

# Package ‘manymodelr’

November 15, 2021

**Title** Build and Tune Several Models

**Version** 0.3.7

**Description** Frequently one needs a convenient way to build and tune several models in one go. The goal is to provide a number of machine learning convenience functions. It provides the ability to build, tune and obtain predictions of several models in one function. The models are built using functions from ‘caret’ with easier to read syntax.  
Kuhn(2014) <[arXiv:1405.6974](https://arxiv.org/abs/1405.6974)>.

**License** GPL-2

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add\_model\_predictions *Add predictions to the data set. A dplyr compatible way to add predictions to a data set.*

---

### Description

Add predictions to the data set. A dplyr compatible way to add predictions to a data set.

### Usage

```
add_model_predictions(model = NULL, old_data = NULL, new_data = NULL)
```

### Arguments

model	A model object from 'fit_model'
old_data	The data set to which predicted values will be added.
new_data	The data set to use for predicting.

### Value

A data.frame object with a new column for predicted values

### See Also

[fit\\_model](#) [extract\\_model\\_info](#)

**Examples**

```
data("yields", package="manymodelr")
yields1 <- yields[1:50,]
yields2<- yields[51:100,]
lm_model <- fit_model(yields1,"weight","height","lm")
head(add_model_predictions(lm_model,yields1,yields2))
```

---

add\_model\_residuals     *Add model residuals*

---

**Description**

A dplyr compatible convenience function to add residuals to a data set

**Usage**

```
add_model_residuals(model = NULL, old_data = NULL)
```

**Arguments**

model                    A model object from ‘fit\_model’  
old\_data                 The data set to which predicted values will be added.

**Value**

A data.frame object with residuals added.

**Examples**

```
data("yields", package="manymodelr")
yields1 <- yields[1:50,]
yields2 <- yields[51:100,]
lm_model <- fit_model(yields1,"weight","height","lm")
head(add_model_residuals(lm_model, yields2))
```

---

agg\_by\_group             *A convenient way to perform grouped operations*

---

**Description**

This function performs operations by grouping the data.

**Usage**

```
agg_by_group(df = NULL, my_formula = NULL, func = NULL, ...)
```

**Arguments**

df	The data set for which correlations are required
my_formula	A formula such as A~B where B is the grouping variable(normally a factor). See examples below
func	The kind of operation e.g sum,mean,min,max,manymodelr::get_mode
...	Other arguments to 'aggregate' see ?aggregate for details

**Value**

A grouped data.frame object with results of the chosen operation.

**Examples**

```
head(agg_by_group(airquality, .~Month, sum))
```

---

drop\_non\_numeric      *Drops non numeric columns from a data.frame object*

---

**Description**

Drops non numeric columns from a data.frame object

**Usage**

```
drop_non_numeric(df)
```

**Arguments**

df	A data.frame object for which non-numeric columns will be dropped
----	---

**Examples**

```
drop_non_numeric(data.frame(A=1:2, B=c("A", "B")))
```

---

extract_model_info	<i>Extract important model attributes</i>
--------------------	---

---

## Description

Provides a convenient way to extract any kind of model information from common model objects

## Usage

```
extract_model_info(model_object = NULL, what = NULL, ...)
```

## Arguments

model_object	A model object for example a linear model object, generalized linear model object, analysis of variance object.
what	character. The attribute you would like to obtain for instance p_value
...	Arguments to other functions e.g. AIC, BIC, deviance etc

## Details

This provides a convenient way to extract model information for any kind of model. For linear models, one can extract such attributes as coefficients, p value("p\_value"), standard error("std\_err"), estimate, t value("t\_value"), residuals, aic and other known attributes. For analysis of variance (aov), other attributes like sum squared(ssq), mean squared error(msq), degrees of freedom(df),p\_value.

## Examples

```
# perform analysis of variance
data("yields", package="manymodelr")
aov_mod <- fit_model(yields, "weight", "height + normal", "aov")
extract_model_info(aov_mod, "ssq")
extract_model_info(aov_mod, c("ssq", "predictors"))
# linear regression
lm_model <- fit_model(yields, "weight", "height", "lm")
extract_model_info(lm_model, c("aic", "bic"))
## glm
glm_model <- fit_model(yields, "weight", "height", "glm")
extract_model_info(glm_model, "aic")
```

---

fit_model	<i>Fit and predict in a single function.</i>
-----------	--

---

### Description

Fit and predict in a single function.

### Usage

```
fit_model(
  df = NULL,
  yname = NULL,
  xname = NULL,
  modeltype = NULL,
  drop_non_numeric = FALSE,
  ...
)
```

### Arguments

df	A data.frame object
yname	The outcome variable
xname	The predictor variable(s)
modeltype	A character specifying the model type e.g lm for linear model
drop_non_numeric	Should non numeric columns be dropped? Defaults to FALSE
...	Other arguments to specific model types.

### Examples

```
data("yields", package="manymodelr")
fit_model(yields, "height", "weight", "lm")
fit_model(yields, "weight", "height + I(yield)**2", "lm")
```

---

fit_models	<i>Fit several models with different response variables</i>
------------	---

---

### Description

Fit several models with different response variables

**Usage**

```
fit_models(
  df = NULL,
  yname = NULL,
  xname = NULL,
  modeltype = NULL,
  drop_non_numeric = FALSE,
  ...
)
```

**Arguments**

df	A data.frame object
yname	The outcome variable
xname	The predictor variable(s)
modeltype	A character specifying the model type e.g lm for linear model
drop_non_numeric	Should non numeric columns be dropped? Defaults to FALSE
...	Other arguments to specific model types.

**Value**

A list of model objects that can be used later.

**Examples**

```
data("yields", package="manymodelr")
fit_models(df=yields,yname=c("height","yield"),xname="weight",modeltype="lm")
#many model types
fit_models(df=yields,yname=c("height","yield"),xname="weight",
modeltype=c("lm", "glm"))
```

---

get\_data\_Stats      *A pipe friendly way to get summary stats for exploratory data analysis*

---

**Description**

A pipe friendly way to get summary stats for exploratory data analysis

**Usage**

```
get_data_Stats(
  x = NULL,
  func = NULL,
  exclude = NULL,
  na.rm = FALSE,
```

```

    na_action = NULL,
    ...
  )

get_stats(
  x = NULL,
  func = NULL,
  exclude = NULL,
  na.rm = FALSE,
  na_action = NULL,
  ...
)

```

### Arguments

x	The data for which stats are required
func	The nature of function to apply
exclude	What kind of data should be excluded? Use for example <code>c("character", "factor")</code> to drop character and factor columns
na.rm	Logical. Should NAs be removed. Defaults to FALSE.
na_action	If na.rm is set to TRUE, this uses na_replace to replace missing values.
...	Other arguments to na_replace See <code>?na_replace</code> for details.

### Details

A convenient wrapper especially useful for `get_mode`

### Value

A data.frame object showing the requested stats

### Examples

```

head(get_data_Stats(airquality, mean, na.rm = TRUE, na_action = "get_mode"))
get_stats(airquality, mean, "non_numeric", na.rm = TRUE, na_action = "get_mode")

```

---

get\_exponent

*Get the exponent of any number or numbers*

---

### Description

Get the exponent of any number or numbers

### Usage

```
get_exponent(y = NULL, x = NULL)
```



**Arguments**

y	The number or numeric columns for which an exponent is required
x	The power to which y is raised

**Details**

Depends on the expo and expo1 functions in expo

**Value**

A data.frame object showing the value,power and result

**Examples**

```
df<-data.frame(A=c(1123,25657,3987))
get_exponent(df,3)
get_exponent(1:5, 2)
```

---

get\_mode

*A convenience function that returns the mode*


---

**Description**

A convenience function that returns the mode

**Usage**

```
get_mode(x, na.rm = TRUE)
```

**Arguments**

x	The dataframe or vector for which the mode is required.
na.rm	Logical. Should 'NA's be dropped? Defaults to 'TRUE'

**Details**

Useful when used together with get\_stats in a pipe fashion. These functions are for exploratory data analysis The smallest number is returned if there is a tie in values The function is currently slow for greater than 300,000 rows. It may take up to a minute. may work with inaccuracies. By default, NAs are discarded.

**Value**

a data.frame or vector showing the mode of the variable(s)

## Examples

```
test<-c(1,2,3,3,3,3,4,5)
test2<-c(455,7878,908981,NA,456,455,7878,7878,NA)
get_mode(test)
get_mode(test2)
## Not run:
mtcars %>%
  get_data_Stats(get_mode)
get_data_Stats(mtcars,get_mode)
## End(Not run)
```

---

get\_this

*Helper function to easily access elements*

---

## Description

Helper function to easily access elements

## Usage

```
get_this(where = NULL, what = NULL)
```

## Arguments

where	Where do you want to get it from? Currently only supports 'list's and 'data.frame' objects.
what	What do you want to extract from the 'data.frame' or 'list'? No quotes. See examples below.

## Details

This is a helper function useful if you would like to extract data from the output of 'multi\_model\_1'.

## Examples

```
my_list<-list(list(A=520),list(B=456,C=567))
get_this(what="A",my_list)
get_this(my_list,"C")
# use values
get_this(my_list, "B")
```

---

get_var_corr	<i>Get correlations between variables</i>
--------------	---

---

## Description

This function returns the correlations between different variables.

## Usage

```
get_var_corr(  
  df,  
  comparison_var = NULL,  
  other_vars = NULL,  
  method = "pearson",  
  drop_columns = c("factor", "character"),  
  ...  
)
```

## Arguments

df	The data set for which correlations are required
comparison_var	The variable to compare to
other_vars	variables for which correlation with comparison_var is required. If not supplied, all variables will be used.
method	The method used to perform the correlation test as defined in 'cor.test'. Defaults to pearson.
drop_columns	A character vector specifying column classes to drop. Defaults to c("factor","character")
...	Other arguments to 'cor.test' see ?cor.test for details

## Value

A data.frame object containing correlations between comparison\_var and each of other\_vars

## Examples

```
# Get correlations between all variables  
get_var_corr(mtcars,"mpg")  
# Use only a few variables  
get_var_corr(mtcars,"mpg", other_vars = c("disp","drat"), method = "kendall", exact=FALSE)
```

---

get\_var\_corr\_                      *Get correlations for combinations*

---

## Description

Get correlations for combinations

## Usage

```
get_var_corr_(
  df,
  subset_cols = NULL,
  drop_columns = c("character", "factor"),
  ...
)
```

## Arguments

df	A 'data.frame' object for which correlations are required in combinations.
subset_cols	A 'list' of length 2. The values in the list correspond to the comparison and other_Var arguments in 'get_var_corr'. See examples below.
drop_columns	A character vector specifying column classes to drop. Defaults to c("factor","character")
...	Other arguments to 'get_var_corr'

## Details

This function extends get\_var\_corr by providing an opportunity to get correlations for combinations of variables. It is currently slow and may take up to a minute depending on system specifications.

## Value

A data.frame object with combinations.

## Examples

```
get_var_corr_(mtcars,method="pearson")
#use only a subset of the data.
get_var_corr_(mtcars,
  subset_cols = list(c("mpg","vs"),
                    c("disp","wt")),
  method="spearman",exact=FALSE)
```

---

multi_model_1	<i>Simultaneously train and predict on new data.</i>
---------------	--

---

## Description

This function provides a convenient way to train several model types. It allows a user to predict on new data and depending on the metrics, the user is able to decide which model predictions to finally use. The models are built based on Max Kuhn's models in the caret package.

## Usage

```
multi_model_1(  
  old_data,  
  yname,  
  xname,  
  method = NULL,  
  metric = NULL,  
  control = NULL,  
  new_data = NULL,  
  ...  
)
```

## Arguments

old_data	The data holding the training dataset
yname	The outcome variable
xname	The predictor variable(s)
method	A vector containing methods to be used as defined in the caret package
metric	One of several metrics. Accuracy, RMSE, MAE, etc
control	See <code>caret ?trainControl</code> for details.
new_data	A data set to validate the model or for which predictions are required
...	Other arguments to caret's train function

## Details

Most of the details of the parameters can be found in the caret package documentation. This function is meant to help in exploratory analysis to make an informed choice of the best models

## Value

A list containing two objects. A tibble containing a summary of the metrics per model, a tibble containing predicted values and information concerning the model

## References

Kuhn (2014), "Futility Analysis in the Cross-Validation of Machine Learning Models" <http://arxiv.org/abs/1405.6974>,

Kuhn (2008), "Building Predictive Models in R Using the caret" ([http://www.jstatsoft.org/article/view/v028i05/v28i05.pold\\_c](http://www.jstatsoft.org/article/view/v028i05/v28i05.pold_c))

## Examples

```
data("yields", package="manymodelr")
train_set<-createDataPartition(yields$normal,p=0.8,list=FALSE)
valid_set<-yields[-train_set,]
train_set<-yields[train_set,]
ctrl<-trainControl(method="cv",number=5)
set.seed(233)
m<-multi_model_1(train_set,"normal",".",c("knn","rpart"),
"Accuracy",ctrl,new_data =valid_set)
m$Predictions
m$Metrics
m$modelInfo
```

---

multi\_model\_2

*Fit and predict in one function*

---

## Description

Fit and predict in one function

## Usage

```
multi_model_2(old_data, new_data, yname, xname, modeltype, ...)
```

## Arguments

old_data	The data set to which predicted values will be added.
new_data	The data set to use for predicting.
yname	The outcome variable
xname	The predictor variable(s)
modeltype	A character specifying the model type e.g lm for linear model
...	Other arguments to specific model types.

## Examples

```
# fit a linear model and get predictions
multi_model_2(iris[1:50,],iris[50:99,],"Sepal.Length","Petal.Length","lm")
# multilinear
multi_model_2(iris[1:50,],iris[50:99,],"Sepal.Length",
"Petal.Length + Sepal.Width","lm")
# glm
multi_model_2(iris[1:50,],iris[50:99,],"Sepal.Length","Petal.Length","glm")
```

---

na_replace	<i>Replace missing values</i>
------------	-------------------------------

---

**Description**

Replace missing values

**Usage**

```
na_replace(df, how = NULL, value = NULL)
```

**Arguments**

df	The data set(data.frame or vector) for which replacements are required
how	How should missing values be replaced? One of ffill, samples,value or any other known method e.g mean, median, max ,min. The default is NULL meaning no imputation is done. For character vectors, the use of 'get_mode' is also supported. No implementation for class factor(yet).
value	If how is set to value, this allows the user to provide a specific fill value for the NAs.

**Details**

This function currently does not support grouping although this may be achieved with some inaccuracies using grouping functions from other packages.

**Value**

A data.frame object with missing values replaced.

**Examples**

```
head(na_replace(airquality,how="value", value="Missing"))
```

---

na_replace_grouped	<i>Replace NAs by group</i>
--------------------	-----------------------------

---

**Description**

A convenient way to replace NAs by group.

**Usage**

```
na_replace_grouped(df, group_by_cols = NULL, ...)
```

**Arguments**

df                    A data.frame object for which grouped NA replacement is desired.  
 group\_by\_cols      The column(s) used to use for the grouping.  
 ...                    Other arguments to 'na\_replace'

**Value**

A 'data.frame' object with 'NA's replaced.

**Examples**

```
test2 <- data.frame(A=c("A", "A", "A", "B", "B", "B"),
  B=c(NA, 5, 2, 2, NA, 2))
head(na_replace_grouped(test2, "A", how="value", "Replaced"))
```

---

plot\_corr

*Plot a correlations matrix*

---

**Description**

This function plots the results produced by 'get\_var\_corr\_'.

**Usage**

```
plot_corr(
  df,
  x = "comparison_var",
  y = "other_var",
  xlabel = "comparison_variable",
  ylabel = "other_variable",
  title = "Correlations Plot",
  plot_style = "circles",
  title_just = 0.5,
  round_which = NULL,
  colour_by = NULL,
  decimals = 2,
  show_which = "corr",
  size = 12.6,
  value_angle = 360,
  shape = 16,
  value_size = 3.5,
  value_col = "black",
  width = 1.1,
  custom_cols = c("indianred2", "green2", "gray34"),
  legend_labels = waiver(),
  legend_title = NULL,
```



```

    signif_cutoff = 0.05,
    signif_size = 7,
    signif_col = "gray13",
    ...
)

```

### Arguments

df	The data to be plotted. A 'data.frame' object produced by 'get_var_corr_'
x	Value for the x axis. Defaults to "comparison_var"
y	Values for the y axis. Defaults to "other_var."
xlabel	label for the x axis
ylabel	label for the y axis
title	plot title.
plot_style	One of squares and circles(currently).
title_just	Justification of the title. Defaults to 0.5, title is centered.
round_which	Character. The column name to be rounded off.
colour_by	The column to use for coloring. Defaults to "correlation". Colour strength thus indicates the strength of correlations.
decimals	Numeric. To how many decimal places should the rounding be done? Defaults to 2.
show_which	Character. One of either corr or signif to control whether to show the correlation values or significance stars of the correlations. This is case sensitive and defaults to corr i.e. correlation values are shown.
size	Size of the circles for plot_style set to circles
value_angle	What angle should the text be?
shape	Values for the shape if plot_style is circles
value_size	Size of the text.
value_col	What colour should the text in the squares/circles be?
width	width value for plot_style set to squares.
custom_cols	A vector(length 2) of colors to use for the plot. The first colour specifies the lower end of the correlations. The second specifies the higher end.
legend_labels	Text to use for the legend labels. Defaults to the default labels produced by the plot method.
legend_title	Title to use for the legend.
signif_cutoff	Numeric. If show_signif is TRUE, this defines the cutoff point for significance. Defaults to 0.05.
signif_size	Numeric. Defines size of the significance stars.
signif_col	Character. Defines the col for the significance stars.
...	Other arguments to get_var_corr_

**Details**

This function uses 'ggplot2' backend. 'ggplot2' is thus required for the plots to work. Since the correlations are obtained by 'get\_var\_corr\_', the default is to omit correlation between a variable and itself. Therefore blanks in the plot would indicate a correlation of 1.

**Value**

A 'ggplot2' object showing the correlations plot.

**Examples**

```
plot_corr(mtcars, show_which = "corr",
  round_values = TRUE,
  round_which = "correlation", decimals = 2, x="other_var",
  y="comparison_var", plot_style = "circles", width = 1.1,
  custom_cols = c("green", "blue", "red"), colour_by = "correlation")
```

---

rowdiff

*Get row differences between values*


---

**Description**

This function returns the differences between rows depending on the user's choice.

**Usage**

```
rowdiff(
  df,
  direction = "forward",
  exclude = NULL,
  na.rm = FALSE,
  na_action = NULL,
  ...
)
```

**Arguments**

df	The data set for which differences are required
direction	One of forward and reverse. The default is forward meaning the differences are calculated in such a way that the difference between the current value and the next is returned
exclude	A character vector specifying what classes should be removed. See examples below
na.rm	Logical. Should missing values be removed? The missing values referred to are those introduced during the calculation ie when subtracting a row with itself. Defaults to FALSE.

na\_action      If na.rm is TRUE, how should missing values be replaced? Depending on the value as set out in 'na\_replace', the value can be replaced as per the user's requirement.

...              Other arguments to 'na\_replace'.

**Value**

A data.frame object of row differences

**See Also**

[na\\_replace](#)

**Examples**

```
# Remove factor columns
data("yields", package="manymodelr")
rowdiff(yields,exclude = "factor",direction = "reverse")
rowdiff(yields[1:5,], exclude="factor", na.rm = TRUE,
na_action = "get_mode",direction = "reverse")
```

---

select_col	<i>A convenient selector gadget</i>
------------	-------------------------------------

---

**Description**

A convenient selector gadget

**Usage**

```
select_col(df, ...)
```

**Arguments**

df              The data set from which to select a column

...              columns to select, no quotes

**Details**

A friendly way to select a column or several columns. Mainly for non-pipe usage It is recommended to use known select functions to do pipe manipulations. Otherwise convert to tibble

**Value**

Returns a dataframe with selected columns

## Examples

```
select_col(yields,height,weight,normal)
# A pipe friendly example
## Not run:
library(dplyr)
as_tibble(yields) %>%
select_col(height, weight, normal)

## End(Not run)
```

---

select_percentile	<i>Get the row corresponding to a given percentile</i>
-------------------	--

---

## Description

Get the row corresponding to a given percentile

## Usage

```
select_percentile(df = NULL, percentile = NULL, descend = FALSE)
```

## Arguments

df	A 'data.frame' object for which a percentile is required. Other data structures are not yet supported.
percentile	The percentile required eg 10 percentile
descend	Logical. Should the data be arranged in descending order? Defaults to FALSE.

## Details

Returns the value corresponding to a percentile. Returns mean values if the position of the percentile is whole number. Values are sorted in ascending order. You can change this by setting descend to TRUE.

## Value

A dataframe showing the row corresponding to the required percentile.

## Examples

```
data("yields", package="manymodelr")
select_percentile(yields,5)
```

---

yields

*Plant yields*

---

**Description**

A simulated data set of plant yields, height, weight, and a binary class

**Usage**

yields

**Author(s)**

Nelson Gonzabato

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