Package 'impower133'

June 11, 2026

Type Package

Title Reproduce IMpower133 Clinical Trial Results

Version 1.0.0

Description Provides functions to simulate baseline characteristics, reconstruct overall survival data from published Kaplan-Meier curves, and generate publication-ready tables and forest plots reproducing the IMpower133 clinical trial results (Horn et al., 2018, <doi:10.1056/NEJMoa1809064>). The IPD reconstruction method is based on Liu et al.(2021, <doi:10.1186/s12874-021-01308-8>).

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Encoding UTF-8

RoxygenNote 7.3.3

Imports dplyr, survival, survminer, gt, forestplot, IPDfromKM, ggplot2, stats, utils, grid

SystemRequirements GNU make

Suggests testthat (>= 3.0.0)

Config/testthat/edition 3

URL https://github.com/fanfande131/impower133

BugReports https://github.com/fanfande131/impower133/issues

NeedsCompilation no

Author Lu Huang [aut, cre], Wenkai Nie [aut], Qingyang Jiang [aut], Qinxin Chen [aut]

Maintainer Lu Huang <2998785392@qq.com>

Repository CRAN

Date/Publication 2026-06-11 12:20:07 UTC

Contents

`analyze_survival` *Analyze survival data and print key statistics*

Description

Analyze survival data and print key statistics

Usage

```
analyze_survival(ipd_data, type = c("OS", "PFS"), times = 12)
```

Arguments

`ipd_data`	Reconstructed data frame or CSV path
`type`	"OS" or "PFS"
`times`	Landmark time point in months, default 12

Value

A list of key statistics (invisibly)

`make_table1` *Generate Table 1: Baseline characteristics*

Description

Create a publication-ready baseline characteristics table using the gt package, formatted to match the original IMpower133 publication style.

Usage

```
make_table1(data)
```

Arguments

data	Data frame from simulate_impower133()

Value

A gt table object

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make_table2 *Generate Table 2: Response rate and disease progression*

Description

Create a publication-ready table summarizing objective response rate, duration of response, and disease progression outcomes using the gt package.

Usage

```
make_table2(data)
```

Arguments

data	Data frame from simulate_impower133()

Value

A gt table object

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make_table3 *Generate Table 3: Adverse events*

Description

Create a publication-ready adverse events table summarizing treatment-related adverse events by grade in the as-treated population, using the gt package.

Usage

```
make_table3(data)
```

Arguments

data	Data frame from simulate_impower133()

Value

A gt table object

plot_figure2c *Plot Figure 2C: Subgroup forest plot*

Description

Calculate hazard ratios for each subgroup based on simulated baseline data merged with reconstructed OS data, and generate a forest plot in the original IMpower133 publication style.

Usage

```
plot_figure2c(data, output_path = "figure2c.png")
```

Arguments

data	Data frame from simulate_impower133() with os_path specified
output_path	Path to output image file, default "figure2c.png"

Value

No return value, saves image to output_path

plot_survival *Plot survival K-M curve*

Description

Plot survival K-M curve

Usage

```
plot_survival(
  ipd_data,
  type = c("OS", "PFS"),
  output_path = tempfile(fileext = ".png"),
  width = 10,
  height = 6
)
```

Arguments

ipd_data	Reconstructed data frame or CSV path
type	"OS" or "PFS"
output_path	Path to output image file
width, height	Image dimensions in inches

Value

No return value, called for side effects (saves a plot to file).

`reconstruct_survival` *Reconstruct individual patient data from K-M curves*

Description

Use IPDfromKM to extract coordinates from published Kaplan-Meier curves and reconstruct individual patient data (IPD).

Usage

```
reconstruct_survival(
  img_path,
  trisk,
  nrisk_control,
  nrisk_treatment,
  x1 = 0,
  x2 = 21,
  y1 = 0,
  y2 = 1,
  output_csv = tempfile(fileext = ".csv"),
  type = c("OS", "PFS")
)
```

Arguments

`img_path`	Path to K-M curve image
`trisk`	Vector of risk time points
`nrisk_control`	Number at risk for control group
`nrisk_treatment`	Number at risk for treatment group
`x1, x2`	X-axis range (actual values)
`y1, y2`	Y-axis range (actual values)
`output_csv`	Path to output CSV file
`type`	"OS" or "PFS"

Value

A data frame with columns time, status, arm (invisibly)

rtriang *Triangular distribution random number generator*

Description

Generate random numbers following a triangular distribution, useful for simulating continuous variables whose median is not at the center of the range.

Usage

```
rtriang(n, min_val, mode_val, max_val)
```

Arguments

n	Sample size
min_val	Minimum value
mode_val	Mode (peak location)
max_val	Maximum value

Value

A numeric vector of length n

Examples

```
rtriang(100, 28, 64, 90)
```

simulate_impower133 *Simulate IMpower133 complete ITT population*

Description

Simulate 403 virtual patients' baseline characteristics, efficacy outcomes, and safety data based on published summary statistics from Tables 1-3.

Usage

```
simulate_impower133(
  seed = 21,
  os_path = NULL,
  pfs_path = NULL,
  method = c("risk_score", "random"),
  output_path = tempfile(fileext = ".csv")
)
```

Arguments

seed	Random seed, default 21
os_path	Path to reconstructed OS data CSV (optional)
pfs_path	Path to reconstructed PFS data CSV (optional)
method	Matching method: "random" or "risk_score" (default)
output_path	Path to save output CSV

Value

A data.frame with 403 rows and all variables (invisibly)

Examples

```
df <- simulate_impower133()
head(df)
```

Index