Package 'GAIPE'

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Type Package

Title Graphical Extension with Accuracy in Parameter Estimation (GAIPE)

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Author Tzu-Yao Lin

Maintainer Yao Lin <zaiyaolin@gmail.com>

Depends R (>= 3.4.1)

Description Implements graphical extension with accuracy in parameter estimation (AIPE) on RMSEA for sample size planning in structural equation modeling based on Lin, T.-Z. & Weng, L.-J. (2014) <doi:10.1080/10705511.2014.915380>. And, it can also implement AIPE on RMSEA and power analysis on RMSEA.

License GPL (>= 2)

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Contents

GAIPE-package *Graphical Extension with Accuracy in Parameter Estimation (GAIPE)*

Description

Implements graphical extension with accuracy in parameter estimation (AIPE) on RMSEA for sample size planning in structural equation modeling based on Lin, T.-Z. & Weng, L.-J. (2014) <doi: 10.1080/10705511.2014.915380>.

Details

Package:	GAIPE
Type:	Package
Version:	1.1
Date:	2022-05-24
License:	GPL (>= 2)

Author(s)

Tzu-Yao Lin Maintainer: Yao Lin <zaiyaolin@gmail.com>

References

Lin, T.-Z. & Weng, L.-J. (2014) Graphical Extension of Sample Size Planning With AIPE on RMSEA Using R. Structural Equation Modeling, 21, 482-490. doi: 10.1080/10705511.2014.915380

AIPE.RMSEA *Sample size planning by AIPE approach on RMSEA*

Description

Performs sample size planning by AIPE approach for RMSEA.

Usage

```
AIPE.RMSEA(rmsea, df, width, clevel = 0.95)
```

Arguments

rmsea	expected RMSEA.
df	model degrees of freedom.
width	desired confidence width.
clevel	confidence level (e.g., .90, .95, etc.).

Value

Return the necessary sample size that satisfies the desired width of a confidence interval.

Author(s)

Tzu-Yao Lin

References

Kelley, K., & Lai, K. (2011). Accuracy in parameter estimation for the root mean square error of approximation: Sample size planning for narrow confidence intervals. Multivariate Behavioral Research, 46, 1-32. doi: 10.1080/00273171.2011.543027

Examples

```
AIPE.RMSEA(rmsea=.05,df=30,width=.02,clevel=.95)
```

CI.RMSEA *Computing the confidence interval for RMSEA*

Description

Computes the confidence interval for RMSEA.

Usage

```
CI.RMSEA(rmsea,df,N,clevel=.95)
```

Arguments

rmsea	expected or observed RMSEA.
df	model degrees of freedom.
N	sample size.
clevel	confidence level (e.g., .90, .95, etc.).

Value

Return the upper and lower bound as well as the expected or observed value of the RMSEA.

Author(s)

Tzu-Yao Lin

References

Browne, M. W., & Cudeck, R. (1992). Alternative ways of assessing model fit. Sociological Methods and Research, 21(2), 230-258. doi: 10.1177/0049124192021002005

Examples

```
CI.RMSEA(rmsea=.05,df=30,N=200,clevel=.95)
```

GAIPE.RMSEA *Sample size planning by GAIPE framework on RMSEA*

Description

Draws the graph for sample size planning by GAIPE framework on RMSEA.

Usage

```
GAIPE.RMSEA(rmsea, df, width = NULL, clevel = 0.95, N = c(100, 1800, 15),
PA_method = c("exact.fit", "close.fit", "not.close.fit"),
H0rmsea = NULL, alpha = 0.05, power = c(0.8, 0.9, 0.95))
```

Arguments

rmsea	vector of the expected RMSEA values.
df	model degrees of freedom.
width	vector of desired confidence interval widths to be highlighted in the graph.
clevel	confidence level (e.g., .90, .95, etc.).
N	vector of specifying the range and the increment of sample size for drawing confidence intervals. Note that N[1:2] represents the range whereas N[3] represents the increment.
PA_method	a character string specifying the desired hypothesis test for power analysis, can be one of "exact.fit", "close.fit", or "not.close.fit".
H0rmsea	RMSEA for null hypothesis.
alpha	type I error rate for power analysis.
power	vector of specifying the power values for which horizontal lines are to be added in the graph.

Details

If user wants to implement the power analysis based on RMSEA in GAIPE, the PA_method and H0rmsea have to be specified. In such a case, the first value of rmsea is the RMSEA for the alternative hypothesis.

Author(s)

Tzu-Yao Lin

References

Lin, T.-Z. & Weng, L.-J. (2014) Graphical Extension of Sample Size Planning With AIPE on RMSEA Using R. Structural Equation Modeling, 21, 482-490. doi:10.1080/10705511.2014.915380

Examples

```
# Drawing the graphs in  Lin & Weng (2014) #

# FIGURE 2 #
GAIPE.RMSEA(rmsea=.05,df=30,width=c(.03,.04))

# FIGURE 3 #
GAIPE.RMSEA(rmsea=c(.05,.08),df=30,width=c(.03,.04))

# FIGURE 4 #
GAIPE.RMSEA(rmsea=.025,df=30,width=c(.03,.04),PA_method="not.close.fit",H0rmsea=0.05)

# FIGURE 5 #
GAIPE.RMSEA(rmsea=.05,df=30,width=c(.03,.04),PA_method="exact.fit",H0rmsea=0)
```

PA.RMSEA *Sample size planning by power analysis on RMSEA*

Description

Performs sample size planning by power analysis on RMSEA.

Usage

```
PA.RMSEA(df, method = c("exact.fit", "close.fit", "not.close.fit"),
H0rmsea, HArmsea, power = 0.8, alpha = 0.05)
```

Arguments

df	model degrees of freedom.
method	a character string specifying the hypothesis test for power analysis, must be one of "exact.fit", "close.fit", or "not.close.fit"(default).
H0rmsea	RMSEA for the null hypothesis.
HArmsea	RMSEA for the alternative hypothesis.
power	desired power value.
alpha	Type I error rate.

Value

Return the necessary sample size that achieves the desired power.

Author(s)

Tzu-Yao Lin

References

Hancock, G. R., & Freeman, M. J. (2001). Power and sample size for the root mean square error of approximation test of not close fit in structural equation modeling. Educational and Psychological Measurement, 61(5), 741-758. doi: 10.1177/00131640121971491

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. Psychological Methods, 1(2), 130-149. doi: 10.1037/1082-989X.1.2.130

Examples

```
PA.RMSEA(df=30,method="not.close.fit",H0rmsea=.05,HArmsea=.02,power=.8,alpha=.05)

# Reproducing Table 8 in Hancock and Freeman (2001) #

# DF=c(seq(5,100,5),seq(110,200,10),225,250)
# POWER=c(seq(.5,.99,.05),.99)
# out=matrix(NA,length(DF),length(POWER))
# for(i in 1:length(DF)){
#   for(j in 1:length(POWER)){
#     out[i,j]=PA.RMSEA(df=DF[i],method="not.close.fit",
#     H0rmsea=.05,HArmsea=.02,power=POWER[j],alpha=.05)
#   }
# }
# colnames(out)=paste("Pi=",POWER,"",sep="")
# rownames(out)=paste("df=",DF,"",sep="")
# out
```

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