

Package: MVLs (via r-universe)

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Title Model Validation Levels

Version 2.1

Description Calculates Model Validation Levels from user provided model data, referent data, and scope files as described by Stafford, Provost, & Jones (2025) [doi:10.1080/17477778.2025.2536096](https://doi.org/10.1080/17477778.2025.2536096). Data files must be structured according to one of the accepted Excel templates as shown by Jones, Provost, Stafford, & Young (2026) <https://www.afit.edu/docs/MVL%20User%20Guide%20v4.pdf>.

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Imports dplyr, DT, geometry, htmlwidgets, lhs, magrittr, openxlsx, purrr, RANN, readxl, shiny, shinyWidgets, stats, tibble, tidyselect, markdown, utils

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NeedsCompilation no

Author Kyle Provost [aut], Corinne Stafford [aut, cre], Ronald Prescott [ctb], Chloe Young [ctb], Nicholas Jones [ctb]

Maintainer Corinne Stafford <corinne.stafford.ctr@us.af.mil>

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MVL	<i>Model Validation Level (MVL)</i>
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Description

Quantifies validity of model outputs compared to referent data according to a defined scope. It generates a validation report containing MVL metrics.

Usage

```
MVL(data_files, scope_files, is.MVLa = FALSE)
```

Arguments

data_files	A character vector of file paths to the data files. This should include paths to both the model output files and the referent data files. All files are expected to be in Excel format (.xlsx or .xls).
scope_files	A character vector of file paths to the scope file(s). These Excel files define the model outputs (responses), factors, and factor levels to be included in the validation analysis.
is.MVLa	A logical value. If TRUE, performs an accuracy only MVLa analysis. Defaults to FALSE.

Details

This function calculates MVLs for defined model outputs. It reads model and referent data from Excel files, understands the scope of the validation from scope file(s), and computes a suite of metrics to assess model validity.

Value

The function returns a validation report as a list object that contains the computed MVL metrics. The exact structure of the report depends on the data and/or scope(s) provided.

References

Jones, N., Provost, K., Stafford, C., & Young, C. (2026). *Model Validation Level (MVL) R Tool User Guide*. Scientific Test and Analysis Techniques Center of Excellence. [STAT COE](#)

Stafford, C., Jones, N., & Provost, K. (2024). *Case Studies on Model Validation Levels*. Scientific Test and Analysis Techniques Center of Excellence. [STAT COE](#)

Stafford, C., Provost, K., & Jones, N. (2025). *Model Validation Levels: Methods and Implementation*. Scientific Test and Analysis Techniques Center of Excellence. [STAT COE](#)

Stafford, C., Provost, K., & Jones, N. (2025). *Model validation levels: an automatable framework for model validation*. Journal of Simulation. [doi:10.1080/17477778.2025.2536096](#)

Examples

```
#Find file paths for example model, referent, and scope files
example_model <- system.file("extdata", "example_stochastic_model.xlsx", package = "MVLs")
example_referent <- system.file("extdata", "example_referent.xlsx", package = "MVLs")
example_scope <- system.file("extdata", "example_scope.xlsx", package = "MVLs")

#Define data files (model outputs and referent data)
data_files <- c(
  example_model,
  example_referent
)

#Define scope file detailing scope of intended use
scope_files <- c(
  example_scope
)

#Calculate validation metrics
result <- MVL(data_files, scope_files)

#Display results
result
```

MVL_app

Run the MVL app user interface

Description

Launches an interactive user interface for the Model Validation Level (MVL) tool.

Usage

```
MVL_app()
```

Details

This function starts a local Shiny web application, providing a graphical user interface (GUI) built around the [MVL](#) function. The R console will be occupied while the app is running.

The application's key features include:

- Instructions and guidance on how to prepare input files.
- Interactive file input controls for data and scope files.
- Display of validation results and metrics.
- Options to save generated validation reports to local files.
- Links to additional documentation and resources.

Value

This function does not return a value to the R session. Its primary effect is to launch the Shiny application.

References

Jones, N., Provost, K., Stafford, C., & Young, C. (2026). *Model Validation Level (MVL) R Tool User Guide*. Scientific Test and Analysis Techniques Center of Excellence. [STAT COE](#)

Stafford, C., Jones, N., & Provost, K. (2024). *Case Studies on Model Validation Levels*. Scientific Test and Analysis Techniques Center of Excellence. [STAT COE](#)

Stafford, C., Provost, K., & Jones, N. (2025). *Model Validation Levels: Methods and Implementation*. Scientific Test and Analysis Techniques Center of Excellence. [STAT COE](#)

Stafford, C., Provost, K., & Jones, N. (2025). *Model validation levels: an automatable framework for model validation*. Journal of Simulation. [doi:10.1080/17477778.2025.2536096](#)

Examples

```
# Open the MVL tool User Interface
if (interactive()) {
  MVL_app()
}
```

MVL _a	<i>Model Validation Level accuracy-only method (MVL_a)</i>
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Description

Quantifies validity of model outputs compared to referent data according to a defined scope of intended use. It generates a validation report containing MVL metrics. MVL_a() does not consider the variability of model outputs and is suitable for deterministic models.

Usage

```
MVLa(data_files, scope_files)
```

Arguments

- | | |
|-------------|---|
| data_files | A character vector of file paths to the data files. This should include paths to both the model output files and the referent data files. All files are expected to be in Excel format (.xlsx or .xls). |
| scope_files | A character vector of file paths to the scope file(s). These Excel file(s) define the model outputs (responses), factors, and factor levels to be included in the validation analysis. |

Details

This function calculates the accuracy-only version of the MVL. It reads model and referent data from Excel files, understands the scope of the validation from scope file(s), and computes a suite of metrics to assess model validity.

Value

The function returns a validation report as a list object that contains the computed MVL metrics. The exact structure of the report depends on the data and/or scope(s) provided.

References

- Jones, N., Provost, K., Stafford, C., & Young, C. (2026). *Model Validation Level (MVL) R Tool User Guide*. Scientific Test and Analysis Techniques Center of Excellence. [STAT COE](#)
- Stafford, C., Jones, N., & Provost, K. (2024). *Case Studies on Model Validation Levels*. Scientific Test and Analysis Techniques Center of Excellence. [STAT COE](#)
- Stafford, C., Provost, K., & Jones, N. (2025). *Model Validation Levels: Methods and Implementation*. Scientific Test and Analysis Techniques Center of Excellence. [STAT COE](#)
- Stafford, C., Provost, K., & Jones, N. (2025). *Model validation levels: an automatable framework for model validation*. Journal of Simulation. [doi:10.1080/17477778.2025.2536096](#)

Examples

```
#Find file paths for example files
example_model <- system.file("extdata", "example_deterministic_model.xlsx", package = "MVLs")
example_referent <- system.file("extdata", "example_referent.xlsx", package = "MVLs")
example_scope <- system.file("extdata", "example_scope.xlsx", package = "MVLs")

#Define data files (model outputs and referent data)
data_files <- c(
  example_model,
  example_referent
)

#Define scope file detailing scope of intended use
scope_files <- c(
  example_scope
)

#Calculate validation metrics
result <- MVLa(data_files, scope_files)

#Display results
result
```

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