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Description Set of common functions used for manipulating colors, detecting and interacting with 'RStudio', modeling, formatting, determining users' operating system, feature scaling, and more!

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<https://r-pkg.thecoatlessprofessor.com/jjb/>

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jjb-package	<i>jjb: Balamuta Miscellaneous</i>
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Description

Set of common functions used for manipulating colors, detecting and interacting with 'RStudio', modeling, formatting, determining users' operating system, feature scaling, and more!

Author(s)

Maintainer: James Balamuta <balamut2@illinois.edu> ([ORCID](#)) [copyright holder]

See Also

Useful links:

- <https://github.com/coatless-rpkg/jjb>
- <https://r-pkg.thecoatlessprofessor.com/jjb/>
- Report bugs at <https://github.com/coatless-rpkg/jjb/issues>

acc	<i>Accuracy of the Model</i>
-----	------------------------------

Description

Calculates the accuracy of the model by taking the mean of the number of times the truth, y , equals the predicted, $\hat{y}$.

Usage

```
acc(y, yhat)
```

Arguments

y	A vector of the true y values
yhat	A vector of predicted $\hat{y}$ values.

Value

The accuracy of the classification in numeric form.

Examples

```
# Set seed for reproducibility
set.seed(100)

# Generate data
n = 1e2

y = round(runif(n))
yhat = round(runif(n))

# Compute
o = acc(y, yhat)
```

celsius_to_fahrenheit	<i>Celsius to Fahrenheit Conversion</i>
-----------------------	---

Description

Converts temperature recorded in Celsius to Fahrenheit.

Usage

```
celsius_to_fahrenheit(t_celsius)
```

Arguments

t_celsius Temperature recorded in Celsius.

Value

A numeric vector.

Examples

```
celsius_to_fahrenheit(33)
```

```
celsius_to_fahrenheit(0)
```

celsius_to_kelvin	<i>Celsius to Kelvin Conversion</i>
-------------------	-------------------------------------

Description

Converts temperature recorded in Celsius to Kelvin.

Usage

```
celsius_to_kelvin(t_celsius)
```

Arguments

t_celsius Temperature recorded in Celsius.

Value

A numeric vector.

Examples

```
celsius_to_kelvin(92)
```

```
celsius_to_kelvin(32)
```

char_at	<i>Character at Position i</i>
---------	--------------------------------

Description

Returns the character at location i inside the string.

Usage

```
char_at(x, index)
```

Arguments

x	A character vector to extract position from.
index	An integer between 1 and length n .

Value

A character vector of length index.

Author(s)

James J Balamuta

Examples

```
# Example string
s = "statistics"

# Single character
char_at(s, 1)

# Vectorized position
char_at(s, c(2, 3))
```

circle_matrix	<i>Create a circle pattern within a matrix</i>
---------------	--

Description

Takes a default matrix and embeds circles within the matrix.

Usage

```
circle_matrix(m, n, x.center, y.center, r, f = 1)
```

Arguments

m	A int that is the number of rows of the matrix
n	A int that is the number of the columns of the matrix.
x.center	A vector of x coordinate center position of the circle.
y.center	A vector of y coordinate center position of the circle.
r	A vector of integers denoting the different circle radii.
f	A vector of values that specify what the inside of the circles should be.

Value

A matrix with circles imprinted within its dimensions.

Author(s)

James Balamuta

Examples

```
# Generate a basic circle matrix
circle_matrix(10, 10, 3, 4, 2)

# Generate two circles within the matrix
circle_matrix(10, 20, c(3,6), c(4,6), c(2,2))

# Different fills
circle_matrix(10, 20, c(3,6), c(4,6), c(2,2), f = c(1,2))
```

convert_cols	<i>Convert Multiple Columns of a data.frame All at once conversion of a data.frame from current column types to alternates.</i>
--------------	---

Description

Convert Multiple Columns of a data.frame
All at once conversion of a data.frame from current column types to alternates.

Usage

```
convert_cols(d, cast)
```

Arguments

d	A data.frame that needs to have specific columns converted.
cast	A string vector containing either: "n" (numeric), "c" (character), or "f" (factor).

Value

A data.frame with converted column types.

Examples

```
n = 100

st = sample(LETTERS, n, replace = TRUE)
sr = sample(letters, n, replace = TRUE)
num = rnorm(n)

d = data.frame(x = st, y = num, z = sr, stringsAsFactors = FALSE)

# Convert all columns

o = convert_cols(d, c("f", "c", "f"))

# Convert a subset
d[, c(1, 3)] = convert_cols(d[, c(1, 3)], c("f", "f"))
```

external_graphs

Change Default Graphing Device from RStudio

Description

Checks to see if the user is in RStudio. If so, then it changes the device to a popup window.

Usage

```
external_graphs(ext = TRUE)
```

Arguments

ext	A logical indicating whether the graph should be done externally or internally in RStudio.
-----	--

Details

Depending on the operating system, the default drivers attempted to be used are:

- OS X: quartz()
- Linux: x11()
- Windows: windows()

Note, this setting is not permanent. Thus, the behavioral change will last until the end of the session.

Also, the active graphing environment will be killed. As a result, any graphs that are open will be deleted. You will have to regraph them.

Value

There is no return value. Instead, once finished, the function will cause a side effect to occur. See details for more.

Author(s)

James Balamuta

Examples

```
# Turn on external graphs
external_graphs()

# Turn off external graphs
external_graphs(FALSE)
```

fahrenheit_to_celsius *Fahrenheit to Celsius Conversion*

Description

Converts temperature recorded in Fahrenheit to Celsius.

Usage

```
fahrenheit_to_celsius(t_fahrenheit)
```

Arguments

t_fahrenheit Temperature recorded in Fahrenheit.

Value

A numeric vector.

Examples

```
fahrenheit_to_celsius(92)

fahrenheit_to_celsius(32)
```

fahrenheit_to_kelvin	<i>Fahrenheit to Kelvin to Conversion</i>
----------------------	---

Description

Converts temperature recorded in Fahrenheit to Kelvin.

Usage

```
fahrenheit_to_kelvin(t_fahrenheit)
```

Arguments

t_fahrenheit Temperature recorded in Fahrenheit.

Value

A numeric vector.

Examples

```
fahrenheit_to_kelvin(92)
```

```
fahrenheit_to_kelvin(32)
```

feature_scaling	<i>Feature Scaling</i>
-----------------	------------------------

Description

Scale features in a datasets.

Usage

```
feature_rescale(x, x_min = NULL, x_max = NULL)
```

```
feature_derescale(x_rescaled, x_min, x_max)
```

```
feature_norm(x, x_norm = NULL)
```

```
feature_denorm(x_norm_std, x_norm = NULL)
```

```
feature_standardize(x, x_mean = NULL, x_sd = NULL)
```

```
feature_destandardize(x_std, x_mean = NULL, x_sd = NULL)
```

Arguments

<code>x</code>	Numeric values
<code>x_min</code>	Minimum non-normalized numeric value
<code>x_max</code>	Maximum non-normalized numeric value
<code>x_rescaled</code>	Rescaled values of <code>x</code> .
<code>x_norm</code>	Euclidean norm of <code>x</code>
<code>x_norm_std</code>	Euclidean vector of normalized <code>x</code> values.
<code>x_mean</code>	Mean of <code>x</code> values
<code>x_sd</code>	Standard Deviation of <code>x</code> values
<code>x_std</code>	Z-transformed <code>x</code> values

Details

The following functions provide a means to either scale features or to descale the features and return them to normal. These functions are ideal for working with optimizers.

Feature Scale	Feature Descale
<code>feature_rescale</code>	<code>feature_derescale</code>
<code>feature_norm</code>	<code>feature_denorm</code>
<code>feature_standardize</code>	<code>feature_destandardize</code>

Value

A numeric vector.

Feature Rescaling

Convert the original data x to x_{scaled} :

$$x[scaled] = (x - x[min]) / (x[max] - x[min])$$

To move from the rescaled value x_{scaled} to the original value x use:

$$x = x[scaled] * (x[max] - x[min]) + x[min]$$

Feature Standardization

Convert the original data x to x_{std} :

$$x[std] = (x - avg[x]) / (sigma[x])$$

To move from the standardized value x_{std} to the original value x use:

$$x = x[std] * sigma[x] + avg[x]$$

Feature Normalization

Convert the original data x to x_{norm} :

$$x[norm] = (x)/||x||$$

To move from the normalized value x_{norm} to the original value x use:

$$x = x[norm] * ||x||$$

Author(s)

James Balamuta

Examples

```
# Rescaling Features
temperatures = c(94.2, 88.1, 32, 0)

temp_min = min(temperatures)
temp_max = max(temperatures)

temperatures_norm = feature_rescale(temp_min, temp_max)
temperatures_denorm = feature_derescale(temperatures_norm, temp_min, temp_max)

all.equal(temperatures, temperatures_denorm)

# Norming Features
x = 1:10

x_norm = sqrt(sum(x^2))

x_norm_std = feature_norm(x, x_norm)

x_recover = feature_denorm(x_norm_std, x_norm)
all.equal(x, x_recover)

# Standardizing Features
x = 1:10

x_mean = mean(x)
x_sd = sd(x)

x_std = feature_standardize(x, x_mean, x_sd)
x_recovery = feature_destandardize(x, x_mean, x_sd)

all.equal(x, x_recovery)
```

`floor_and_cap`*Floor and Cap a Numeric Variable*

Description

Determine the floor and cap of a numeric variable by taking quantiles. Using the quantiles, values in the data found to be *lower* or *higher* than the floor or cap are replaced.

Usage

```
floor_and_cap(x, probs = c(0.025, 0.975))
```

Arguments

<code>x</code>	A vector that has length N .
<code>probs</code>	A vector containing two values between 0 and 1, with the first being less than the second.

Value

A vector with the values floored and capped.

Examples

```
# One case version
n = 100

x = rnorm(n)

x[n - 1] = -99999
x[n] = 10000

y = floor_and_cap(x)

# Dataset example

d = data.frame(x, y = rnorm(n))

o = sapply(d, floor_and_cap)
```

int_to_hex	<i>Convert 0-255 to a Hex number</i>
------------	--------------------------------------

Description

This is a helper function for [rgb_to_hex](#). This function takes a single R, G, or B numeric value and converts it to hex.

Usage

```
int_to_hex(n)
```

Arguments

n	An int
---	--------

Value

A string of length 2.

Examples

```
int_to_hex(22)
```

is_rstudio	<i>Is R Open in RStudio?</i>
------------	------------------------------

Description

Detects whether R is open in RStudio.

Usage

```
is_rstudio()
```

Value

A logical value that indicates whether R is open in RStudio.

Author(s)

James Balamuta

Examples

```
is_rstudio()
```

`is_whole`*Integer Check*

Description

Checks whether the submitted value is an integer

Usage

```
is_whole(x)
```

Arguments

`x` A numeric value to check to see if it is an integer.

Value

A boolean value indicating whether the value is an integer or not.

Author(s)

James Balamuta

Examples

```
is_whole(2.3)
is_whole(4)
is_whole(c(1,2,3))
is_whole(c(.4,.5,.6))
is_whole(c(7,.8,9))
```

`is_windows`*Check for an Operating System*

Description

Performs a check to determine the OS

Usage

```
is_windows()
```

```
is_macos()
```

```
is_linux()
```

```
is_sun()
```

Value

Either TRUE or FALSE

Author(s)

James Joseph Balamuta

kelvin_to_celsius	<i>Kelvin to Celsius Conversion</i>
-------------------	-------------------------------------

Description

Converts temperature recorded in Kelvin to Celsius.

Usage

```
kelvin_to_celsius(t_kelvin)
```

Arguments

t_kelvin	Temperature recorded in Kelvin.
----------	---------------------------------

Value

A numeric vector.

Examples

```
kelvin_to_celsius(92)
```

```
kelvin_to_celsius(32)
```

kelvin_to_fahrenheit	<i>Kelvin to Fahrenheit Conversion</i>
----------------------	--

Description

Converts temperature recorded in Celsius to Kelvin.

Usage

```
kelvin_to_fahrenheit(t_kelvin)
```

Arguments

t_kelvin	Temperature recorded in Kelvin.
----------	---------------------------------

Value

A numeric vector.

Examples

```
kelvin_to_fahrenheit(92)
```

```
kelvin_to_fahrenheit(32)
```

lagged

Lag Vector Values

Description

Provides a lagging mechanism for vector data.

Usage

```
lagged(x, lag = 1)
```

Arguments

x A vec of data.

lag An integer value.

Value

A vector with lagged values and NAs.

Author(s)

James Balamuta

Examples

```
x = rnorm(10)
```

```
lagged(x, 2)
```

max_n	<i>Maxima and Minima n elements</i>
-------	-------------------------------------

Description

Obtain the Maximum or Minimum n elements from a vector.

Usage

```
max_n(x, n = 1L)
```

```
min_n(x, n = 1)
```

Arguments

x	Data vector
n	Number of observations to select

Details

The underlying function sorts the data using `base::sort()` and then extracts out the appropriate n-back or n-forward values.

As a result of the sorting procedure, this is an inefficient function.

Value

A vector containing the maximum/minimum of n elements.

Examples

```
x = 1:10

# Defaults to traditional max
# This is more costly to compute than using the regular max function.
max_n(x)

# Retrieve top two observations (highest first)
max_n(x, 2)

# Missing values have no effect on the sorting procedure
x[9] = NA
max_n(x, 3)

# Defaults to traditional min.
# This is more costly to compute than using the regular min function.
min_n(x)
min(x)

# Retrieve bottom two observations (lowest first)
```

```
min_n(x, 2)

# Missing values have no effect on the sorting procedure
x[2] = NA
min_n(x, 3)
```

mkdir*Make Directory*

Description

Create a directory using either a relative path or an absolute path.

Usage

```
mkdir(dir, r = TRUE)
```

Arguments

<code>dir</code>	A string indicating the directory to make.
<code>r</code>	A boolean that indicates whether the directories should be made recursively

Value

New directory on file system

Author(s)

James Balamuta

Examples

```
# Make directory from working directory
mkdir("toad")

## This assumes the computer is on Windows and the C drive exists.
# Make directory from absolute path
mkdir("C:/path/to/dir/toad")
```

mse*Mean Squared Error (MSE)*

Description

Calculates the mean square of the model by taking the mean of the sum of squares between the truth, y , and the predicted, $\hat{y}$ at each observation i .

Usage

```
mse(y, yhat)
```

Arguments

<code>y</code>	A vector of the true y values
<code>yhat</code>	A vector of predicted $\hat{y}$ values.

Details

The equation for MSE is:

$$\frac{1}{n} \sum_{i=1}^n (y_i - \hat{y}_i)^2$$

Value

The MSE in numeric form.

Examples

```
# Set seed for reproducibility
set.seed(100)

# Generate data
n = 1e2

y = rnorm(n)
yhat = rnorm(n, 0.5)

# Compute
o = mse(y, yhat)
```

na_prop_overall	<i>Determine Amount of Missing Values in Data</i>
-----------------	---

Description

Computes the proportion of data that is missing in a given data set.

Usage

```
na_prop_overall(x)

na_prop_by_variable(x)

na_prop_by_observation(x)

na_count_overall(x)

na_count_by_variable(x)

na_count_by_observation(x)
```

Arguments

x A vector of length N or a matrix with dimensions $N \times P$.

Value

- Overall: a single numeric value between $[0, 1]$ or a count between $[0, N]$.
- Variable: P different numeric values between $[0, 1]$ or counts between $[0, N]$.
- Observation: N different numeric values between $[0, 1]$ or counts between $[0, P]$.

Examples

```
# By vector
x = c(1, 2, NA, 4)
na_prop_overall(x)
na_count_overall(x)

# By Data Frame
missing_df = data.frame(
  a = c(1, 2, NA, 4),
  b = c(3, NA, 2, NA)
)

# Proportion
na_prop_overall(missing_df)
na_prop_by_variable(missing_df)
na_prop_by_observation(missing_df)
```

```
# Counts
na_count_overall(missing_df)
na_count_by_variable(missing_df)
na_count_by_observation(missing_df)
```

pad_number	<i>Pad Numeric Numbers</i>
------------	----------------------------

Description

Add zeros before start of the number

Usage

```
pad_number(x)
```

Arguments

x	A vector
---	----------

Value

A character vector that is padded to the length of the maximum entry.

Author(s)

James Balamuta

Examples

```
# Padding applied
pad_number(8:10)

# No padding applied
pad_number(2:3)

# Pads non-negative number with 0.
# This needs to be improved slightly...
pad_number(-1:1)
```

require_linux	<i>Require a Specific Operating System</i>
---------------	--

Description

Mandates the presence of an operating system

Usage

```
require_linux()
```

```
require_windows()
```

```
require_macos()
```

```
require_sun()
```

Details

If any of these functions are called on the wrong operating system. A stop error is triggered and the function will fail.

Author(s)

James Joseph Balamuta

rgb_to_hex	<i>Convert RGB Value to Hexadecimal</i>
------------	---

Description

This function converts an RGB value to the hexadecimal numbering system.

Usage

```
rgb_to_hex(R, G, B, pound = TRUE)
```

Arguments

R	A int that is between 0 and 255 for the Red value.
G	A int that is between 0 and 255 for the Green value.
B	A int that is between 0 and 255 for the Blue value.
pound	A bool that indicates whether a pound sign should be prepended to the hexadecimal.

Value

A string containing the hexadecimal information.

Examples

```
# Hexadecimal with pound sign
rgb_to_hex(255,255,255)

# Hexadecimal without pound sign
rgb_to_hex(255,255,255,FALSE)
```

rmse

Root Mean Squared Error (RMSE)

Description

Calculates the root mean square of the model by taking the square root of mean of the sum of squares between the truth, y , and the predicted, $\hat{y}$ at each observation i .

Usage

```
rmse(y, yhat)
```

Arguments

y	A vector of the true y values
yhat	A vector of predicted $\hat{y}$ values.

Details

The formula for RMSE is:

$$\sqrt{\frac{1}{n} \sum_{i=1}^n (y_i - \hat{y}_i)^2}$$

Value

The RMSE in numeric form

Examples

```
# Set seed for reproducibility
set.seed(100)

# Generate data
n = 1e2

y = rnorm(n)
```

```
yhat = rnorm(n, 0.5)

# Compute
o = mse(y, yhat)
```

shade	<i>Shade an RGB value</i>
-------	---------------------------

Description

The function shades or darkens an RGB value by adding black to the values.

Usage

```
shade(rgb_value, shade_factor = 0.1)
```

Arguments

- rgb_value A vector with length 3×1 .
- shade_factor A double that ranges between $[0, 1]$.

Value

A matrix with dimensions 3×1 .

Examples

```
shade(c(22, 150, 230), shade_factor = 0.5)
```

system_arch	<i>System Architecture</i>
-------------	----------------------------

Description

System Architecture

Usage

```
system_arch()
```

Value

Either "x64" or "x32"

system_graphic_driver *Natural Graphics Driver for Operating System*

Description

Provides the default operating system graphics utility

Usage

```
system_graphic_driver()
```

Value

A string that is either:

- "quartz": if on MacOS
- "windows": if on Windows
- "x11": if on Linux or Solaris

Author(s)

James Balamuta

See Also

[is_rstudio](#)

Examples

```
# Returns a string depending on test platform
system_graphic_driver()
```

tint	<i>Tint an RGB value</i>
------	--------------------------

Description

The function tints or lightens an RGB value by adding white to the values.

Usage

```
tint(rgb_value, tint_factor = 0.2)
```

Arguments

rgb_value	A vector with length 3×1 .
tint_factor	A double that ranges between $[0, 1]$.

Value

A matrix with dimensions 3×1 .

Examples

```
tint(c(22, 150, 230), tint_factor = 0.5)
```

tr

Obtain the Trace of a Square Matrix

Description

Calculates and returns the trace of a square matrix.

Usage

```
tr(x)
```

Arguments

x A matrix that is square e.g. $N \times N$

Value

A matrix with circles imprinted within its dimensions.

Author(s)

James Balamuta

Examples

```
# I_2 matrix  
tr(diag(2))
```

url_title	Create a "safe" url title
-----------	---------------------------

Description

Takes a string, forces characters to lower case, then removes punctuation and switch spaces to - instead of _

Usage

```
url_title(st)
```

Arguments

st	A string that needs to be a title in a url
----	--

Value

A string with the aforementioned modifications.

Author(s)

James Balamuta

Examples

```
url_title("My Name is Jaime!")
```

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