

# Package ‘plotROC’

March 16, 2015

**Type** Package

**Title** Generate Useful ROC Curve Charts for Print and Interactive Use

**Version** 1.3.3

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**Description** Most ROC curve plots obscure the cutoff values and inhibit interpretation and comparison of multiple curves. This attempts to address those shortcomings by providing plotting and interactive tools. Functions are provided to generate an interactive ROC curve plot for web use, and print versions. A Shiny application implementing the functions is also included.

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**URL** <http://sachsmc.github.io/plotROC>

**BugReports** <http://github.com/sachsmc/plotROC/issues>

**Depends** R (>= 3.0.0)

**Imports** grid, ggplot2, gridSVG, shiny

**Suggests** ggthemes, knitr, testthat, stringr, ROCR

**VignetteBuilder** knitr

**NeedsCompilation** no

**Repository** CRAN

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## R topics documented:

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|                 |  |
|-----------------|--|
| plotROC-package | <i>A short title line describing what the package does</i> |
|-----------------|--|

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## Description

A more detailed description of what the package does. A length of about one to five lines is recommended.

## Details

This section should provide a more detailed overview of how to use the package, including the most important functions.

## Author(s)

Who wrote it, email optional.

Maintainer: Michael Sachs <sachsmc@gmail.com>

## References

This optional section can contain literature or other references for background information.

## See Also

Optional links to other man pages

## Examples

# Optional simple examples of the most important functions

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calculate\_multi\_roc     *Calculate the Empirical ROC curves for multiple biomarkers*

---

### Description

Calculate empirical ROC curve estimates given labels and predictions. Designed to work with the multi\_ggroc function, this takes a data.frame and computes the ROC curve for a given list of markers.

### Usage

```
calculate_multi_roc(data, M_string, D_string)
```

### Arguments

|          |   |
|----------|---|
| data     | data frame containing at least 1 marker and the common class labels, coded as 0 and 1 |
| M_string | vector of marker column names   |
| D_string | class label column name   |

### Value

List of data frames containing cutoffs, and estimated true and false positive fractions

### Examples

```
D.ex <- rbinom(100, 1, .5)
fakedata <- data.frame(M1 = rnorm(100, mean = D.ex),
  M2 = rnorm(100, mean = D.ex, sd = .4), D = D.ex)
calculate_multi_roc(fakedata, c("M1", "M2"), "D")
```

---

calculate\_roc     *Calculate the Empirical ROC curve*

---

### Description

Calculate the empirical ROC curve estimate given labels and predictions

### Usage

```
calculate_roc(M, D, ci = FALSE, alpha = 0.05)
```

**Arguments**

|       |  |
|-------|--|
| M     | continuous marker values or predictions of class labels  |
| D     | class labels, must be coded as 0 and 1. If not numeric with 0/1, then plotROC assumes the first level in sort order is healthy status, with a warning. |
| ci    | Logical, if true, will calculate exact joint confidence regions for the TPF and FPF  |
| alpha | Confidence level, ignored if ci = FALSE  |

**Details**

Confidence intervals for TPF and FPF are calculated using the exact method of Clopper and Pearson (1934) each at the level  $1 - \sqrt{1 - \alpha}$ . Based on result 2.4 from Pepe (2003), the cross-product of these intervals yields a  $1 - \alpha$

**Value**

A dataframe containing cutoffs, estimated true and false positive fractions, and confidence intervals if ci = TRUE.

**Examples**

```
D.ex <- rbinom(100, 1, .5)
calculate_roc(rnorm(100, mean = D.ex), D.ex)
calculate_roc(rnorm(100, mean = D.ex), D.ex, ci = TRUE)
```

---

```
export_interactive_roc
```

*Generate svg code for an ROC curve object*

---

**Description**

Takes a ggplot object as returned by [ggroc](#) or [multi\\_ggroc](#) and returns a string that contains html suitable for creating a standalone interactive ROC curve plot.

**Usage**

```
export_interactive_roc(ggroc_p, cutoffs = NULL, font.size = "12px",
  prefix = "a", width = 6, height = 6, lty = NULL, color = NULL,
  lwd = NULL, legend = FALSE)
```

**Arguments**

|                        |   |
|------------------------|---|
| <code>ggroc_p</code>   | An object as returned by <a href="#">ggroc</a> or <a href="#">multi_ggroc</a> . It can be modified with annotations, themes, etc. |
| <code>cutoffs</code>   | Optional vector or list of vectors to over-ride the default cutoff labels. Useful for rescaling or rounding.                      |
| <code>font.size</code> | Character string that determines font size of cutoff labels   |
| <code>prefix</code>    | A string to assign to the objects within the svg. Enables unique identification by the javascript code                            |
| <code>width</code>     | Width in inches of plot   |
| <code>height</code>    | Height in inches of plot  |
| <code>lty</code>       | Optional vector of integers defining line types to apply to curves  |
| <code>color</code>     | Optional vector of color names to apply to curves   |
| <code>lwd</code>       | Line widths for curves  |
| <code>legend</code>    | Logical. If true plots a legend in bottom right corner of plot  |

**Details**

If you intend to include more than one of these objects in a single page, use a different prefix string for each one. To use this function in knitr, use the chunk options `fig.keep='none'` and `results = 'asis'`, then `cat()` the resulting string to the output. See the vignette for examples. Older browsers (< IE7) are not supported.

**Value**

A character object containing the html necessary to plot the ROC curve in a web browser

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|                    |                          |
|--------------------|--------------------------|
| <code>ggroc</code> | <i>Plot an ROC curve</i> |
|--------------------|--------------------------|

---

**Description**

Given a data frame or list of data frames as computed by [calculate\\_roc](#) plot the curve using `ggplot` and sensible defaults. Pass the resulting object and data to [export\\_interactive\\_roc](#), [plot\\_interactive\\_roc](#), or [plot\\_journal\\_roc](#).

**Usage**

```
ggroc(rocdata, fpf_string = "FPF", tpf_string = "TPF", c_string = "c",
      ci = FALSE, label = NULL, label.adj.x = 0, label.adj.y = 0,
      label.angle = 45, plotmath = FALSE, xlabel = "False positive fraction",
      ylabel = "True positive fraction")
```

**Arguments**

|             |   |
|-------------|---|
| rocdata     | Data frame containing true and false positive fractions, and cutoff values                |
| fpf_string  | Column name identifying false positive fraction column                                    |
| tpf_string  | Column name identifying true positive fraction column                                     |
| c_string    | Column name identifying cutoff values   |
| ci          | Logical, if TRUE will create invisible confidence regions for use in the interactive plot |
| label       | Optional direct label for the ROC curve   |
| label.adj.x | Adjustment for the horizontal positioning of the label                                    |
| label.adj.y | Adjustment for the vertical positioning of the label                                      |
| label.angle | Adjustment for angle of label   |
| plotmath    | Logical. If TRUE, labels will be parsed as expressions. See ?plotmath for details.        |
| xlabel      | Defaults to "False positive fraction"   |
| ylabel      | Defaults to "True positive fraction"  |

**Value**

A ggplot object

---

modCss

*Add custom font size, more customizations to come*

---

**Description**

Add custom font size, more customizations to come

**Usage**

```
modCss(font.size)
```

**Arguments**

|           |  |
|-----------|--|
| font.size | String describing font size, 12px, for example |
|-----------|--|

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|       |  |
|-------|--|
| modJs | <i>Modify javascript function to use custom name</i> |
|-------|--|

---

**Description**

Modify javascript function to use custom name

**Usage**

```
modJs(selector, prefix, rect = "")
```

**Arguments**

|          |  |
|----------|--|
| selector | css selector for the geompoints.object                                   |
| prefix   | Prefix of the svg  |
| rect     | If not empty, the selector for the geom_rects for the confidence regions |

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|             |                                 |
|-------------|---------------------------------|
| multi_ggroc | <i>Plot multiple ROC curves</i> |
|-------------|---------------------------------|

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**Description**

Given a list of results computed by [calculate\\_roc](#), plot the curve using ggplot with sensible defaults. Pass the resulting object and data to [export\\_interactive\\_roc](#), [plot\\_interactive\\_roc](#), or [plot\\_journal\\_roc](#).

**Usage**

```
multi_ggroc(datalist, fpf_string = rep("FPF", length(datalist)),
  tpf_string = rep("TPF", length(datalist)), c_string = rep("c",
  length(datalist)), label = NULL, legend = FALSE, label.adj.x = rep(0,
  length(datalist)), label.adj.y = rep(0, length(datalist)),
  label.angle = rep(45, length(datalist)), plotmath = FALSE,
  xlabel = "False positive fraction", ylabel = "True positive fraction")
```

**Arguments**

|             |   |
|-------------|---|
| datalist    | List of data frames each containing true and false positive fractions and cutoffs |
| fpf_string  | Column names identifying false positive fraction                                  |
| tpf_string  | Column names identifying true positive fraction                                   |
| c_string    | Column names identifying cutoff values  |
| label       | Optional vector of direct labels for the ROC curve, same length as datalist       |
| legend      | If true, draws legend instead of labels   |
| label.adj.x | Adjustment for the positioning of the label, same length as datalist              |

|             |  |
|-------------|--|
| label.adj.y | Adjustment for the positioning of the label, same length as datalist               |
| label.angle | Adjustment for angle of label, same length as datalist                             |
| plotmath    | Logical. If TRUE, labels will be parsed as expressions. See ?plotmath for details. |
| xlabel      | Defaults to "False positive fraction"  |
| ylabel      | Defaults to "True positive fraction"   |

**Value**

A ggplot object

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|                      |  |
|----------------------|--|
| plot_interactive_roc | <i>Generate a standalone html document displaying an interactive ROC curve</i> |
|----------------------|--|

---

**Description**

Generate a standalone html document displaying an interactive ROC curve

**Usage**

```
plot_interactive_roc(ggroc, file = NULL, ...)
```

**Arguments**

|       |   |
|-------|---|
| ggroc | An object as returned by <a href="#">ggroc</a> or <a href="#">multi_ggroc</a> . It can be modified with annotations, themes, etc. |
| file  | A path to save the result to. If NULL, will save to a temporary directory   |
| ...   | arguments passed to <a href="#">export_interactive_roc</a>  |

**Value**

NULL opens an interactive document in Rstudio or the default web browser



---

plot\_journal\_roc      *Plot an ROC curve for use in print*

---

### Description

Given a ggroc object, creates a plot suitable for print.

### Usage

```
plot_journal_roc(ggroc_p, font.size = 3, n.cuts = 20, ci.at = NULL,  
  opacity = 0.3, lty = NULL, color = NULL, lwd = NULL, legend = FALSE)
```

### Arguments

|           |   |
|-----------|---|
| ggroc_p   | An object as returned by <a href="#">ggroc</a> or <a href="#">multi_ggroc</a> . It can be modified with annotations, themes, etc.                                   |
| font.size | Integer that determines font size of cutoff labels  |
| n.cuts    | Number of cutoffs to display  |
| ci.at     | Cutoff values at which to plot confidence regions, if non-NULL, rocdata must contain limits for the confidence region, as returned by <a href="#">calculate_roc</a> |
| opacity   | Opacity level for confidence region boxes. Defaults to 0.3. Must be between 0 and 1   |
| lty       | Optional vector of integers defining line types to apply to curves  |
| color     | Optional vector of color names to apply to curves   |
| lwd       | Line widths for curves  |
| legend    | Logical. If true plots a legend in bottom right corner of plot  |

### Value

A ggplot object

---

shiny\_plotROC      *Start the plotROC Shiny app*

---

### Description

A convenience function to easily start the shiny application. It will open in Rstudio, or in the default web browser.

### Usage

```
shiny_plotROC()
```

---

`verify_d`*Check that D is OK for using as binary disease status*

---

**Description**

Checks for two classes and gives informative error messages

**Usage**

```
verify_d(D)
```

**Arguments**

D                      Vector that will be checked for 2-class labels

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