Arguments

ratings   This is a data frame containing 3 columns or more. The first column contains
                 subject numbers (there could be duplicates if a subject was assigned multiple
                 ratings) and each of the remaining columns is associated with a particular rater
                 and contains its numeric ratings.

gam.zero   This is an optional parameter that represents a vector containing an arbitrary
                 number of null values between 0 and 1 for which a p-value will be calculated. If
                 left unspecified, its default value will be 0.

Value

This function returns a vector containing p-values associated with the null values specified in the
parameter gam.zero.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 8, section 8.3.5, equation
8.3.8. Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
#Let c(0.05,0.13,0.28,0.33) be an arbitrary vector of values between 0 and 1
pvals.ICC1b(iccdata1,c(0.05,0.13,0.28,0.33))
```

---

pvals.ICC2a.inter   *P-values of ICCa(2,1) under Model 2 with interaction.*

Description

This function can compute several p-values associated with the Intraclass Correlation Coefficient
(ICC) used to quantify intra-rater reliability coefficient under the random factorial ANOVA model
with subject-rater interaction (Model 2). This function computes the p-value for each of the null
values specified in the parameter gam.zero.

Usage

```
pvals.ICC2a.inter(dfra, gam.zero = 0)
```

Arguments

dfra   This is a data frame containing 3 columns or more. The first column contains
                 subject numbers (there could be duplicates if a subject was assigned multiple
                 ratings) and each of the remaining columns is associated with a particular rater
                 and contains its numeric ratings.

gam.zero   This is an optional parameter that represents a vector containing an arbitrary
                    number of null values between 0 and 1 for which a p-value will be calculated. If
                    not specified then its default value will be 0.

Value

This function returns a vector containing p-values associated with the null values specified in the
parameter gam.zero.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 9, section 9.3.2 (page
245) Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
pvals.ICC2a.inter(iccdata1,c(0.15,0.20,0.25))
```

---

pvals.ICC2a.nointer   *P-values of ICCa(2,1) under Model 2 without subject-rater interac-*
                         tion.

Description

This function can compute several p-values associated with the Intraclass Correlation Coefficient
(ICC) used to quantify intra-rater reliability under the random factorial ANOVA model without
subject-rater interaction (Model 2). This function computes the p-value for each of the null values
specified in the parameter rho.zero.

Usage

```
pvals.ICC2a.nointer(dfra, gam.zero = 0)
```

Arguments

dfra   This is a data frame containing 3 columns or more. The first column contains
                    subject numbers (there could be duplicates if a subject was assigned multiple
                    ratings) and each of the remaining columns is associated with a particular rater
                    and contains its numeric ratings.

gam.zero   This is an optional parameter that represents a vector containing an arbitrary
                    number of null values between 0 and 1 for which a p-value will be calculated. If
                    not specified then its default value will be 0.

Value

This function returns a vector containing p-values associated with the null values specified in the parameter rho.zero. #iccdata1 is a small dataset that comes with the package. Use it as follows: library(irrICC) iccdata1 #see what the iccdata1 dataset looks like pvals.ICC2a.nointer(iccdata1) pvals.ICC2a.nointer(iccdata1,seq(0.2,0.5,0.05))

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 9, section 9.5.1, equation 9.5.17, Advanced Analytics, LLC.

---

pvals.ICC2r.inter	*P-values of ICC(2,1) under Model 2 with subject-rater interaction, for user-provided null values.*

Description

This function computes p-values for the Intraclass Correlation Coefficients (ICC) used as a measure of inter-rater reliability under the random factorial ANOVA model (Model 2) with subject-rater interaction. The output is vector of p-values, one for each of the null values specified in the optional rho.zero parameter, whose default value is 0.

Usage

```
pvals.ICC2r.inter(dfra, rho.zero = 0)
```

Arguments

dfra	This is a data frame containing 3 columns or more. The first column contains subject numbers (there could be duplicates if a subject was assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.
rho.zero	This is an optional parameter that represents a vector containing an arbitrary number of null values between 0 and 1 for which a p-value will be calculated. If not specified then its default value will be 0.

Value

This function returns a vector containing p-values associated with the null values specified in the parameter rho.zero.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 9, section 9.3.1 Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
pvals.ICC2r.inter(iccdata1,c(0.15,0.20,0.25))
```

---

pvals.ICC2r.nointer   *P-values of ICC(2,1) under Model 2 without subject-rater interaction.*

Description

This function can compute several p-values associated with the Intraclass Correlation Coefficient (ICC) used to quantify inter-rater reliability under the random factorial ANOVA model without subject-rater interaction (Model 2). This function computes the p-value for each of the null values specified in the parameter rho.zero.

Usage

```
pvals.ICC2r.nointer(dfra, rho.zero = 0)
```

Arguments

dfra	This is a data frame containing 3 columns or more. The first column contains subject numbers (there could be duplicates if a subject was assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.
rho.zero	This is an optional parameter that represents a vector containing an arbitrary number of null values between 0 and 1 for which a p-value will be calculated. If not specified then its default value will be 0.

Value

This function returns a vector containing p-values associated with the null values specified in the parameter rho.zero.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 9, section 9.5.1, equation 9.5.15, Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
pvals.ICC2r.nointer(iccdata1)
pvals.ICC2r.nointer(iccdata1,seq(0.2,0.5,0.05))
```

---

pvals.ICC3a.inter   *P-values of ICCa(3,1) under Model 3 with subject-rater interaction.*

Description

This function can compute several p-values associated with the Intraclass Correlation Coefficient (ICC) used to quantify intra-rater reliability under the mixed factorial ANOVA model with subject-rater interaction (Model 3). This function computes the p-value for each of the null values specified in the parameter rho.zero.

Usage

```
pvals.ICC3a.inter(dfra, gam.zero = 0)
```

Arguments

dfra   This is a data frame containing 3 columns or more. The first column contains subject numbers (there could be duplicates if a subject was assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.

gam.zero   This is an optional parameter that represents a vector containing an arbitrary number of null values between 0 and 1 for which a p-value will be calculated. If not specified then its default value will be 0.

Value

This function returns a vector containing p-values associated with the null values specified in the parameter rho.zero.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 10, section 10.3.3 (page 286) Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
pvals.ICC3a.inter(iccdata1)
pvals.ICC3a.inter(iccdata1,seq(0.2,0.5,0.05))
```

---

pvals.ICC3r.inter	*P-value of the Intraclass Correlation Coefficient ICC(3,1) under Model 3 with subject-rater interaction.*

Description

This function computes the p-value associated with the ICC under the mixed factorial ANOVA model with subject-rater interaction. The ICC considered here is the one used as a measure of inter-rater reliability and the p-value is calculated for each of the null values specified in the parameter rho.zero.

Usage

```
pvals.ICC3r.inter(dfra, rho.zero = 0)
```

Arguments

dfra	This is a data frame containing 3 columns or more. The first column contains subject numbers (there could be duplicates if a subject was assigned multiple ratings) and each of the remaining columns is associated with a particular rater and contains its numeric ratings.
rho.zero	This is an optional parameter that represents a vector containing an arbitrary number of null values between 0 and 1 for which a p-value will be calculated. If not specified then its default value will be 0.

Value

This function returns a vector containing p-values associated with the null values specified in the parameter rho.zero.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 10, section 10.3.3 Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
pvals.ICC3r.inter(iccdata1) #gives you the p-value associated with default null value of 0
pvals.ICC3r.inter(iccdata1,c(0,0.15,0.25,0.33)) #produces p-values for an arbitrary vector
```

---

pvals.ICC3r.nointer   *P-values of ICC(3,1) under Model 3 without subject-rater interaction.*

Description

This function can compute several p-values associated with the Intraclass Correlation Coefficient (ICC) used to quantify inter-rater reliability under the mixed factorial ANOVA model without subject-rater interaction (Model 3). This function computes the p-value for each of the null values specified in the parameter rho.zero.

Usage

```
pvals.ICC3r.nointer(dfra, rho.zero = 0)
```

Arguments

dfra   This is a data frame containing 3 columns or more. The first column contains
                subject numbers (there could be duplicates if a subject was assigned multiple
                ratings) and each of the remaining columns is associated with a particular rater
                and contains its numeric ratings.

rho.zero   This is an optional parameter that represents a vector containing an arbitrary
                number of null values between 0 and 1 for which a p-value will be calculated. If
                not specified then its default value will be 0.

Value

This function returns a vector containing p-values associated with the null values specified in the parameter rho.zero.

References

Gwet, K.L. (2014): *Handbook of Inter-Rater Reliability - 4th ed.* chapter 10, section 10.3.3 (page 286) Advanced Analytics, LLC.

Examples

```
#iccdata1 is a small dataset that comes with the package. Use it as follows:
library(irrICC)
iccdata1 #see what the iccdata1 dataset looks like
pvals.ICC3r.nointer(iccdata1)
pvals.ICC3r.nointer(iccdata1,seq(0.2,0.5,0.05))
```

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