Package 'AHPhybrid'

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Type Package

Title AHP Hybrid Method	
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Description The AHP method (Analytic Hierarchy Process) is a multi-criteria decision-making method addressing choice and outranking problems. The method enables to perform the analysis of alternatives in each type of criterion and then provides a global performance of each alternative in the decision con The main difference of this package is the possibility of evaluating the alternatives using quatative data, by numerical representation, and qualitative data, using the Saaty scale, providing prefer relation between variables by a pairwise evaluation.	nti-
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AHPhybrid

AHP Hybrid

Description

The AHP method (Analytic Hierarchy Process) is a multi-criteria decision-making method addressing choice and outranking problems. The method enables to perform the analysis of alternatives in each type of criterion and then provides a global performance of each alternative in the decision context. The main difference of this package is the possibility of evaluating the alternatives using quantitative data, by numerical representation, and qualitative data, using the Saaty scale, providing preference relation between variables by a pairwise evaluation.

Usage

```
AHPhybrid(title, Alternatives, Qualitative_criteria, Quantitative_criteria, Quantitative_crit_min_max, n_alt, n_crit, n_crit_Qual, n_crit_Quant, Criteria_Comparison, Alternatives_comparison_qualit_crit, Alternatives_quantitative_crit)
```

Arguments

title Title of analysis.

Alternatives Name of alternatives in analysis.

Qualitative_criteria

Name of criteria with qualitative performance.

Quantitative_criteria,

Name of criteria with quantitative performance.

Quantitative_crit_min_max

A vector with objectives, minimize or maximize, to each criteria.

n_alt number of alternatives (It is not necessary to make any input).

n_crit number of criteria (It is not necessary to make any input).

n_crit_Qual number of qualitative criteria (It is not necessary to make any input).

n_crit_Quant number of quantitative criteria (It is not necessary to make any input).

Criteria_Comparison

Input of matrix comparison with the preferences relations between the criteria.

Alternatives_comparison_qualit_crit

Input of matrix comparison with the preferences relations between the alternatives in each qualitative criterion.

Alternatives_quantitative_crit

Input of quantitative performance of alternatives in each quantitative criterion.

Value

- Calculation of criteria priorities;
- Calculation of alternatives priorities in each criterion and in a global context.
- Validadtion of prefernce inputs by the consistency index;
- Provide the analysis considering qunatitative and qualitative data.

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References

GOLDEN, Bruce L.; WASIL, Edward A.; HARKER, Patrick T. The analytic hierarchy process. Applications and Studies, Berlin, Heidelberg, 1989. https://link.springer.com/book/10.1007

Examples

```
title <- "Layout Manufacturing Analysis"
Alternatives <- c("Layout_A", "Layout_B")</pre>
Qualitative_criteria <- c("Material Handling", "Process Quality" )
Quantitative_criteria <- c("Cost", "Production", "Cost Reduction")
Quantitative_crit_min_max <- c("min","max", "max")
n_alt <- length(Alternatives)</pre>
n_crit <- (length(Qualitative_criteria)+length(Quantitative_criteria))</pre>
n_crit_Qual <- length(Qualitative_criteria)</pre>
n_crit_Quant <- length(Quantitative_criteria)</pre>
Criteria_Comparison <- matrix(c(1, 1/5, 1, 1/7, 1/2,
                                5, 1, 3, 1, 2,
                                1, 1/3, 1, 1/4, 1/2,
                                7, 1, 4, 1, 2,
                                2, 1/2, 2, 1/2, 1),
                                ncol = n_crit, nrow = n_crit, byrow = TRUE)
Alternatives_comparison_qualit_crit <- list(</pre>
                                             matrix(c( 1, 5,
                                                     1/5, 1),
                                               ncol = n_alt, nrow = n_alt, byrow = TRUE),
                                             matrix(c( 1, 1/3,
                                                        3, 1),
                                                ncol = n_alt, nrow = n_alt, byrow = TRUE)
                                             )
Alternatives_quantitative_crit <- matrix(c(200000, 17389, 420000,
                                            300000, 28257, 360000),
```

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nrow = n_alt, ncol = n_crit_Quant, byrow = TRUE)

AHPhybrid(title, Alternatives, Qualitative_criteria, Quantitative_criteria, Quantitative_crit_min_max, n_alt, n_crit, n_crit_Qual, n_crit_Quant, Criteria_Comparison, Alternatives_comparison_qualit_crit, Alternatives_quantitative_crit)

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