Plot Toolkit Documentation

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CHAPTER

ONE

INTRODUCTION

Plot Toolkit is a set of python functions, classes, and decorators intended to simplify usage of the matplotlib package. Matplotlib provides an excellent framework for rapidly generating plots, however, applying strict formatting specifications to these plots typically requires writing a lot amount of code. Plot Toolkit's purpose is to reduce this.

CHAPTER

TWO

FUNCTIONS

2.1 Formatting

2.1.1 Axes

Functions for formatting axes

plot_toolkit.axes.**set_xaxis**(...)

Formats an x-axis

Arguments:

subplot <Axes> on which to act

ticks Ticks

tick_kw Keyword arguments to be passed to set_xticks(...)

ticklabels Tick labels

tick_fp Tick label font; passed to gen_font(...)

ticklabel_kw Keyword arguments to be passed to set_xticklabels(...)

tick_params Keyword arguments to be passed to set_tick_params(...)

label Label text

label_fp Label font; passed to gen_font(...)

label_kw Keyword arguments to be passed to set_xlabel(...)

lw Width of x-axis lines

plot_toolkit.axes.**set_yaxis**(...)

Formats a y-axis

Arguments:

subplot <Axes> on which to act

ticks Ticks

tick_kw Keyword arguments to be passed to set_yticks(...)

ticklabels Tick labels

tick_fp Tick label font; passed to gen_font(...)

ticklabel_kw Keyword arguments to be passed to set_yticklabels(...)

tick_params Keyword arguments to be passed to set_tick_params(...)

label Label text

label_fp Label font; passed to gen_font(...)

label_kw Keyword arguments to be passed to set_ylabel(...)

lw Width of y-axis lines

`plot_toolkit.axes.`**`set_colorbar`**`(...)`

Formats a colorbar

Arguments:

cbar <ColorBar> to act on

ticks Ticks

ticklabels Tick labels

tick_fp Tick label font; passed to gen_font(...)

label Label text

label_fp Label font; passed to gen_font(...)

`plot_toolkit.axes.`**`set_multi`**`(...)`

Formats a set of multiple plots

Arguments:

subplots OrderedDict of <Axes> on which at act

first Index of first plot in multiple

nrows Number of rows of plots in multiple

ncols Number of columns of plots in multiple

xkwargs Keyword arguments to be passed to set_xaxis

ykwargs Keyword arguments to be passed to set_yaxis

2.1.2 Text

Functions for adding text labels and annotations

`plot_toolkit.text.`**`set_title`**`(...)`

Prints a title for a figure or subplot

Arguments:

figure_or_subplot <Figure> or <Axes> on which to act

text Title text; *s*, *t*, *title*, and *label* also supported

fp Title font; *fontproperties* also supported; passed to gen_font(...)

top Distance between top of figure and title (inches); applies to Figure title only

Returns:

text New <Text>

`plot_toolkit.text.`**`set_bigxlabel`**`(...)`

Prints a large x-axis label shared by multiple subplots

Arguments:

figure_or_subplots <Figure> or OrderedDict of <Axes> on which to act

text Label text; *s*, *label*, and *xlabel* also supported

fp Label font; *fontproperties* also supported; passed to gen_font(...)

bottom Distance between bottom of figure and label (inches); if negative, distance between bottommost plot and label

top Distance between top of figure and label (inches); if negative, distance between topmost plot and label; overrides *bottom*

x Horizontal position of label in figure reference frame (proportion 0.0-1.0); overrides *bottom/top*

y Vertical position of label in figure reference frame (proportion 0.0-1.0); overrides *bottom/top*

Returns:

text New <Text>

`plot_toolkit.text.`**`set_bigylabel`**`(...)`

Prints a large x-axis label shared by multiple subplots

Arguments:

figure_or_subplots <Figure> or OrderedDict of <Axes> on which to act

text Label text; *s*, *label*, and *ylabel* also supported

fp Label font; *fontproperties* also supported; passed to gen_font(...)

left Distance between left side of figure and label (inches); if negative, distance between leftmost plot and label

right Distance between right side of figure and label (inches); if negative, distance between rightmost plot and label; overrides *left*

x Horizontal position of label in figure reference frame (proportion 0.0-1.0); overrides *left/right*

y Vertical position of label in figure reference frame (proportion 0.0-1.0); overrides *left/right*

rotation Label rotation; default = 'vertical'

Returns:

text New <Text>

`plot_toolkit.text.`**`set_inset`**`(...)`

Prints an inset to a subplot

Arguments:

subplot <Axes> on which to act

text Inset text; *s* and *inset* also supported

fp Inset font; *fontproperties* also supported; passed to gen_font(...)

xpos Horizontal position of inset in subplot reference frame; (proportion 0.0-1.0)

ypos Vertical position of inset in subplot reference frame; (proportion 0.0-1.0)

x Horizontal position of inset in subplot reference frame; overrides *xpos*

y Vertical position of inset in subplot reference frame; overrides *ypos*

ha Text horizontal alignment; default = 'left'

va Text vertical alignment; default = 'top'

Returns:

text New <Text>

`plot_toolkit.text.set_text(...)`

Prints text on a figure or subplot

Arguments:

figure_or_subplot <Figure> or <Axes> on which to act

text Text; *s* also supported

fp Font; *fontproperties* also supported; passed to gen_font(...)

ha Text horizontal alignment; default = 'center'

va Text vertical alignment; default = 'center'

Returns:

text New <Text>

2.1.3 Legend

`plot_toolkit.legend.set_legend(...)`

Draws and formats a legend on *subplot*

By default includes all series; may alternatively accept manual lists of *handles* and *labels* for plotted series

Arguments:

subplot <Axes> on which to act

handles List of handles for plotted series

labels List of labels for plotted series

fp Legend font; *fontproperties* and *prop* also supported; passed to gen_font(...)

Returns:

legend <Legend>

2.2 Auxiliary

2.2.1 General

General functions

`plot_toolkit.multi_kw(...)`

Function to allow arguments to be set by one of several potential keyword arguments. For example, the keyword argument *s* represeting a string might be set using *s*, *text*, *label*, or if none of these are present, a default value. Note that *kwargs* should not be passed to this function using the ** syntax.

Arguments:

keywords List of acceptable keyword arguments; first match is used and other are deleted

default Default value to use if none of *keywords* are present in *kwargs*

kwargs Dictionary of keyword arguments to be tested

Returns:

value Value from *kwargs* of first matching keyword in *keywords*, or *default* if none are present

`plot_toolkit.`**`pad_zero`**`(...)`

Returns a list of tick labels, each with the same number of digits after the decimal

Arguments:

ticks List or numpy array of ticks

digits Number of digits to include after the decimal

Returns:

tick_labels Tick labels, each with the same number of digits after the decimal

2.2.2 Matplotlib

`plot_toolkit.`**`get_edges`**`(...)`

Arguments:

figure_or_subplots <Figure> of dictionary of <Axes> on which to act

Returns:

edges Dictionary; keys are ‘x’ and ‘y’, values are numpy arrays with dimensions (axis, min...max)

`plot_toolkit.`**`gen_font`**`(...)`

Arguments:

fp Font settings

Behavior:

If *fp* is <FontProperties>, acts as a pass-through, return *fp* argument
If *fp* is a String of form ‘##L’, makes new <FontProperties>
‘##’ = size; ‘L’ = {‘r’: regular, ‘b’ bold}
If *fp* is a Dict, makes new <FontProperties> using given keyword arguments

Returns:

fp <FontProperties> object to given specifications

`plot_toolkit.`**`gen_contour_levels`**`(...)`

Arguments:

I Intensity

cutoff Proportion of data below minimum level (0.0-1.0)

include_negative Return levels for negative intensity as well as positive

Returns:

levels Numpy array of levels

`plot_toolkit.`**`gen_cmap`**`(...)`

Returns colormap that is *color* over all values

Not useful for heatmaps; useful for countours

Arguments:

color Tuple, list, or numpy array of red, green, and blue (0.0-1.0); or string of named matplotlib color

Returns:

cmap <LinearSegmentedColormap>

`plot_toolkit.`**`gen_figure_subplots`**`(...)`

Generates a figure and subplots to specifications

Differs from matplotlib's built-in functions in that it:

- Accepts input in inches rather that relative figure coordinates
- Optionally calculates figure dimensions from provided subplot dimensions, rather than the reverse
- Returns subplots in an OrderedDict
- Smoothly adds additional subplots to a previously-generated figure (i.e. can be called multiple times)

Arguments:

nrows Number of rows of subplots

ncols Number of columns of subplots

sub_width Width of subplot(s)

sub_height Height of subplot(s)

top Distance between top of figure and highest subplot(s)

bottom Distance between bottom of figure and lowest subplot(s)

right Distance between right side of figure and rightmost subplot(s)

left Distance between left side of figure and leftmost subplots(s)

hspace Vertical distance between adjacent subplots

wspace Horizontal distance between adjacent subplots

fig_width Width of figure; by default calculated from above arguments

fig_height Height of figure, by default calculated from above arguments

Returns:

figure <Figure>

subplots OrderedDict of subplots (1-indexed)

`plot_toolkit.`**`identify`**`(...)`

Identifies index of each subplot with inset text

Arguments:

subplots OrderedDict of subplots

CHAPTER

THREE

DECORATORS

3.1 Figure_Output

class `plot_toolkit.Figure_Output.`**`Figure_Output`**`(...)`

Decorator class to allow plotting functions to save figures more easily

Arguments:

outfile Output file name or <matplotlib.backends.backend_pdf.PdfPages>

Behavior:

Calls decorated function, which should return a <matplotlib.Figure.Figure>
If *outfile* is a string ending in '.png', saves figure as a png file.
If *outfile* is a string ending in '.pdf', saves figure as a pdf file using PdfPages
If *outfile* is a PdfPages object, appends figure to that object as a page

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