Package 'MVPapp'

November 13, 2026

Title Interactive Platform for Pharmacometrics Model Visualization and Simulation

Version 1.0.0

Description An interactive 'shiny' application for exploring pharmacometrics models with minimal setup. Users can explore model structures, parameters and dosing regimens with 'mrgsolve', and compare simulations with observed data. Additional features include parameter sensitivity analysis, non-compartmental analysis (NCA), data exploration, variability assessment with virtual populations, and optional AI-assisted model translation. For design considerations of the app, see Choy et al. (2025) <doi:10.1002/psp4.70023>.

License GPL (>= 3)

URL https://github.com/stevechoy/MVPapp, https://stevechoy.github.io/MVPapp/

Encoding UTF-8

Imports bslib (>= 0.5.1), cowplot, data.table (>= 1.14.2), dplyr (>= 1.1.0), DT, flextable (>= 0.6.10), ggplot2 (>= 3.4.4), grid, graphics, grDevices, htmltools (>= 0.5.5), magrittr, mrgsolve (>= 1.5.0), plotly (>= 4.10.1), rhandsontable (>= 0.3.8), rlang (>= 1.0.0), scales, shiny (>= 1.7.4.1), shinyAce, shinyBS (>= 0.61.1), shinycssloaders, shinydashboard (>= 0.7.2), shinyFiles, shinyjs (>= 1.0), shinythemes, shinyWidgets (>= 0.8.0), stats, stringr, tidyr, tools, utils, zip

Suggests curl, ellmer (>= 0.4.0), GGally, httr2, knitr, mime, ncar, NonCompart, nonmem2mrgsolve, nonmem2rx, pdftools, rmarkdown, shinyalert, spelling, testthat (>= 3.0.0)

Additional_repositories https://stevechoy.r-universe.dev

Depends R (>= 4.1)

LazyData true

Collate ``utils-pipe.R'' ``utils.R'' ``ui_settings.R'' ``code_templates.R'' ``shiny_helpers.R'' ``plot_helpers.R'' ``data_utils.R'' ``plots_data.R'' ``simulation.R'' ``variability.R'' ``nca.R''

``sensitivity.R" ``llm.R" ``session_state.R" ``repro_bundle.R"
``run_mvp.R" ``zzz.R" ``data.R"

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cdc.expand *CDC pediatric virtual population*

Description

A virtual pediatric population (birth to 20 years) simulated from the US Centers for Disease Control and Prevention (CDC) growth charts. Used by the app to sample age, weight and height when the "CDC" database is selected for variability simulations.

Usage

```
cdc.expand
```

Format

A data frame with 97,177 rows and 6 columns:

SEX Sex: 0 = male, 1 = female.

AGEMO Age (months).

AGEYR Age (years).

WT Body weight (kg).

HT Length/stature (cm).

BMI Body mass index (kg/m^2).

Details

Body weight and stature were simulated from the published LMS parameters (Box-Cox power, median and coefficient of variation) of the weight-for-age and stature-for-age charts for each sex and month of age, by drawing standard normal Z-scores and applying $X = M(1 + LSZ)^{1/L}$. Rows with implausible BMI (outside 10 to 50 kg/m^2) were removed. See `data-raw/databases.R` in the GitHub repository for the code.

Source

CDC growth charts, percentile data files with LMS values: https://www.cdc.gov/growthcharts/percentile_data_files.htm.

See Also

nhanes.filtered, who.expand

`nhanes.filtered` *NHANES population (1999-2023)*

Description

Sex, age, body weight and height of participants in the US National Health and Nutrition Examination Survey (NHANES), cycles 1999-2000 to 2021-2023, aged 2 years and older. Used by the app to sample age, weight and height when the "NHANES" database is selected for variability simulations.

Usage

```
nhanes.filtered
```

Format

A data frame with 101,400 rows and 5 columns:

SEX Sex: 0 = male, 1 = female.

AGEMO Age (months), derived from `AGEYR`.

AGEYR Age (years).

WT Body weight (kg).

HT Standing height (cm).

Details

Demographics and body measures files were merged by participant and only complete records were kept. Age is recorded in whole years, so AGEMO is AGEYR * 12. See data-raw/databases.R in the GitHub repository for the code.

Source

Centers for Disease Control and Prevention (CDC), National Center for Health Statistics, National Health and Nutrition Examination Survey: https://wwwn.cdc.gov/nchs/nhanes/Default.aspx.

See Also

cdc.expand, who.expand

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run_mvp *Launch Model Visualization Platform App*

Description

run_mvp() launches the MVP app. mvp_app() returns the app as a Shiny app object without running it, e.g. for deployment on Posit Connect or shinyapps.io (an app.R containing MVPapp::mvp_app() is sufficient).

The app is evaluated in its own environment (whose parent gives access to MVPapp and its key dependencies), so neither the global environment nor the search path is modified. Global options changed by the app are set when it starts and restored when it stops.

Usage

```
mvp_app(
  appDir = system.file("shiny", package = "MVPapp"),
  insert_watermark = TRUE,
  max_dataset_size = 200,
  authentication_code = NA_character_,
  internal_version = TRUE,
  pw_models_path = NA_character_,
 llm_choices = c("Claude", "Gemini", "OpenAI", "OpenRouter", "OpenAI-Compatible",
    "DeepSeek", "Azure OpenAI", "AWS Bedrock"),
  api_upload = NA_character_,
  api_chat = NA_character_,
  user_id = "MVP_user",
  reuse_context = FALSE,
  model_gemini = "gemini-3.8-flash",
  model_openai = "gpt-6.1-sol",
  model_anthropic = "claude-sonnet-5-5",
  model_openrouter = "arcee-ai/trinity-large-preview:free",
  model_openai_compatible = "gpt-5.2",
```

```
  model_deepseek = "deepseek-flash",
  model_apollo = "claude_4_6_sonnet",
  model_azure = "gpt-5.2",
  model_aws = "anthropic.claude-sonnet-5",
  temperature = 1,
  llm_seed = 42,
  model_lang = c("mrgsolve", "nonmem", "rxode2"),
  prompts_path = system.file("shiny/prompts.R", package = "MVPapp"),
  show_debugging_msg = FALSE,
  brand_color = NULL,
  brand_text_color = NULL,
  brand_logo = NULL,
  brand_favicon = NULL,
  page_title = NULL,
  ...
)

run_mvp(
  appDir = system.file("shiny", package = "MVPapp"),
  insert_watermark = TRUE,
  max_dataset_size = 200,
  authentication_code = NA_character_,
  internal_version = TRUE,
  pw_models_path = NA_character_,
 llm_choices = c("Claude", "Gemini", "OpenAI", "OpenRouter", "OpenAI-Compatible",
    "DeepSeek", "Azure OpenAI", "AWS Bedrock"),
  api_upload = NA_character_,
  api_chat = NA_character_,
  user_id = "MVP_user",
  reuse_context = FALSE,
  model_gemini = "gemini-3.8-flash",
  model_openai = "gpt-6.1-sol",
  model_anthropic = "claude-sonnet-5-5",
  model_openrouter = "arcee-ai/trinity-large-preview:free",
  model_openai_compatible = "gpt-5.2",
  model_deepseek = "deepseek-flash",
  model_apollo = "claude_4_6_sonnet",
  model_azure = "gpt-5.2",
  model_aws = "anthropic.claude-sonnet-5",
  temperature = 1,
  llm_seed = 42,
  model_lang = c("mrgsolve", "nonmem", "rxode2"),
  prompts_path = system.file("shiny/prompts.R", package = "MVPapp"),
  show_debugging_msg = FALSE,
  brand_color = NULL,
  brand_text_color = NULL,
  brand_logo = NULL,
  brand_favicon = NULL,
```

```
  page_title = NULL,
  ...
)
```

Arguments

appDir	Character. Directory containing the app's app.R. Defaults to the copy installed with MVPapp and rarely needs changing.
insert_watermark	Logical. Default TRUE. Set to FALSE to remove the "For Internal Use Only" watermark from simulation plots and NCA reports.
max_dataset_size	Numeric. Default 200. Maximum upload dataset size in MB.
authentication_code	Character. Default NA_character_. Provide a string (e.g., password) to password-lock the entire app.
internal_version	Logical. Default TRUE. Set to FALSE when hosting the app outside an internal deployment (e.g. on AWS or shinyapps.io): the help text for locked models then points to GitHub instead, and it selects the external Apollo endpoint (internal deployments only).
pw_models_path	Character. Default NA_character_. Path to an R file defining password-gated models (see system.file("shiny/passworded_models_example.R", package = "MVPapp") and vignette("supply-passwords")).
llm_choices	Character vector of LLM providers offered in the app; the first one is selected by default. Defaults to all supported providers: "Claude", "Gemini", "OpenAI", "OpenRouter", "OpenAI-Compatible", "DeepSeek", "Azure OpenAI" and "AWS Bedrock". Internal-deployment providers (e.g. "PMx Co-Modeler", "Apollo") are also accepted.
api_upload	Character. Default NA_character_. API upload URL when using Dify-based workflows (internal deployment only)
api_chat	Character. Default NA_character_. Base URL required when using OpenAI-Compatible providers, e.g. "https://api.moonshot.ai/v1" ("/chat/completions" is appended automatically)
user_id	Character. Default MVP_user. User ID for LLMs
reuse_context	Logical. Default FALSE. Set to TRUE to re-use same conversation during re-tries.
model_gemini	Character. Default gemini-3.8-flash. Model for Gemini.
model_openai	Character. Default gpt-6.1-sol. Model for OpenAI / ChatGPT.
model_anthropic	Character. Default claude-sonnet-5-5. Model for Anthropic / Claude.
model_openrouter	Character. Default arcee-ai/trinity-large-preview:free. Model for OpenRouter.
model_openai_compatible	Character. Default gpt-5.2. Model for OpenAI-compatible providers.

`model_deepseek` Character. Default deepseek-flash. Model for DeepSeek.

`model_apollo` Character. Default claude_4_6_sonnet. Model for Apollo (internal deployment only).

`model_azure` Character. Default gpt-5.2. Model for Azure OpenAI.

`model_aws` Character. Default anthropic.claude-sonnet-5. Model for AWS Bedrock.

`temperature` Numeric. Default 1. Between 0 (more deterministic) and 1 (more creative) (not all models support this).

`llm_seed` Numeric. Default 42. Seed number for LLMs (not all models support this).

`model_lang` Character. Default "mrgsolve" (the first element). Model translation language: "mrgsolve", "nonmem" (for testing only) or "rxode2" (for testing only).

`prompts_path` Character. Path to an R file defining the LLM prompts. Defaults to the prompts installed with MVPapp. See `vignette("automatic-translation")` for more information.

`show_debugging_msg` Logical. Default FALSE. Set to TRUE to output verbose working messages in the console, useful for debugging. AI translation responses are then also kept for review (see Details).

`brand_color` Character. Default NULL (the default navy). A colour, e.g. `"#F36633"` or `"orange"`, used for the navbar, active tab, box headers, table headers and loading spinners. See "Branding" in Details.

`brand_text_color` Character. Default NULL. Colour of the text on `brand_color` (navbar and box headers). By default white or black is chosen for readability. Ignored if `brand_color` is NULL.

`brand_logo` Character. Default NULL (no logo). Path to an image file (png, jpg, svg, ...) or a web URL, shown in the navbar in front of the page title.

`brand_favicon` Character. Default NULL (the MVP icon shipped with the package). Path to an image file (png, ico, svg) or a web URL, used as the browser tab icon.

`page_title` Character. Default NULL ("Model Visualization Platform (MVP)"). Title shown in the navbar. When set, it is also used as the browser tab title.

`...` For `run_mvp()`, `shiny::runApp()` arguments (e.g. `launch.browser`, `port`). `launch.browser` defaults to `TRUE` here, so the app opens in your web browser (also from RStudio, which would otherwise use its viewer pane); use `launch.browser = FALSE` to turn that off. Any other named arguments are passed to the app.

Details

Objects kept for debugging. MVPapp does not write to the global environment. Objects useful for debugging are kept in an internal environment, `MVPapp:::.mvp_state`, and remain available in the R session after the app is closed. List them with `ls(MVPapp:::.mvp_state)`:

- `last_ev_df$model_1`, `last_ev_df$model_2`: the dosing event tables used in each model's most recent simulation (also used for the reproducible bundle download).
- `deps_env`: an internal cache used to run the app; not useful for debugging.

- With show_debugging_msg = TRUE, AI translation responses: llm_result (initial translation), llm_refine (latest retry that still failed), llm_success (Dify's reply when told the code compiled), branch_model / branch_refine (raw answers before cleaning) and ellmer_chat_response / dify_chat_response (raw chat responses).

Branding. For a company deployment, the title, colour, logo and favicon can be set when launching, without editing any package files. Each is optional; with all of them left at NULL the app looks as it always did.

```
run_mvp(brand_color   = "#F36633",
        brand_logo    = "path/to/company_logo.png",
        brand_favicon = "path/to/favicon.png",
        page_title    = "Company Model Visualization Platform")
```

Image files are read from where they are and served by the app, so they do not need to be inside the package (a web URL also works). A logo with a transparent background and a height of about 30 pixels or more works best. brand_color replaces the navy in the navbar, the active tab, the headers and borders of the panels, the data table headers and the loading spinners. The same arguments work with mvp_app() for hosted deployments.

Hosting and security. MVPapp evaluates R and C++ model code supplied in the browser, so anyone who can open the app can run code on the server under the server account. authentication_code and the model passwords are a convenience to limit access to the interface and to hide models, not a security boundary: host the app only for trusted users, in a sandboxed account or container. The same applies to AI translation: its output is compiled automatically, and compiling mrgsolve code can itself run commands, so do not translate documents from untrusted sources on a shared server.

Without installing MVPapp (e.g. where package installation is restricted), the development version can also be launched from GitHub, provided its dependencies are installed: shiny::runGitHub("MVPapp", "stevechoy", subdir = "inst/shiny").

Value

run_mvp() is called for its side effect of launching the app and returns the value of shiny::runApp() invisibly once the app is closed. mvp_app() returns a Shiny app object (class shiny.appobj).

See Also

https://stevechoy.github.io/MVPapp/articles/supply-passwords.html https://stevechoy.github.io/MVPapp/articles/automatic-translation.html chat for LLM chat interface.

Examples

```
if (interactive()) {
  run_mvp(insert_watermark = FALSE) # remove watermarks

  # Other examples:
  # run_mvp(launch.browser = FALSE) # do not open a browser (argument passed to runApp)
  # run_mvp(authentication_code = "some_password") # Password-lock the site,
  #                                                # could be useful in deployment
  # run_mvp(pw_models_path = "path/to/your/private/models.R") # see
```

```
  #   system.file("shiny/passworded_models_example.R", package = "MVPapp")
  # run_mvp(llm_choices = "Claude", model_anthropic = "claude-sonnet-5-5",
  #         temperature = 0) # Uses Claude only with reproducible results
}

# App object, e.g. as the only line of an app.R file for deployment:
app <- mvp_app(insert_watermark = FALSE)
```

`who.expand` *WHO pediatric virtual population*

Description

A virtual pediatric population (birth to 10 years) simulated from the World Health Organization (WHO) Child Growth Standards and Growth Reference. Used by the app to sample age, weight and height when the "WHO" database is selected for variability simulations.

Usage

```
who.expand
```

Format

A data frame with 77,744 rows and 6 columns:

SEX Sex: 0 = male, 1 = female.

AGEMO Age (months).

AGEYR Age (years).

WT Body weight (kg).

HT Length/height (cm).

BMI Body mass index (kg/m^2).

Details

Body weight and height were simulated from the published LMS parameters (Box-Cox power, median and coefficient of variation) for each sex and month of age, by drawing standard normal Z-scores and applying $X = M(1 + LSZ)^{1/L}$. Sources:

- Weight-for-age, 0 to 10 years.
- Length/height-for-age, 0 to 5 years (Child Growth Standards) and 5 to 10 years (Growth Reference 5-19 years).

Rows with implausible BMI (outside 10 to 50 kg/m^2) were removed. See `data-raw/databases.R` in the GitHub repository for the code.

Source

WHO Child Growth Standards: https://www.who.int/toolkits/child-growth-standards/standards/weight-for-age, https://www.who.int/toolkits/child-growth-standards/standards/length-height-for-age. WHO Growth Reference 5-19 years: https://www.who.int/toolkits/growth-reference-data-for-5to19-years/indicators/height-for-age.

See Also

cdc.expand, nhanes.filtered

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