

# Package: AHPGaussian (via r-universe)

September 11, 2024

**Type** Package

**Title** New Multicriteria Method: AHPGaussian

**Version** 0.1.2

**Date** 2023-06-06

**Maintainer** Cid Edson Povoas <cidedson@gmail.com>

**URL** <https://cidedson.github.io/ahpgaussian/>

**BugReports** <https://github.com/cidedson/ahpgaussian/issues>

**Depends** R (>= 3.6.0), stats

**Imports** reshape2, methods

**Description** Implements the Analytic Hierarchy Process (AHP) method using Gaussian normalization (AHPGaussian) to derive the relative weights of the criteria and alternatives. It also includes functions for visualizing the results and generating graphical outputs. Method as described in: dos Santos, Marcos (2021) <[doi:10.13033/ijahp.v13i1.833](https://doi.org/10.13033/ijahp.v13i1.833)>.

**License** GPL (>= 2)

**Encoding** UTF-8

**LazyLoad** yes

**LazyData** yes

**RoxygenNote** 7.2.3

**Suggests** spelling

**Language** en-US

**Repository** <https://cidedson.r-universe.dev>

**RemoteUrl** <https://github.com/cidedson/ahpgaussian>

**RemoteRef** HEAD

**RemoteSha** 73623bc163a5b0fb7590baf12a426bd5d8f11574

## Contents

ahpgaussian . . . . .	2
cellphones . . . . .	3
plot . . . . .	4
summary.ahpgaussian . . . . .	5
warships . . . . .	6
<b>Index</b>	<b>7</b>

---

 ahpgaussian

*New Multicriteria Method: AHPGaussian*


---

### Description

Analytic Hierarchy Process (AHP) is a method allowing individuals or groups to make complex decisions. The core concept of AHP is that alternatives are always compared pairwise (and not, say, by giving a score, or sorting alternatives). AHP is used in many fields, from finance to criminal investigation.

The AHP Gaussian is a modification of the AHP that uses a Gaussian function to model the pairwise comparisons between criteria and alternatives. In the traditional AHP, pairwise comparisons are made using numerical values on a scale from 1 to 9, which can be subjective and lead to inconsistencies. The AHP Gaussian addresses this issue by using a continuous function that allows for more precise and consistent comparisons.

The function is defined by a mean value and a standard deviation, which can be estimated from the pairwise comparison data. The resulting weights for the criteria and alternatives are obtained by solving a system of linear equations. The Gaussian AHP has been shown to be effective in various applications, including military decision-making and environmental management.

### Usage

```
ahpgaussian(x)
```

### Arguments

x                    A data.frame object.

### Value

Values are returned from the analysis with results and graphical output

### Author(s)

Cid Edson Povoas (<cidedson@gmail.com>)

## References

dos Santos, M, Costa, I. P. de A., & Gomes, C. F. S. (2021) Multicriteria decision-making in the selection of warships: a new approach to the ahp method. *International Journal of the Analytic Hierarchy Process*, 13(1). <doi:10.13033/ijahp.v13i1.833>

## Examples

```
##
## Example 1
##

ws <- ahpgaussian(warships)

summary(ws)

plot(ws)
```

---

cellphones	<i>Decision Matrix</i>
------------	------------------------

---

## Description

An example data.frame about cellphone model characteristics

## Usage

```
data(cellphones)
```

## Format

The format is:

```
'data.frame': 5 obs. of 5 variables:
 $ criteria: chr  "Price" "Camera" "Storage" "Battery Life" ...
 $ Xiaomi  : int  1500 12 64 24 94
 $ Samsung : int  1800 12 128 18 120
 $ iPhone  : int  5000 20 128 10 117
 $ min_max : chr  "min" "max" "max" "max" ...
# Description
#
criteria: Statement of the goal, decision criteria and alternatives.
Xiaomi: Xiaomi model;
Samsung: Samsung model; or
iPhone: iPhone model.
min_max: Weights of criteria and alternatives.
```

## Examples

```
data(cellphones)
cellphones
```

---

plot

*Plot Method for ahpgaussian objects*

---

## Description

These are methods for objects of class ahpgaussian.

## Usage

```
## S3 method for class 'ahpgaussian'
plot(x, ...)
```

## Arguments

x                    A given object of the class ahpgaussian  
...                   Other graphical parameters may also be passed as arguments to these functions.

## Author(s)

Cid Edson Povoas (<cidedson@gmail.com>)

## References

dos Santos, M, Costa, I. P. de A., & Gomes, C. F. S. (2021) Multicriteria decision-making in the selection of warships: a new approach to the ahp method. *International Journal of the Analytic Hierarchy Process*, 13(1). <doi:10.13033/ijahp.v13i1.833>

## See Also

[ahpgaussian](#)

## Examples

```
##
## Example 1
## ahpgaussian
##
# ahpgaussian
cp <- ahpgaussian(cellphones)
plot(cp)
```

---

summary.ahpgaussian    *Summary Method for ahpgaussian objects*

---

### Description

Returns (and prints) a summary list for ahpgaussian) objects.

### Usage

```
## S3 method for class 'ahpgaussian'  
summary(object,  
        presentation=FALSE, ...)
```

### Arguments

object	A given object of the class ahpgaussian
presentation	Logic. If TRUE the summary of the class ahpgaussian is showed well formatted in the screen, else, return a list. The default is FALSE.
...	Potential further arguments (require by generic).

### Author(s)

Cid Edson Povoas (<cidedson@gmail.com>)

### References

dos Santos, M, Costa, I. P. de A., & Gomes, C. F. S. (2021) Multicriteria decision-making in the selection of warships: a new approach to the ahp method. *International Journal of the Analytic Hierarchy Process*, 13(1). <doi:10.13033/ijahp.v13i1.833>

### See Also

[ahpgaussian](#)

### Examples

```
##  
## Example 1  
## ahpgaussian  
##  
# ahpgaussian  
cp <- ahpgaussian(cellphones)  
summary(cp)
```

---

 warships

*Decision Matrix*


---

### Description

A data.frame Decision Matrix of the data used Santos (2021), the first column lists the criteria, while the next three columns represent the alternatives and the last column represents the objective choice between minimum and maximum for a given criterion. Each model corresponds to an alternative of ship, classified according to its respective criteria.

### Usage

```
data(warships)
```

### Format

The format is:

```
'data.frame': 9 obs. of 5 variables:
 criteria: chr "Action Radius" "Fuel Endurance" "Autonomy" "Primary Cannon" ...
 model_1 : num 4000 11 30 25 1 0 290 592 6
 model_2 : num 9330 26 25 25 2 1 310 633 8
 model_3 : num 10660 30 35 120 2 ...
 min_max : chr "max" "max" "max" "max" ...
 #
 # Description
 #
 criteria: Statement of the goal, decision criteria and alternatives.
 model_1: Replicate the current Corvette Barroso;
 model_2: Build a slightly modernized ship (2.600 ton corvette); or
 model_3: Build a model with more significant modernizations (3.000 ton corvette).
 min_max: Weights of criteria and alternatives.
```

### References

dos Santos, M, Costa, I. P. de A., & Gomes, C. F. S. (2021) Multicriteria decision-making in the selection of warships: a new approach to the ahp method. *International Journal of the Analytic Hierarchy Process*, 13(1). <doi:10.13033/ijahp.v13i1.833>.

### Examples

```
data(warships)
warships
```

# Index

- \* **ahpgaussian**
    - plot, [4](#)
    - summary.ahpgaussian, [5](#)
  - \* **ahp**
    - ahpgaussian, [2](#)
    - plot, [4](#)
    - summary.ahpgaussian, [5](#)
  - \* **datasets**
    - cellphones, [3](#)
    - warships, [6](#)
  - \* **plot**
    - plot, [4](#)
  - \* **summary**
    - summary.ahpgaussian, [5](#)
- ahpgaussian, [2, 4, 5](#)
- cellphones, [3](#)
- plot, [4](#)
- summary.ahpgaussian, [5](#)
- warships, [6](#)