

# Package ‘assertHE’

February 20, 2026

**Title** Visualisation and Verification of Health Economic Decision Models

**Version** 1.0.1

**Description** Designed to help health economic modellers when building and reviewing models. The visualisation functions allow users to more easily review the network of functions in a project, and get lay summaries of them. The asserts included are intended to check for common errors, thereby freeing up time for modellers to focus on tests specific to the individual model in development or review. For more details see Smith and colleagues (2024)<[doi:10.12688/wellcomeopenres.23180.1](https://doi.org/10.12688/wellcomeopenres.23180.1)>.

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**Encoding** UTF-8

**RoxygenNote** 7.3.3

**Suggests** testthat (>= 3.0.0), colourpicker, clipr, jsonlite

**Config/testthat/edition** 3

**Depends** R (>= 4.1.0)

**Imports** assertthat, ggplot2, dplyr, utils, visNetwork, covr, htmltools, officer, flextable, knitr, shiny, shinyjs, rstudioapi, roxygen2, methods, waiter, igraph, httr

**URL** <https://dark-peak-analytics.github.io/assertHE/>,  
<https://github.com/dark-peak-analytics/assertHE>

**BugReports** <https://github.com/dark-peak-analytics/assertHE/issues>

**NeedsCompilation** no

**Author** Robert Smith [aut, cre, cph] (ORCID: <<https://orcid.org/0000-0003-0245-3217>>),  
Wael Mohammed [aut] (ORCID: <<https://orcid.org/0000-0003-0370-4903>>),  
Jack Smith [aut],  
Oliver Dolin [aut] (ORCID: <<https://orcid.org/0000-0003-0766-1277>>),  
Dark Peak Analytics Ltd [cph, fnd]

**Maintainer** Robert Smith <[rsmith@darkpeakanalytics.com](mailto:rsmith@darkpeakanalytics.com)>

**Repository** CRAN

**Date/Publication** 2026-02-20 11:40:13 UTC

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**Details**

If the input expression `x` is not an atomic value, symbol, or an environment pointer, the function breaks it up into a list of components. It also handles expressions of the form `foo$bar` by splitting them up, keeping only the relevant parts for parsing.

If `x` is a list of expressions, the function recursively parses each expression until they can no longer be listed, filtering out atomic values in the process.

If `x` is not listable (e.g. a function), it is deparsed into a character string.

**Value**

A character string or a list of parsed components, depending on the input expression.

---

|                  |                                     |
|------------------|-------------------------------------|
| assertHE_example | <i>Get path to assertHE example</i> |
|------------------|-------------------------------------|

---

**Description**

assertHE comes bundled with a number of sample files in its `inst/extdata` directory. This function make them easy to access

**Usage**

```
assertHE_example(file = NULL)
```

**Arguments**

`file` Name of file. If NULL, the example files will be listed.

**Value**

If `file` is NULL, returns a character vector containing the names of all files and directories available in the package's directory (`extdata`). If `file` specifies the name of an existing example file, returns a character vector of length one containing the full path to that file. Stops with an error if the specified file does not exist within the example directory.

**Examples**

```
assertHE_example()  
assertHE_example("example_scripts/example_tricky_functions.R")
```

---

|            |                                      |
|------------|--------------------------------------|
| check_init | <i>Check and initialize a vector</i> |
|------------|--------------------------------------|

---

**Description**

This function checks a given vector for several conditions, including values being within the range 0 to 1 inclusive and the sum of values being equal to 1. If the vector is named, the function checks all elements have names and no names are duplicates.

**Usage**

```
check_init(x)
```

**Arguments**

x                    A numeric vector with named elements.

**Value**

If successful there is no message, otherwise, it issues warnings with informative messages for each failed condition.

**Examples**

```
x <- setNames(object = c(0.2, 0.3, 0.4, 0.1), nm = letters[1:4])
check_init(x) # x is a valid input, no warnings issued

x <- setNames(c(0.2, 0.3, 0.4, 0.1), nm = c("H", NA, "NA", "D"))
check_init(x) # Should issue a warning about missing names

x <- c(-2, 0.3, 0.4, 0.1)
check_init(x) # Should issue a warning about a value below 0 and about not summing to 1
```

---

|                    |                           |
|--------------------|---------------------------|
| check_markov_trace | <i>Check Markov Trace</i> |
|--------------------|---------------------------|

---

**Description**

This function checks the properties of a markov trace conform to expectations. That it is: numeric, values are between 0 and 1 with all rows summing to 1. Also allows users to check that the dead state is monotonically decreasing (if provided)

**Usage**

```
check_markov_trace(
  m_TR,
  dead_state = NULL,
  confirm_ok = FALSE,
  stop_if_not = FALSE
)
```

**Arguments**

|             |  |
|-------------|--|
| m_TR        | The markov trace to be checked.                              |
| dead_state  | character vector length 1 denoting dead state (e.g. "D")     |
| confirm_ok  | if OK, return a message confirming all checks passed.        |
| stop_if_not | return error messages. The default (FALSE) returns warnings. |

**Value**

A message indicating whether the matrix passed all the checks or an error message if any check failed.

**Examples**

```
v_hs_names <- c("H", "S", "D")
n_hs <- length(v_hs_names)
n_t <- 10

m_TR <- matrix(data = NA,
               nrow = n_t,
               ncol = n_hs,
               dimnames = list(NULL, v_hs_names))

m_TR[, "H"] <- seq(1, 0, length.out = n_t)
m_TR[, "S"] <- seq(0, 0.5, length.out = n_t)
m_TR[, "D"] <- 1 - m_TR[, "H"] - m_TR[, "S"]
check_markov_trace(m_TR = m_TR, dead_state = "D", confirm_ok = TRUE)

# the following results in an error because the trace has infeasible values
m_TR[10, "D"] <- 0
m_TR[9, "S"] <- 1
try(check_markov_trace(m_TR = m_TR, stop_if_not = TRUE, dead_state = "D", confirm_ok = TRUE))
```

**Description**

This function checks the properties of a transition probability array with 2 or three dimensions conform to standard expectations. That it is that each slice is: square, numeric, values are between 0 and 1 with all rows summing to 1. If a dead state is provided, it checks that the dead state -> dead state probability in each slice is equal to 1.

**Usage**

```
check_trans_prob_array(a_P, dead_state = NULL, stop_if_not = FALSE)
```

**Arguments**

`a_P`                    The transition probability array to be checked.

`dead_state`            character vector length 1 denoting dead state (e.g. "D")

`stop_if_not`            return error messages. The default (FALSE) returns warnings.

**Value**

A message indicating whether the array passed all the checks or a warning/error message if any check failed.

**Examples**

```
v_hs_names <- c("H", "S", "D")
n_hs <- length(v_hs_names)
a_P <- array(
  data = 0,
  dim = c(n_hs, n_hs, 1000),
  dimnames = list(v_hs_names, v_hs_names, 1:1000)
)
a_P["H", "S", ] <- 0.3
a_P["H", "D", ] <- 0.01
a_P["S", "D", ] <- 0.1
a_P["S", "H", ] <- 0.5

for(x in 1:1000){
  diag(a_P[, ,x]) <- 1 - rowSums(a_P[, ,x])
}

check_trans_prob_array(a_P = a_P, stop_if_not = FALSE)
# introduce error
a_P["H", "S", 1:10] <- 0

try(check_trans_prob_array(a_P = a_P, stop_if_not = FALSE))
```

---

check\_trans\_prob\_mat *Check Transition Probability Matrix*

---

### Description

This function checks the properties of a transition probability matrix conform to standard expectations. That it is: square, numeric, values are between 0 and 1 with all rows summing to 1. If a dead state is provided, it checks that the dead state -> dead state probability is 1.

### Usage

```
check_trans_prob_mat(
  m_P,
  dead_state = NULL,
  confirm_ok = FALSE,
  stop_if_not = FALSE
)
```

### Arguments

|             |  |
|-------------|--|
| m_P         | The transition probability matrix to be checked.             |
| dead_state  | character vector length 1 denoting dead state (e.g. "D")     |
| confirm_ok  | if OK, return a message confirming all checks passed.        |
| stop_if_not | return error messages. The default (FALSE) returns warnings. |

### Value

A message indicating whether the matrix passed all the checks or a warning/error message if any check failed.

### Examples

```
v_hs_names <- c("H", "S", "D")
n_hs <- length(v_hs_names)
m_P <- matrix(data = 0, nrow = n_hs, ncol = n_hs,
              dimnames = list(v_hs_names, v_hs_names))
m_P["H", "S"] <- 0.3
m_P["H", "D"] <- 0.01
m_P["S", "D"] <- 0.1
m_P["S", "H"] <- 0.5
diag(m_P) <- (1 - rowSums(m_P))
check_trans_prob_mat(m_P)

# introduce error
m_P["H", "S"] <- 0.2
try(check_trans_prob_mat(m_P, confirm_ok = TRUE, stop_if_not = TRUE))
```

---

|               |                                  |
|---------------|----------------------------------|
| create_prompt | <i>Create a prompt for a LLM</i> |
|---------------|----------------------------------|

---

**Description**

Uses the function arguments and function body as inputs to create a prompt for the LLM.

**Usage**

```
create_prompt(foo_arguments, foo_body, foo_name, foo_desc, foo_title)
```

**Arguments**

|               |                               |
|---------------|-------------------------------|
| foo_arguments | the arguments to the function |
| foo_body      | the body of the function      |
| foo_name      | function name                 |
| foo_desc      | function description          |
| foo_title     | function title                |

**Value**

a single prompt in the form of a character string

**Examples**

```
create_prompt(  
  foo_arguments = LETTERS[1:3],  
  foo_body = "D <- A+B+C; return(D)",  
  foo_name = "calculate_QALYs",  
  foo_desc = "This function calcs QALYs",  
  foo_title = "Calculate the QALYs")
```

---

|                   |                                      |
|-------------------|--------------------------------------|
| define_app_server | <i>Create Shiny app server logic</i> |
|-------------------|--------------------------------------|

---

**Description**

Create Shiny app server logic

**Usage**

```
define_app_server(network_object, project_path, foo_path)
```

**Arguments**

network\_object visNetwork object to be displayed in the shiny app  
 project\_path Path to the project directory  
 foo\_path path to the function folder

**Value**

Shiny app server logic

---

define\_app\_ui *Create Shiny app UI*

---

**Description**

Create Shiny app UI

**Usage**

```
define_app_ui(network_title)
```

**Arguments**

network\_title Character string representing the title of the network to be displayed above the network.

**Value**

Shiny app user interface

---

extract\_function\_name *Extract function name from a string*

---

**Description**

Extract function name from a long string. This works by identifying "function(" in the string and then finding the operand before and splitting on that before keeping the character there.

**Usage**

```
extract_function_name(string)
```

**Arguments**

string A string containing a function definition, this must contain the word 'function'

**Value**

A string containing the function name

**Examples**

```
extract_function_name("better_name <- function(x){\n more code} asfdas <- function(x){}")
extract_function_name("better_name <- function(x){\n more code}")
```

---

find\_files

*find\_files*

---

**Description**

Find files based upon regular expression searching IMPORTANT - a Directory is NOT a file. (for most instances of file systems)

**Usage**

```
find_files(
  file_regx = ".R",
  path = ".",
  recursive = TRUE,
  exclude_files = NULL,
  exclude_dirs = NULL
)
```

**Arguments**

```
file_regx      = ".*" - a regular expression for files to source
path           = "." - a path to search
recursive      = TRUE - recurse into subdirectories
exclude_files  = NULL - regx for files to exclude
exclude_dirs   = NULL - regx for directories to exclude
```

**Value**

list of files

**Examples**

```
find_files(file_regx = ".*", ## any file name
  path = ".*", # the current directory and all subdirectories
  recursive = FALSE, # don't recurse
  exclude_files = ".*utility.*", # exclude "utility" anywhere in basename
  exclude_dirs = "\\<tmp\\>|/tmp/|/tmp\\>|\\<tmp/" # exclude any directory named "tmp", or subdirs
)
```

---

find\_folder\_function\_definitions

*Creates summary of R files in folder with functions defined within and locations.*

---

### Description

Applies find\_function\_definitions to each file in a folder and aggregate results

### Usage

```
find_folder_function_definitions(  
  foo_folder = ".",  
  f_excl = NULL,  
  d_excl = NULL  
)
```

### Arguments

foo\_folder      A folder to apply find\_function\_definitions to each script in.  
f\_excl          A regular expression for files to NOT process (basename)  
d\_excl          A regular expression for directories to NOT process (dirname)

### Value

A dataframe containing a column for function string and a column for function location.

### Examples

```
# Skip listed files "somefile.R", and "another_file.R"  
folder_path <- assertHE_example("example_project")  
find_folder_function_definitions(  
  foo_folder = folder_path,  
  f_excl = "\\b(somefile\\.R|another_file\\.R)\\b"  
)
```

---

find\_function\_calls\_in\_file

*Find all function calls in file*

---

### Description

Searches through a file for function calls using SYMBOL\_FUNCTION\_CALL

**Usage**

```
find_function_calls_in_file(  
  relative_path = NULL,  
  foo_strings,  
  filter_for_test_that = FALSE  
)
```

**Arguments**

`relative_path` path of file to search in

`foo_strings` string vector of function names to search for

`filter_for_test_that`  
whether to filter for only functions used after the call to `test_that`. Default `FALSE`.

**Value**

a dataframe with the columns 'foo' for function name and 'test\_location' which gives the file in which the function is called with the line in which the function is called appended.

**Examples**

```
file_path <- assertHE_example("example_project/tests/testthat/test-calculate_costs.R")  
find_function_calls_in_file(  
  relative_path = file_path,  
  foo_strings = "calculate_costs"  
)
```

---

find\_function\_calls\_in\_folder

*Find specific function calls in a folder*

---

**Description**

Runs `find_function_calls_in_file` on all files in a folder, and combined results into a single dataframe

**Usage**

```
find_function_calls_in_folder(  
  test_folder,  
  foo_strings,  
  filter_for_test_that = FALSE  
)
```

**Arguments**

test\_folder      folder containing all tests  
 foo\_strings      string vector of function names to search for  
 filter\_for\_test\_that  
                   whether to filter for only functions used after the call to test\_that. Default FALSE.

**Value**

dataframe with two columns. 'foo' contains function names, test\_location contains the location of the tests for each function (file and line number).

**Examples**

```
folder_path <- assertHE_example("example_project/tests/testthat")
find_function_calls_in_folder(
  foo_strings = c("calculate_costs", "calculate_QALYs",
                 "create_Markov_trace", "FOO_WITH_NO_TESTS"),
  test_folder = folder_path
)
```

---

find\_function\_definitions

*Parses an R source file, returns function names defined within.*

---

**Description**

Using `utils::getParseData()`, searches for function definitions by matching the `FUNCTION` keyword (i.e. "function") with it's associated `SYMBOL` (i.e the function name)

**Usage**

```
find_function_definitions(filename)
```

**Arguments**

filename            A string containing a path to an R source file

**Value**

A dataframe with interesting information

**Examples**

```
file_path <- assertHE_example("example_scripts/example_tricky_functions.R")
find_function_definitions(filename = file_path)
```

---

`find_next_vector_element`*Find the next element of the vector after a value*

---

**Description**

Find the next element of the vector after a value

**Usage**

```
find_next_vector_element(value, vector, LTE = FALSE)
```

**Arguments**

|        |  |
|--------|--|
| value  | A value of numeric values                                    |
| vector | A vector of numeric values                                   |
| LTE    | a boolean to determine collection on "greater than or equal" |

**Value**

The next element of the vector after the value

**Examples**

```
find_next_vector_element(value = 5, vector = 1:10)
find_next_vector_element(value = 5, vector = 1:4)
find_next_vector_element(value = 5, vector = 1:5, LTE = FALSE)
find_next_vector_element(value = 5, vector = 1:5, LTE = TRUE)
```

---

`find_previous_vector_element`*Find the previous element of the vector before a value*

---

**Description**

Find the previous element of the vector before a value

**Usage**

```
find_previous_vector_element(value, vector, LTE = FALSE)
```

**Arguments**

|        |   |
|--------|---|
| value  | A value of numeric values   |
| vector | A vector of numeric values  |
| LTE    | a boolean to determine collection on "less than" or "less than equal" |

**Value**

The previous element of the vector before the value

**Examples**

```
find_previous_vector_element(value = 5, vector = 1:10)
find_previous_vector_element(value = 5, vector = 6:10)
find_previous_vector_element(value = 5, vector = 5:10, LTE = FALSE)
find_previous_vector_element(value = 5, vector = 5:10, LTE = TRUE)
```

---

`get_active_functions`    *get all active functions that exist in the global environment*

---

**Description**

get all active functions that exist in the global environment

**Usage**

```
get_active_functions(packages = "assertTHE")
```

**Arguments**

`packages`            a vector containing the names of packages to include in the search

**Value**

a vector containing the names of all active functions in the global environment

---

`get_fileCheersClassifications`  
*Get cheers classification tags from a given file*

---

**Description**

For a provided filepath, identify the cheers classification tags and the function names that follow them.

**Usage**

```
get_fileCheersClassifications(
  filename,
  cheers_pattern,
  function_pattern = "(\\s|=|-)function\\\\"
)
```

**Arguments**

filename            A string containing the filepath to the file to be checked  
cheers\_pattern    A string containing the roxygen tag for cheers which is used as an identifier  
function\_pattern            A string containing the pattern to identify functions

**Value**

A list containing the cheers tags and the function names that follow them

**See Also**

Other cheers: [get\\_folderCheersClassifications\(\)](#)

---

get\_folderCheersClassifications

*Get cheers classification tags from a given folder*

---

**Description**

For a provided folder path, identify the cheers classification tags and the function names that follow them.

**Usage**

```
get_folderCheersClassifications(path, cheers_pattern, path_ignore = "tests/")
```

**Arguments**

path            A string containing the filepath to the folder to be checked  
cheers\_pattern    A string containing the roxygen tag for cheers which is used as an identifier  
path\_ignore    A string containing the pattern to identify files to ignore

**Value**

A list containing the cheers tags and the function names that follow them

**See Also**

Other cheers: [get\\_fileCheersClassifications\(\)](#)

---

get\_foo\_coverage      *Get coverage by function*

---

**Description**

Get coverage by function

**Usage**

```
get_foo_coverage(foo_folder, test_folder)
```

**Arguments**

foo\_folder      folder containing functions  
test\_folder     folder containing tests

**Value**

a dataframe with a column for functions and a column for coverage

**Examples**

```
# Example takes more than 5 seconds to run
if(require(testthat)) {
  folder_path1 <- assertHE_example("example_project/R")
  folder_path2 <- assertHE_example("example_project/tests/testthat")
  get_foo_coverage(
    foo_folder = folder_path1,
    test_folder = folder_path2
  )
}
```

---

get\_function\_data      *Retrieve Function data to a list*

---

**Description**

This function retrieves data about the arguments and body of a specified function.

**Usage**

```
get_function_data(foo_name, envir = environment())
```

**Arguments**

- foo\_name      The name of the function to retrieve data from.
- envir         The environment in which to look for the function.

**Value**

A list with elements for 'arguments' and 'body' of the specified function.

---

*get\_function\_line*      *Extract function line in file path*

---

**Description**

Extract function line in file path

**Usage**

```
get_function_line(file_location)
```

**Arguments**

- file\_location    Character scalar specifying the path of a file.

**Value**

A numeric scalar

---

*get\_function\_path*      *Remove artefacts from file path*

---

**Description**

Remove artefacts from file path

**Usage**

```
get_function_path(file_location, project_path)
```

**Arguments**

- file\_location    Character scalar specifying the path of a file.
- project\_path     Character scalar specifying the path of the project.

**Value**

A character scalar

---

get\_isolated\_foo      *Get Isolated Functions*

---

**Description**

Get Isolated Functions

**Usage**

```
get_isolated_foo(df_edges)
```

**Arguments**

df\_edges      A dataframe with two columns ("from" and "to") representing the dependencies.

**Value**

A vector of isolated function names.

---

get\_roxygen\_description  
*Get Title and Description from Parsed List*

---

**Description**

This function extracts the title and description from a parsed list.

**Usage**

```
get_roxygen_description(parsed_list)
```

**Arguments**

parsed\_list      A list containing parsed elements.

**Value**

A list containing the title and description.

**Examples**

```
parsed_list <- list(list(tag = "title", val = "Sample Title"),  
                  list(tag = "description", val = "This is a sample description."))  
get_roxygen_description(parsed_list)
```

---

`get_roxygen_description_from_foo`*Get roxygen title and description from function*

---

**Description**

Get roxygen title and description from function

**Usage**

```
get_roxygen_description_from_foo(foo_name)
```

**Arguments**

foo\_name            function for which want description

**Value**

text containing description

---

`identify_dependencies` *Identify Dependencies*

---

**Description**

Identify dependencies between functions.

**Usage**

```
identify_dependencies(v_unique_foo, pkg_env = environment())
```

**Arguments**

v\_unique\_foo        Vector of unique function strings.

pkg\_env             The package environment where the functions are defined (e.g. global).

**Value**

A dataframe with two columns ("from" and "to") representing the dependencies.

---

|              |                     |
|--------------|---------------------|
| locate_funcs | <i>locate_funcs</i> |
|--------------|---------------------|

---

**Description**

locates the lines which define a function within a single file

**Usage**

```
locate_funcs(file)
```

**Arguments**

file                   = a connection object or a character string path to a file.

**Value**

Returns a data frame with the following columns: func\_num: The ID of the function - monotonic increasing from 1. func\_start: The line number (within the file) of the function start. func\_end: The line number of the function end.

---

|                   |                                  |
|-------------------|----------------------------------|
| make_closable_tab | <i>Create closable shiny tab</i> |
|-------------------|----------------------------------|

---

**Description**

Create closable shiny tab

**Usage**

```
make_closable_tab(tab_name, content_output_Id, output_type = "text")
```

**Arguments**

tab\_name               Character scalar representing the name or title of the shiny tab.  
content\_output\_Id  
                          Character scalar representing the id of the shiny tab.  
output\_type             Character scalar specifying the type of rendered output. Default is "text" and can also accept "HTML".

**Value**

A tab that can be passed to shiny::tabsetPanel()

---

plotNetwork

*Plot Network*


---

### Description

Visualize a network plot using the visNetwork package.

### Usage

```
plotNetwork(
  df_edges,
  from_col = "from",
  to_col = "to",
  df_summary,
  df_coverage,
  color_no_test = c(background = "#fad1d0", border = "#9c0000", highlight = "#9c0000"),
  color_with_test = c(background = "#e6ffe6", border = "#65a765", highlight = "#65a765"),
  color_mod_coverage = c(background = "#FFD580", border = "#E49B0F", highlight =
    "#E49B0F"),
  moderate_coverage_range = c(0.2, 0.8),
  show_in_shiny = FALSE,
  network_title = NULL,
  scale_node_size_by_degree = FALSE
)
```

### Arguments

|                           |   |
|---------------------------|---|
| df_edges                  | A data frame containing columns "from" and "to" representing the edges of the network.                        |
| from_col                  | Name of the column in df_edges representing the source nodes.   |
| to_col                    | Name of the column in df_edges representing the target nodes.   |
| df_summary                | A summary dataframe containing the information about each function.   |
| df_coverage               | a summary dataframe with function names and test coverages  |
| color_no_test             | named vector with hexcodes for background, border and highlight   |
| color_with_test           | named vector with hexcodes for background, border and highlight   |
| color_mod_coverage        | named vector with hexcodes for background, border and highlight where coverage moderate                       |
| moderate_coverage_range   | vector of two values giving range defined as moderate coverage.   |
| show_in_shiny             | logical scalar indicating whether to prepare/deploy the network using a built in shiny app. Default is FALSE. |
| network_title             | title of the network plot.  |
| scale_node_size_by_degree | Scale the node size by the degree centrality of the node.   |

**Value**

A visNetwork object representing the network plot.

---

plot\_PSA\_stability      *Plot cumulative mean Probabilistic Sensitivity Analysis results*

---

**Description**

This function plots the cumulative mean of incremental net monetary benefit (INMB), incremental cost-effectiveness ratio (ICER), incremental costs, or incremental effects for different strategies compared to a specified comparator.

**Usage**

```
plot_PSA_stability(
  m_eff,
  m_cost,
  lambda,
  currency_symbol = "$",
  v_strategy_labels = NULL,
  v_strategy_colors = NULL,
  comparator = NULL,
  output = "inmb",
  include_reference_line = TRUE,
  log_x = FALSE
)
```

**Arguments**

|                        |  |
|------------------------|--|
| m_eff                  | Numeric matrix of effects for different strategies.                                    |
| m_cost                 | Numeric matrix of costs for different strategies.                                      |
| lambda                 | Numeric value specifying the willingness-to-pay threshold for ICER.                    |
| currency_symbol        | String specifying the currency symbol for y-axis labels.                               |
| v_strategy_labels      | Named vector of strategy labels e.g. c("A" = "Strategy A").                            |
| v_strategy_colors      | Named vector of strategy colors e.g. c("A" = "#665BA6").                               |
| comparator             | Column name representing the comparator strategy (e.g. "A").                           |
| output                 | String specifying the type of plot, limited to: "inmb", "icer", "costs", or "effects". |
| include_reference_line | Logical indicating whether to include a reference line.                                |
| log_x                  | Logical indicating whether to use a logarithmic scale on the x-axis.                   |

**Value**

A ggplot object representing the cumulative mean PSA stability plot.

**Examples**

```
# create example matrices
n_psa <- 10000

m_eff <- matrix(data = runif(n = n_psa * 4, min = 0, max = 1),
               nrow = n_psa,
               ncol = 4,
               dimnames = list(NULL, paste0("Strategy ", c("A", "B", "C", "D"))))

m_cost <- matrix(data = runif(n = n_psa * 4, min = 5000, max = 20000),
                nrow = n_psa,
                ncol = 4,
                dimnames = list(NULL, paste0("Strategy ", c("A", "B", "C", "D"))))

v_strategy_colors <- setNames(object = grDevices::palette.colors(n = ncol(m_eff)),
                              nm = colnames(m_eff))

plot_PSA_stability(m_eff = m_eff,
                  m_cost = m_cost,
                  lambda = 20000,
                  currency_symbol = "\u0024",
                  v_strategy_labels = colnames(m_eff),
                  v_strategy_colors = v_strategy_colors,
                  comparator = colnames(m_eff)[1],
                  output = "inmb",
                  include_reference_line = TRUE,
                  log_x = FALSE)
```

---

processNodes

*Process Nodes*

---

**Description**

Process unique nodes from a dataframe of edges.

**Usage**

```
processNodes(df_edges, from_col = "from", to_col = "to")
```

**Arguments**

|          |  |
|----------|--|
| df_edges | A data frame containing columns "from" and "to" representing the edges of the network. |
| from_col | Name of the column in df_edges representing the source nodes.                          |
| to_col   | Name of the column in df_edges representing the target nodes.                          |

**Value**

A data frame of unique nodes with labels.

---

|                |   |
|----------------|---|
| return_message | <i>Extract the content from the output of the LLM</i> |
|----------------|---|

---

**Description**

Extracts content and prints the number of tokens used as a message.

**Usage**

```
return_message(API_response, verbose = TRUE)
```

**Arguments**

|              |   |
|--------------|---|
| API_response | response from the LLM API                                     |
| verbose      | whether to include the message for the number of token's used |

**Value**

A single string summary of the content of the LLM response

---

|               |  |
|---------------|--|
| run_shiny_app | <i>Run a Shiny app to host a network visualization</i> |
|---------------|--|

---

**Description**

Run a Shiny app to host a network visualization

**Usage**

```
run_shiny_app(
  uiFunction = define_app_ui,
  serverFunction = define_app_server,
  network_object,
  network_title = "Function Network",
  project_path,
  foo_path
)
```

**Arguments**

|                |  |
|----------------|--|
| uiFunction     | Function defining shiny user-interface             |
| serverFunction | Function defining shiny server logic               |
| network_object | visNetwork object to be displayed in the shiny app |
| network_title  | Title to be displayed in hte app above the title   |
| project_path   | Path to the project directory                      |
| foo_path       | Path to the function folder                        |

**Value**

A shiny app

---

|              |                     |
|--------------|---------------------|
| source_funcs | <i>source_funcs</i> |
|--------------|---------------------|

---

**Description**

Sources *only* the functions discovered in an R file.

**Usage**

```
source_funcs(file, env)
```

**Arguments**

|      |   |
|------|---|
| file | a connection object or a character string path to a file. |
| env  | the environment in which to source the functions.         |

**Value**

No return value, called for side effects.

**IMPORTANT !!!**

Sourcing *this* file is a mistake - may result in infinite recursion.

---

|              |                     |
|--------------|---------------------|
| source_lines | <i>source_lines</i> |
|--------------|---------------------|

---

**Description**

Sources specified lines within a single file.

**Usage**

```
source_lines(file, lines, env)
```

**Arguments**

|       |   |
|-------|---|
| file  | a connection object or a character string path to a file. |
| lines | A vector of integers specifying the lines to be sourced.  |
| env   | the environment in which to source the lines.             |

**Value**

No return value, called for side effects.

**IMPORTANT !!!**

Sourcing *this* file is a mistake - may result in infinite recursion.

---

|  |   |
|--|---|
| summarise_function_from_arguments_and_body | <i>Summarise a function from its arguments and body</i> |
|--|---|

---

**Description**

Summarise a function using a LLM via API and retrieve the result

**Usage**

```
summarise_function_from_arguments_and_body(
  foo_name,
  foo_arguments,
  foo_body,
  foo_title,
  foo_desc,
  model_name = "gpt-3.5-turbo-0125",
  llm_api_url = Sys.getenv("LLM_API_URL"),
  llm_api_key = Sys.getenv("LLM_API_KEY")
)
```

**Arguments**

|               |   |
|---------------|---|
| foo_name      | function name                                       |
| foo_arguments | vector of arguments                                 |
| foo_body      | single character containing the unparsed body       |
| foo_title     | function title                                      |
| foo_desc      | function description                                |
| model_name    | name of the LLM to use (default gpt-3.5-turbo-0125) |
| llm_api_url   | url to the API for the LLM                          |
| llm_api_key   | key for the API for the LLM                         |

**Value**

response from LLM containing all pertinent information & tokens used

**Examples**

```
## Not run:
tmp <- summarise_function_from_arguments_and_body(
  foo_arguments = LETTERS[1:3],
  foo_body = "D <- A+B+C; return(D)",
  model_name = "gpt-3.5-turbo-0125",
  llm_api_url = Sys.getenv("LLM_API_URL"),
  llm_api_key = Sys.getenv("LLM_API_KEY"),
  foo_desc = "add three numbers, these numbers relate to the number of apples on three trees",
  foo_title = "apple adder",
  foo_name = "apple_add"
)
htr::content(tmp)

## End(Not run)
```

---

summarise\_function\_with\_LLM

*Summarize a function using a Large Language Model*

---

**Description**

This function summarizes another function using a Language Model.

**Usage**

```
summarise_function_with_LLM(
  foo_name,
  llm_api_url = Sys.getenv("LLM_API_URL"),
  llm_api_key = Sys.getenv("LLM_API_KEY"),
  envir = environment()
)
```

**Arguments**

|             |  |
|-------------|--|
| foo_name    | function name                                      |
| llm_api_url | url to the API for the LLM                         |
| llm_api_key | key for the API for the LLM                        |
| envir       | The environment in which to look for the function. |

**Value**

A character string with a summary of the function based on its arguments and body.

**Examples**

```
## Not run:
summarise_function_with_LLM(foo_name = "get_active_functions",
                           llm_api_url = Sys.getenv("LLM_API_URL"),
                           llm_api_key = Sys.getenv("LLM_API_KEY"),
                           envir = rlang::ns_env("assertHE"))

## End(Not run)
```

---

|                 |  |
|-----------------|--|
| summarise_model | <i>Summarise the model functions in a single folder.</i> |
|-----------------|--|

---

**Description**

Summarise the model functions in a single folder.

**Usage**

```
summarise_model(
  project_path = ".",
  foo_folder = "R",
  exclude_files = NULL,
  exclude_dirs = NULL,
  test_folder = NULL,
  output_format = "dataframe"
)
```

**Arguments**

|               |  |
|---------------|--|
| project_path  | path to the project folder, if not provided, will use current working directory. |
| foo_folder    | path to folder containing all functions for the model                            |
| exclude_files | A regular expression for files to NOT process (basename)                         |
| exclude_dirs  | A regular expression for directories to NOT process (dirname)                    |
| test_folder   | folder containing all tests  |
| output_format | output format to use, defaults to dataframe, options include latex and word.     |

**Value**

dataframe with three columns. 'foo\_string' contains function names, 'foo\_location' contains the location of the function definitions, 'test\_location' contains the locations of tests for each function (both file and line number).

**Examples**

```
project_path <- assertHE_example("example_project")
foo_folder <- "R"
test_folder <- "tests/testthat"

summarise_model(
  project_path = project_path,
  foo_folder = foo_folder,
  test_folder = test_folder
)

summarise_model(
  project_path = project_path,
  foo_folder = foo_folder,
  test_folder = NULL
)
```

---

|                   |                          |
|-------------------|--------------------------|
| visualise_project | <i>Visualize Project</i> |
|-------------------|--------------------------|

---

**Description**

Visualize the dependencies between functions in a project using a network plot.

**Usage**

```
visualise_project(
  project_path,
  foo_path = "R",
  test_path = NULL,
  exclude_files = NULL,
  exclude_dirs = NULL,
  run_coverage = FALSE,
  color_no_test = c(background = "#fad1d0", border = "#9c0000", highlight = "#9c0000"),
  color_with_test = c(background = "#e6ffe6", border = "#65a765", highlight = "#65a765"),
  color_mod_coverage = c(background = "#FFD580", border = "#E49B0F", highlight =
    "#E49B0F"),
  moderate_coverage_range = c(0.2, 0.8),
  print_isolated_foo = FALSE,
  show_in_shiny = FALSE,
  network_title = "Function Network",
```

```

    scale_node_size_by_degree = TRUE
  )

```

### Arguments

|                           |   |
|---------------------------|---|
| project_path              | Path to the project folder.   |
| foo_path                  | Path to the folder containing foo functions.  |
| test_path                 | Path to the folder containing test functions.   |
| exclude_files             | A regular expression for files to NOT process (basename)  |
| exclude_dirs              | A regular expression for directories to NOT process (dirname)   |
| run_coverage              | Boolean determining whether to run coverage assessment  |
| color_no_test             | named vector with hexcodes for background, border and highlight   |
| color_with_test           | named vector with hexcodes for background, border and highlight   |
| color_mod_coverage        | named vector with hexcodes for background, border and highlight where coverage moderate                       |
| moderate_coverage_range   | vector of two values giving range defined as moderate coverage.   |
| print_isolated_foo        | Print the isolated functions to the console (default false)   |
| show_in_shiny             | logical scalar indicating whether to prepare/deploy the network using a built in shiny app. Default is FALSE. |
| network_title             | title of the network plot.  |
| scale_node_size_by_degree | Scale the node size by the degree centrality of the node.   |

### Value

A visNetwork object representing the network plot of function dependencies.

### Examples

```

# Example takes more than 5 seconds to run
# Visualize project dependencies in HTML
if(require(testthat)) {
  folder_path <- assertHE_example("example_project")
  visualise_project(
    project_path = folder_path,
    foo_path = "R",
    test_path = "tests/testthat",
    run_coverage = TRUE
  )
}

# Visualize project dependencies in shiny
if(interactive()) {

```

```
visualise_project(  
  project_path = folder_path,  
  foo_path = "R",  
  test_path = "tests/testthat",  
  run_coverage = TRUE,  
  show_in_shiny = TRUE  
)  
}
```

---

**wrap\_string***Wrap a string to lines of a specified width*

---

### Description

This function takes an input string and wraps it to lines of a specified width, breaking the string at word boundaries.

### Usage

```
wrap_string(input_string, width = 80)
```

### Arguments

**input\_string**    The input string to be wrapped.  
**width**            The maximum width of each line. Default is 80 characters.

### Value

A character vector where each element represents a line of the wrapped string.

### Examples

```
input_string <- "This is a long string that needs to be wrapped to fit within  
                  a specified width."  
wrapped_lines <- wrap_string(input_string, width = 30)  
cat(wrapped_lines, sep = "\n")
```

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