

# Package ‘GAIPE’

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**Type** Package

**Title** Graphical Extension with Accuracy in Parameter Estimation  
(GAIPE)

**Version** 1.0

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**Depends** R (>= 2.15.3)

**Description** GAIPE implements graphical representation of accuracy in parameter estimation (AIPE) on RMSEA for sample size planning in structural equation modeling. Sample sizes suggested by RMSEA with AIPE method and power analysis approach can also be obtained separately using the provided functions.

**License** GPL (>= 2)

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GAIPE-package

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

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**Description**

GAIPE implements graphical representation of accuracy in parameter estimation (AIPE) on RMSEA for sample size planning in structural equation modeling. Sample sizes suggested by RMSEA with AIPE method and power analysis approach can also be obtained separately using the provided functions.

**Details**

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Version: 1.0  
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**Author(s)**

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

**References**

Lin, T.-Y. & Weng, L.-J. (Under review). Graphical extension of sample size planning with AIPE on RMSEA. *Structural Equation Modeling: A Multidisciplinary Journal*.

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

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**Description**

Performs sample size planning by AIPE approach on 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.

**Examples**

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

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CI.RMSEA

*Computing the confidence interval for RMSEA*

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**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, 230-258.

**Examples**

```
CI.RMSEA(rmse=.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(rmse, 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.-Y. & Weng, L.-J. (Under review). Graphical extension of sample size planning with AIPE on RMSEA. *Structural Equation Modeling: A Multidisciplinary Journal*.

**Examples**

```
# Drawing the graphs in Lin & Weng (Under review) #

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

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

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

# FIGURE 5 #
GAIPE.RMSEA(rmse=.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**

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods, 1*, 130-149.

**Examples**

```
PA.RMSEA(df=30,method="not.close.fit",H0rmsea=.05,HArmsea=0.01)
```

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