# Package ‘critpath’

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Dataset for the CPM method

Description
Fictitious data that is used in the examples. In this dataset, the activities occur on the edges

Usage
cpmexample1

Format
A data frame composed of predetermined columns:

from starting activity node
to final activity node
label activity label
time duration of the activity

Dataset for the LESS method

Description
Fictitious data that is used in the examples. In this dataset, the activities occur on the edges

Usage
lessexample1
Format

A data frame composed of predetermined columns:

- **from** starting activity node
- **to** final activity node
- **label** activity label
- **time** normal duration of the activity
- **bound_time** the shortest duration of the activity
- **norm_cost** normal cost of the activity
- **bound_cost** boundary cost of the activity

Dataset for the CPM method

Description

Fictitious data that is used in the examples. In this dataset, the activities occur on the edges

Usage

pertexample1

Format

A data frame composed of predetermined columns:

- **from** starting activity node
- **to** final activity node
- **label** activity label
- **opt_time** optimistic duration of activity
- **likely_time** the most likely duration of the activity
- **pes_time** pesimistic duration of activity
plot_alap  
An ALAP chart

Description
An ALAP chart

Usage
plot_alap(yourlist, bar_size = 10)

Arguments
yourlist  List of objects that make up the solution to the project management problem.
bar_size  Thickness of the bar drawn for activity (set to 10 by default).

Value
Draws an ALAP (activities start and finish As Late As Possible) chart broken down into critical ("CR") and non-critical ("NC") activities. Marks the slack of time.

Examples
x <- solve_pathAOA(cpmexample1, deterministic = TRUE)
plot_alap(x)

plot_asap  
An ASAP chart

Description
An ASAP chart

Usage
plot_asap(yourlist, bar_size = 10)

Arguments
yourlist  List of objects that make up the solution to the project management problem.
bar_size  Thickness of the bar drawn for activity (set to 10 by default).

Value
Draws an ASAP (activities start and finish As Soon As Possible) chart broken down into critical ("CR") and non-critical ("NC") activities. Marks the slack of time.
Examples

```r
x <- solve_pathAOA(cpmexample1, deterministic = TRUE)
plot_asap(x)
```

Description

Graph with marked critical path

Usage

```r
plot_crit_pathAOA(yourlist, fixed_seed = 23)
```

Arguments

- **yourlist**: Data frame describing the problem
- **fixed_seed**: Optional parameter setting random seed to user value to get similar looking plots each time the function is run (set to 23 by default).

Value

The function draws the graph along with the critical path by means of the DiagrammeR package functions.

Examples

```r
x <- solve_pathAOA(cpmexample1, TRUE)
plot_crit_pathAOA(x)
```

Description

A Gantt chart

Usage

```r
plot_gantt(yourlist, bar_size = 10)
```

Arguments

- **yourlist**: List of objects that make up the solution to the project management problem.
- **bar_size**: Thickness of the bar drawn for activity (set to 10 by default).
Value

Draws a Gantt chart broken down into critical ("CR") and non-critical ("NC") activities. Marks the slack of time.

Examples

```r
x <- solve_pathAOA(cpmexample1, deterministic = TRUE)
plot_gantt(x)
```

---

**plot_graphAOA**  
*Graph without critical path*

Description

Graph without critical path

Usage

```r
plot_graphAOA(input_data, fixed_seed = 23)
```

Arguments

- `input_data`: Data frame describing the problem.
- `fixed_seed`: Optional parameter setting random seed to user value to get similar looking plots each time the function is run (set to 23 by default).

Value

The function draws a relationship graph between activities without solving the problem and thus without marking critical activities.

Examples

```r
plot_graphAOA(cpmexample1)
```
plot_norm

The cumulative distribution function of the normal distribution

Description
The cumulative distribution function of the normal distribution

Usage
plot_norm(yourlist)

Arguments
yourlist List of objects making up the solution to the project management problem

Value
Draws a graph of the normal distribution with the expected directive term from the PERT method and the standard deviation for this term. The chart also includes lines indicating the schedules of the risk-taker and the belayer.

Examples
y <- solve_pathAOA(pertexample1, deterministic = FALSE)
plot_norm(y)

plot_TC

Total cost change plot

Description
Total cost change plot

Usage
plot_TC(your_list)

Arguments
your_list List containing solved problem

Value
Based on the results of the LESS method, a graph of the total cost value of all iterations is created

Examples
z <- solve_lessAOA(lessexample1, 50, 15)
plot_TC(z)
solve_lessAOA  
*Determines the solution using the LESS method*

**Description**
Determines the solution using the LESS method

**Usage**
```
solve_lessAOA(input_data, ICconst, ICslope)
```

**Arguments**
- **input_data**: Data frame containing the graph structure and activity durations. The frame consists of 7 columns (the order matters):
  1. `from`: The number of the node where the activity starts.
  2. `to`: The number of the node where the activity ends.
  3. `label`: Activity labels.
  4. `time`: Normal duration of the activity.
  5. `bound_time`: Boundary (the shortest possible) duration of activities.
  6. `norm_cost`: Normal costs.
  7. `bound_cost`: Boundary costs.
- **ICconst**: Intercept of the indirect cost function.
- **ICslope**: Slope of the indirect cost function.

**Value**
A list made of a graph and a result set.

**Examples**
```
z <- solve_lessAOA(lessexample1, 50, 15)
```

---

solve_pathAOA  
* Finds a solution using CPM and PERT methods *

**Description**
Finds a solution using CPM and PERT methods

**Usage**
```
solve_pathAOA(input_data, deterministic = TRUE)
```
solve_pathAOA

Arguments

input_data  Data frame containing the structure of the graph and the duration of the activity. For the CPM method there will be 4 columns (the order is important, not the name of the column):
1. from The number of the node where the activity starts.
2. to The number of the node where the activity ends.
3. label Activity labels.
4. time Activities duration.
For the PERT method there will be 4 columns (the order is important, not the name of the column):
1. from The number of the node where the activity starts.
2. to The number of the node where the activity ends.
3. label Activity labels.
4. opt_time Optimistic duration of activities.
5. likely_time The most likely duration of the activity.
6. pes_time Pessimistic duration of activities.
deterministic  A logical parameter specifying the solution method. If set to TRUE (default), the CPM method is used. If is set to FALSE, the PERT method is used.

Value

The list is made of a graph, schedule and selected partial results.

Examples

x <- solve_pathAOA(cpmexample1, deterministic = TRUE)
y <- solve_pathAOA(pertexample1, deterministic = FALSE)
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