# Package 'ggmice'

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**Title** Visualizations for 'mice' with 'ggplot2'

**Version** 0.1.1

**Description** Enhance a 'mice' imputation workflow with visualizations for incomplete and/or imputed data. The plotting functions produce 'ggplot' objects which may be easily manipulated or extended. Use 'ggmice' to inspect missing data, develop imputation models, evaluate algorithmic convergence, or compare observed versus imputed data.

**License** GPL (>= 3)

**URL** https://amices.org/ggmice/

**BugReports** https://github.com/amices/ggmice/issues

**Imports** cli, dplyr, ggplot2, magrittr, mice, purrr, rlang, scales, stats, stringr, tidyr, tidyselect, utils

**Suggests** covr, knitr, lifecycle, patchwork, plotly, rmarkdown, testthat (>= 3.0.0)

**VignetteBuilder** knitr

**Config/testthat/edition** 3

**Copyright** 'ggmice' authors

**Encoding** UTF-8

**RoxygenNote** 7.3.2

**NeedsCompilation** no

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`bwplot` *Box-and-whisker plot of observed and imputed data*

---

## Description

Box-and-whisker plot of observed and imputed data

## Usage

```
bwplot(...)
```

## Arguments

| | |
|---|---|
| `...` | Any arguments passed to the function. |

## Value

The output of mice::bwplot and a message about the `ggmice` equivalent.

## Examples

```
imp <- mice::mice(mice::nhanes, maxit = 1, printFlag = FALSE)
bwplot(imp)
```

## densityplot *Densityplot of observed and imputed data*

### Description

Densityplot of observed and imputed data

### Usage

```
densityplot(...)
```

### Arguments

| | |
|---|---|
| ... | Any arguments passed to the function. |

### Value

The output of mice::densityplot and a message about the ggmice equivalent.

### Examples

```
imp <- mice::mice(mice::nhanes, maxit = 1, printFlag = FALSE)
densityplot(imp)
```

## ggmice *Plot incomplete or imputed data*

### Description

Plot incomplete or imputed data

### Usage

```
ggmice(data = NULL, mapping = ggplot2::aes())
```

### Arguments

| | |
|---|---|
| data | An incomplete dataset (of class data.frame), or an object of class mice::mids. |
| mapping | A list of aesthetic mappings created with ggplot2::aes(). |

## Value

An object of class ggplot2::ggplot. The ggmice function returns output equivalent to ggplot2::ggplot output, with a few important exceptions:

- The theme is set to theme_mice.
- The color scale is set to the mice::mdc colors.
- The colour aesthetic is set to .where, an internally defined variable which distinguishes observed data from missing data or imputed data (for incomplete and imputed data, respectively).

## See Also

See the ggmice vignette to use the ggmice() function on incomplete data or imputed data.

## Examples

```
dat <- mice::nhanes
ggmice(dat, ggplot2::aes(x = age, y = bmi)) + ggplot2::geom_point()
imp <- mice::mice(dat, print = FALSE)
ggmice(imp, ggplot2::aes(x = age, y = bmi)) + ggplot2::geom_point()
```

---

# plot_corr *Plot correlations between (incomplete) variables*

---

## Description

Plot correlations between (incomplete) variables

## Usage

```
plot_corr(
  data,
  vrb = "all",
  label = FALSE,
  square = TRUE,
  diagonal = FALSE,
  rotate = FALSE,
  caption = TRUE
)
```

## Arguments

| | |
|---|---|
| data | A dataset of class data.frame, tibble, or matrix. |
| vrb | String, vector, or unquoted expression with variable name(s), default is "all". |
| label | Logical indicating whether correlation values should be displayed. |
| square | Logical indicating whether the plot tiles should be squares. |

| | |
|---|---|
| diagonal | Logical indicating whether the correlation of each variable with itself should be displayed. |
| rotate | Logical indicating whether the variable name labels should be rotated 90 degrees. |
| caption | Logical indicating whether the figure caption should be displayed. |

## Value

An object of class ggplot2::ggplot.

## Examples

```
# plot correlations for all columns
plot_corr(mice::nhanes)

# plot correlations for specific columns by supplying a character vector
plot_corr(mice::nhanes, c("chl", "hyp"))

# plot correlations for specific columns by supplying unquoted variable names
plot_corr(mice::nhanes, c(chl, hyp))

# plot correlations for specific columns by passing an object with variable names
# from the environment, unquoted with `!!`
my_variables <- c("chl", "hyp")
plot_corr(mice::nhanes, !!my_variables)
# object with variable names must be unquoted with `!!`
try(plot_corr(mice::nhanes, my_variables))
```

---

# plot_flux *Plot the influx and outflux of a multivariate missing data pattern*

---

## Description

Plot the influx and outflux of a multivariate missing data pattern

## Usage

```
plot_flux(data, vrb = "all", label = TRUE, caption = TRUE)
```

## Arguments

| | |
|---|---|
| data | An incomplete dataset of class `data.frame` or `matrix`. |
| vrb | String, vector, or unquoted expression with variable name(s), default is "all". |
| label | Logical indicating whether variable names should be displayed within the plot (the default) or with colors in the legend. |
| caption | Logical indicating whether the figure caption should be displayed. |

## Value

An object of class ggplot2::ggplot.

## Examples

```
# plot flux for all columns
plot_flux(mice::nhanes)

# plot flux for specific columns by supplying a character vector
plot_flux(mice::nhanes, c("chl", "hyp"))

# plot flux for specific columns by supplying unquoted variable names
plot_flux(mice::nhanes, c(chl, hyp))

# plot flux for specific columns by passing an object with variable names
# from the environment, unquoted with `!!`
my_variables <- c("chl", "hyp")
plot_flux(mice::nhanes, !!my_variables)
# object with variable names must be unquoted with `!!`
try(plot_flux(mice::nhanes, my_variables))
```

---

# plot_miss *Plot missingness in a dataset*

---

## Description

**[Experimental]**

## Usage

```
plot_miss(
  data,
  vrb = "all",
  ordered = FALSE,
  rotate = FALSE,
  grid = FALSE,
  square = FALSE
)
```

## Arguments

| | |
|---|---|
| data | An incomplete dataset of class data.frame or matrix. |
| vrb | String, vector, or unquoted expression with variable name(s), default is "all". |
| ordered | Logical indicating whether rows should be ordered according to their pattern. |
| rotate | Logical indicating whether the variable name labels should be rotated 90 degrees. |
| grid | Logical indicating whether borders should be present between tiles. |
| square | Logical indicating whether the plot tiles should be squares, defaults to squares. |

## Value

An object of class ggplot2::ggplot.

## Examples

```
# plot correlations for all columns
plot_miss(mice::nhanes)

# plot correlations for specific columns by supplying a character vector
plot_miss(mice::nhanes, c("chl", "hyp"))

# plot correlations for specific columns by supplying unquoted variable names
plot_miss(mice::nhanes, c(chl, hyp))

# plot correlations for specific columns by passing an object with variable names
# from the environment, unquoted with `!!`
my_variables <- c("chl", "hyp")
plot_miss(mice::nhanes, !!my_variables)
# object with variable names must be unquoted with `!!`
try(plot_miss(mice::nhanes, my_variables))

# plot larger dataset
plot_miss(mice::boys)
plot_miss(mice::boys, ordered = TRUE)
```

---

# plot_pattern *Plot the missing data pattern of an incomplete dataset*

---

## Description

Plot the missing data pattern of an incomplete dataset

## Usage

```
plot_pattern(
  data,
  vrb = "all",
  square = TRUE,
  rotate = FALSE,
  cluster = NULL,
  npat = NULL,
  caption = TRUE
)
```

### Arguments

| | |
|---|---|
| data | An incomplete dataset of class data.frame or matrix. |
| vrb | String, vector, or unquoted expression with variable name(s), default is "all". |
| square | Logical indicating whether the plot tiles should be squares, defaults to squares to mimick mice::md.pattern(). |
| rotate | Logical indicating whether the variable name labels should be rotated 90 degrees. |
| cluster | Optional character string specifying which variable should be used for clustering (e.g., for multilevel data). |
| npat | Optional numeric input specifying the number of missing data patterns to be visualized, defaults to all patterns. |
| caption | Logical indicating whether the figure caption should be displayed. |

### Value

An object of class ggplot2::ggplot.

### Examples

```
# plot missing data pattern for all columns
plot_pattern(mice::nhanes)

# plot missing data pattern for specific columns by supplying a character vector
plot_pattern(mice::nhanes, c("chl", "hyp"))

# plot missing data pattern for specific columns by supplying unquoted variable names
plot_pattern(mice::nhanes, c(chl, hyp))

# plot missing data pattern for specific columns by passing an object with variable names
# from the environment, unquoted with `!!`
my_variables <- c("chl", "hyp")
plot_pattern(mice::nhanes, !!my_variables)
# object with variable names must be unquoted with `!!`
try(plot_pattern(mice::nhanes, my_variables))
```

---

## plot_pred *Plot the predictor matrix of an imputation model*

---

### Description

Plot the predictor matrix of an imputation model

## Usage

```
plot_pred(
  data,
  vrb = "all",
  method = NULL,
  label = TRUE,
  square = TRUE,
  rotate = FALSE
)
```

## Arguments

| | |
|---|---|
| data | A predictor matrix for mice, typically generated with mice::make.predictorMatrix or mice::quickpred, or an object of class mice::mids. |
| vrb | String, vector, or unquoted expression with variable name(s), default is "all". |
| method | Character string or vector with imputation methods. |
| label | Logical indicating whether predictor matrix values should be displayed. |
| square | Logical indicating whether the plot tiles should be squares. |
| rotate | Logical indicating whether the variable name labels should be rotated 90 degrees. |

## Details

The predictor matrix in mice::mice determines the role an imputation model predictor takes in the imputation model. The rows correspond to incomplete target variables, and the columns to imputation model predictors.

A value of 1 indicates that the column variable is a predictor to impute the target (row) variable. The value 0 means that it is not used as predictor.

Imputation methods for multilevel data use other codes than 0 and 1:

- Methods 2l.bin, 2l.lmer, 2l.norm, 2l.pan, 2lonly.mean, 2lonly.norm and 2lonly.pmm use code -2 to indicate the class variable;
- Methods 2l.bin, 2l.lmer, 2l.norm and 2l.pan use code 2 to indicate the random effects;
- Method 2l.pan uses codes 3 and 4 to add class means to codes 1 and 2 respectively.

## Value

An object of class ggplot2::ggplot.

## References

van Buuren, S. (2018). Flexible imputation of missing data. Chapman and Hall/CRC. stefvanbuuren.name/fimd

## Examples

```
# generate a predictor matrix
pred <- mice::quickpred(mice::nhanes)

# plot predictor matrix for all columns
plot_pred(pred)

# plot predictor matrix for specific columns by supplying a character vector
plot_pred(pred, c("chl", "hyp"))

# plot predictor matrix for specific columns by supplying unquoted variable names
plot_pred(pred, c(chl, hyp))

# plot predictor matrix for specific columns by passing an object with variable names
# from the environment, unquoted with `!!`
my_variables <- c("chl", "hyp")
plot_pred(pred, !!my_variables)
# object with variable names must be unquoted with `!!`
try(plot_pred(pred, my_variables))

# plot predictor matrix of mids object
imp <- mice::mice(mice::nhanes, print = FALSE)
plot_pred(imp)
```

---

# plot_trace *Plot the trace lines of the imputation algorithm*

---

## Description

Plot the trace lines of the imputation algorithm

## Usage

```
plot_trace(data, vrb = "all", trend = FALSE, legend = TRUE)
```

## Arguments

| | |
|---|---|
| data | An object of class mice::mids. |
| vrb | String, vector, or unquoted expression with variable name(s), default is "all". |
| trend | Logical indicating whether a smoothened trend should be added, default is FALSE. |
| legend | Logical indicating whether the plot legend should be visible, default is TRUE. |

## Details

The vrb argument is "quoted" via rlang::enexpr() and evaluated according to tidy evaluation principles. In practice, this technical nuance only affects users when passing an object from the environment (e.g., a vector of variable names) to the vrb argument. In such cases, the object must be "unquoted" via the !! prefix operator.

## Value

An object of class ggplot2::ggplot.

## Examples

```
# create [mice::mids] object with [mice::mice()]
imp <- mice::mice(mice::nhanes, print = FALSE)

# plot trace lines for all imputed columns
plot_trace(imp)

# plot trace lines for specific columns by supplying a string or character vector
plot_trace(imp, "chl")
plot_trace(imp, c("chl", "hyp"))
# plot trace lines for specific columns by supplying unquoted variable names
plot_trace(imp, chl)
plot_trace(imp, c(chl, hyp))

# plot trace lines for specific columns by passing an object with variable names
# from the environment, unquoted with `!!`
my_variables <- c("chl", "hyp")
plot_trace(imp, !!my_variables)
# object with variable names must be unquoted with `!!`
try(plot_trace(imp, my_variables))
```

---

# stripplot *Stripplot of observed and imputed data*

---

## Description

Stripplot of observed and imputed data

## Usage

```
stripplot(...)
```

## Arguments

| | |
|---|---|
| ... | Any arguments passed to the function. |

## Value

The output of mice::stripplot and a message about the ggmice equivalent.

## Examples

```
imp <- mice::mice(mice::nhanes, maxit = 1, printFlag = FALSE)
stripplot(imp)
```

`xyplot` *Scatterplot of observed and imputed data*

## Description

Scatterplot of observed and imputed data

## Usage

```
xyplot(...)
```

## Arguments

| | |
|---|---|
| `...` | Any arguments passed to the function. |

## Value

The output of mice::xyplot and a message about the `ggmice` equivalent.

## Examples

```
imp <- mice::mice(mice::nhanes, maxit = 1, printFlag = FALSE)
xyplot(imp, bmi ~ age)
```

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