MissiePlots Documentation

Release 0.1

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CHAPTER

ONE

CUBESLICER

cubeslicer.**Cube**(*cube*, *slices*, *scales=None*, ***kwargs*)

Plot the slices of a cube in 3D with ease. This function takes the 3D cube and does the rest for you, just specify the slices you want! See below or the tutorial in https://github.com/SophiaVaughan/MissiePlots for more information.

Parameters

- **cube** (*np.ndarray, list*) – The cube to be plotted. Must have exactly 3 axis.
- **slices** (*dict*) – The slices to be plotted. Must be of the format {0:a, 1:b, 2:c} where a,b,c are None, an integer, a list of integers or a numpy array of integers. The integers specify the index of the slice to be plotted along the axis specified by the key. The order in the dict specifies which axis of the cube maps to which axis of the plot, the first maps the the x axis, the second to y and so on.
- **scales** (*dict or None, default=None*) – Maps the index of the cube to the x,y,z scales (this does not alter how slices works). Must be of the format {0:a, 1:b, 2:c} where a,b,c are None, a list or a numpy array. If None, the index is kept as the scale, if a list or array are supplied then they must be the same length as the cube along the axis given by the corresponding key.
- **kwargs** (*dict or keywords*) –

  saveloc [str, default='./'] The filepath to the folder in which to save the plot if savename is not None.

  savename [str or None, default=None] If not None, the plot is saved as a png file with this filename in the folder specified by saveloc.

  figsize [tuple, default=(8,8)] A length 2 tuple specifying the size of the figure to be created.

  font_scale [int or float, default=1] A scale factor by which to increase all the fontsizes of the labels in the plot.

  title [str, optional] The title of the plot. If this keyword isn't used, no title will be added.

  xlabel [str, optional] The label for the x axis of the plot. If this keyword isn't used, no label will be added.

  ylabel [str, optional] The label for the y axis of the plot. If this keyword isn't used, no label will be added.

  zlabel [str, optional] The label for the z axis of the plot. If this keyword isn't used, no label will be added.

cbarlabel [str, optional] The label for the colorbar of the plot. If this keyword isn't used, no label will be added.

xticks [list or np.ndarray, optional] A list/array of ticks to include on the x axis of the plot. If this keyword isn't used, the default ticks will be used.

yticks [list or np.ndarray, optional] A list/array of ticks to include on the y axis of the plot. If this keyword isn't used, the default ticks will be used.

zticks [list or np.ndarray, optional] A list/array of ticks to include on the z axis of the plot. If this keyword isn't used, the default ticks will be used.

cbarticks [list or np.ndarray, optional] A list/array of ticks to include on the colorbar of the plot. If this keyword isn't used, the default ticks will be used.

xlim [list, optional] A length 2 list containing the [min, max] range for the x axis of the plot. If this keyword isn't used, the default range will be used.

ylim [list, optional] A length 2 list containing the [min, max] range for the y axis of the plot. If this keyword isn't used, the default range will be used.

zlim [list, optional] A length 2 list containing the [min, max] range for the z axis of the plot. If this keyword isn't used, the default range will be used.

cbarlim [list, optional] A length 2 list containing the [min, max] range for the colorbar of the plot. If this keyword isn't used, the default range will be used.

cbar_marks [list or np.ndarray, optional] A list/array of points along the colorbar to add marks to. If this keyword isn't used, no marks will be added.

cbar_mark_labels [list or np.ndarray, optional] A list/array of strings to label the corresponding marks specified with cbar_marks. If this keyword isn't used, no marks will be added.

cmap [matplotlib.pyplot.cm.<colormap>, default=matplotlib.pyplot.cm.bone] The colormap to use for the plot.

norm [list, np.ndarray or None, default=None] If not None then this specifies the boundaries along which to discretize the colormap.

zorder_function [function, default= an internal function] DO NOT USE UNLESS NEEDED. If the slices appear ontop of one another when they shouldn't then use the function to map the center x,y,z value of the slice to a number. The silces will then be plotted in ascending order of that number.

`cubeslicer.`**`CubeSlice`**(*cube*, *slices*, *scales=None*, ***kwargs*)

Want to plot the slices of a cube in 3D and display those slices in 2D on the same plot? Look no further, this function takes the 3D cube and does the rest for you, just specify the slices you want! See below or the tutorial in https://github.com/SophiaVaughan/MissiePlots for more information.

Parameters

- **`cube`** (*`np.ndarray, list`*) – The cube to be plotted. Must have exactly 3 axis.
- **`slices`** (*`dict`*) – The slices to be plotted. Must be of the format {0:a, 1:b, 2:c} where a,b,c are None, an integer, a list of integers or a numpy array of integers. The integers specify the index of the slice to be plotted along the axis specified by the key. The order in the dict specifies which axis of the cube maps to which axis of the plot, the first maps the the x axis, the second to y and so on.
- **`scales`** (*`dict or None, default=None`*) – Maps the index of the cube to the x,y,z scales (this does not alter how slices works). Must be of the format {0:a, 1:b, 2:c} where a,b,c are None, a list or a numpy array. If None, the index is kept

as the scale, if a list or array are supplied then they must be the same length as the cube along the axis given by the corresponding key.

- **kwargs** (*dict or keywords*) –

  saveloc [str, default='./'] The filepath to the folder in which to save the plot if savename is not None.

  savename [str or None, default=None] If not None, the plot is saved as a png file with this filename in the folder specified by saveloc.

  figsize [tuple, default=(8,8)] A length 2 tuple specifying the size of the figure to be created.

  font_scale [int or float, default=1] A scale factor by which to increase all the fontsizes of the labels in the plot.

  title [str, optional] The title of the plot. If this keyword isn't used, no title will be added.

  xlabel [str, optional] The label for the x axis of the plot. If this keyword isn't used, no label will be added.

  ylabel [str, optional] The label for the y axis of the plot. If this keyword isn't used, no label will be added.

  zlabel [str, optional] The label for the z axis of the plot. If this keyword isn't used, no label will be added.

  cbarlabel [str, optional] The label for the colorbar of the plot. If this keyword isn't used, no label will be added.

  xticks [list or np.ndarray, optional] A list/array of ticks to include on the x axis of the plot. If this keyword isn't used, the default ticks will be used.

  yticks [list or np.ndarray, optional] A list/array of ticks to include on the y axis of the plot. If this keyword isn't used, the default ticks will be used.

  zticks [list or np.ndarray, optional] A list/array of ticks to include on the z axis of the plot. If this keyword isn't used, the default ticks will be used.

  cbarticks [list or np.ndarray, optional] A list/array of ticks to include on the colorbar of the plot. If this keyword isn't used, the default ticks will be used.

  xlim [list, optional] A length 2 list containing the [min, max] range for the x axis of the plot. If this keyword isn't used, the default range will be used.

  ylim [list, optional] A length 2 list containing the [min, max] range for the y axis of the plot. If this keyword isn't used, the default range will be used.

  zlim [list, optional] A length 2 list containing the [min, max] range for the z axis of the plot. If this keyword isn't used, the default range will be used.

  cbarlim [list, optional] A length 2 list containing the [min, max] range for the colorbar of the plot. If this keyword isn't used, the default range will be used.

  cbar_marks [list or np.ndarray, optional] A list/array of points along the colorbar to add marks to. If this keyword isn't used, no marks will be added.

  cbar_mark_labels [list or np.ndarray, optional] A list/array of strings to label the corresponding marks specified with cbar_marks. If this keyword isn't used, no marks will be added.

markpoints [dict] Used to add crosshairs to points on the 2d slices. Must be of the format {0:a, 1:b, 2:c} where a,b,c are None or a list of 2/3 length tuples. The tuples are of the form (f,d,e) or (d,e) where d is the point to mark on the x axis in data coordinates and e is the same for the y axis. If f is used it is the index of the slice to plot the crosshairs on. The x axis maps to the lowest axis that is not the slices axis and the y aixs is the other axis that is not the slice axis.

cmap [matplotlib.pyplot.cm.<colormap>, default=matplotlib.pyplot.cm.bone] The colormap to use for the plot.

norm [list, np.ndarray or None, default=None] If not None then this specifies the boundaries along which to discretize the colormap.

zorder_function [function, default= an internal function] DO NOT USE UNLESS NEEDED. If the slices appear ontop of one another when they shouldn't then use the function to map the center x,y,z value of the slice to a number. The silces will then be plotted in ascending order of that number.

cubeslicer.**Slice**(*cube*, *slices*, *scales=None*, ***kwargs*)

Plot a range of 2D slices of a cube with ease. This function takes the 3D cube and does the rest for you, just specify the slices you want! See below or the tutorial in https://github.com/SophiaVaughan/MissiePlots for more information.

Parameters

- **cube** (*np.ndarray, list*) – The cube to be plotted. Must have exactly 3 axis.
- **slices** (*dict*) – The slices to be plotted. Must be of the format {0:a, 1:b, 2:c} where a,b,c are None, an integer, a list of integers or a numpy array of integers. The integers specify the index of the slice to be plotted along the axis specified by the key. The order in the dict specifies which axis of the cube maps to which axis of the plot, the first maps the the x axis, the second to y and so on.
- **scales** (*dict or None, default=None*) – Maps the index of the cube to the x,y,z scales (this does not alter how slices works). Must be of the format {0:a, 1:b, 2:c} where a,b,c are None, a list or a numpy array. If None, the index is kept as the scale, if a list or array are supplied then they must be the same length as the cube along the axis given by the corresponding key.
- **kwargs** (*dict or keywords*) –

  saveloc [str, default='./'] The filepath to the folder in which to save the plot if savename is not None.

  savename [str or None, default=None] If not None, the plot is saved as a png file with this filename in the folder specified by saveloc.

  figsize [tuple, default=(8,8)] A length 2 tuple specifying the size of the figure to be created.

  font_scale [int or float, default=1] A scale factor by which to increase all the fontsizes of the labels in the plot.

  title [str, optional] The title of the plot. If this keyword isn't used, no title will be added.

  xlabel [str, optional] The label for the x axis of the plot. If this keyword isn't used, no label will be added.

  ylabel [str, optional] The label for the y axis of the plot. If this keyword isn't used, no label will be added.

zlabel [str, optional] The label for the z axis of the plot. If this keyword isn't used, no label will be added.

cbarlabel [str, optional] The label for the colorbar of the plot. If this keyword isn't used, no label will be added.

xticks [list or np.ndarray, optional] A list/array of ticks to include on the x axis of the plot. If this keyword isn't used, the default ticks will be used.

yticks [list or np.ndarray, optional] A list/array of ticks to include on the y axis of the plot. If this keyword isn't used, the default ticks will be used.

zticks [list or np.ndarray, optional] A list/array of ticks to include on the z axis of the plot. If this keyword isn't used, the default ticks will be used.

cbarticks [list or np.ndarray, optional] A list/array of ticks to include on the colorbar of the plot. If this keyword isn't used, the default ticks will be used.

xlim [list, optional] A length 2 list containing the [min, max] range for the x axis of the plot. If this keyword isn't used, the default range will be used.

ylim [list, optional] A length 2 list containing the [min, max] range for the y axis of the plot. If this keyword isn't used, the default range will be used.

zlim [list, optional] A length 2 list containing the [min, max] range for the z axis of the plot. If this keyword isn't used, the default range will be used.

cbarlim [list, optional] A length 2 list containing the [min, max] range for the colorbar of the plot. If this keyword isn't used, the default range will be used.

cbar_marks [list or np.ndarray, optional] A list/array of points along the colorbar to add marks to. If this keyword isn't used, no marks will be added.

cbar_mark_labels [list or np.ndarray, optional] A list/array of strings to label the corresponding marks specified with cbar_marks. If this keyword isn't used, no marks will be added.

markpoints [dict] Used to add crosshairs to points on the 2d slices. Must be of the format {0:a, 1:b, 2:c} where a,b,c are None or a list of 2/3 length tuples. The tuples are of the form (f,d,e) or (d,e) where d is the point to mark on the x axis in data coordinates and e is the same for the y axis. If f is used it is the index of the slice to plot the crosshairs on. The x axis maps to the lowest axis that is not the slices axis and the y aixs is the other axis that is not the slice axis.

cmap [matplotlib.pyplot.cm.<colormap>, default=matplotlib.pyplot.cm.bone] The colormap to use for the plot.

norm [list, np.ndarray or None, default=None] If not None then this specifies the boundaries along which to discretize the colormap.

zorder_function [function, default= an internal function] DO NOT USE UNLESS NEEDED. If the slices appear ontop of one another when they shouldn't then use the function to map the center x,y,z value of the slice to a number. The silces will then be plotted in ascending order of that number.

CHAPTER

TWO

LOGL

logl.**SigmaMap**(*arry*, *func*, *scales=None*, ***kwargs*)

Plot a 2D log likelihood array with accompanying significances with ease. This function takes the 2D array and does the rest for you, just specify a conversion function for the loglikelihhod to significance! See below or the tutorial in https://github.com/SophiaVaughan/MissiePlots for more information.

Parameters

- **array** (*np.ndarray, list*) – The array to be plotted. Must have exactly 2 axis.
- **func** (*callable*) – A function that takes the array and converts the log likelihood values to significance. Is called like this: sig = func(arry)
- **scales** (*dict or None, default=None*) – Maps the index of the cube to the x,y scales. Must be of the format {0:a, 1:b} where a,b are None, a list or a numpy array. If None, the index is kept as the scale, if a list or array are supplied then they must be the same length as the array along the axis given by the corresponding key.
- **kwargs** (*dict or keywords*) –

  saveloc [str, default='./'] The filepath to the folder in which to save the plot if savename is not None.

  savename [str or None, default=None] If not None, the plot is saved as a png file with this filename in the folder specified by saveloc.

  figsize [tuple, default=(8,8)] A length 2 tuple specifying the size of the figure to be created.

  font_scale [int or float, default=1] A scale factor by which to increase all the fontsizes of the labels in the plot.

  title [str, optional] The title of the plot. If this keyword isn't used, no title will be added.

  xlabel [str, optional] The label for the x axis of the plot. If this keyword isn't used, no label will be added.

  ylabel [str, optional] The label for the y axis of the plot. If this keyword isn't used, no label will be added.

  siglabel [str, optional] The label for the 'significance' side of the colorbar of the plot. If this keyword isn't used, the default "Significance" label will be added.

  logllabel [str, optional] The label for the 'Log Likelihood' side of the colorbar of the plot. If this keyword isn't used, the default "Log Likelihood" label will be added.

xticks [list or np.ndarray, optional] A list/array of ticks to include on the x axis of the plot. If this keyword isn't used, the default ticks will be used.

yticks [list or np.ndarray, optional] A list/array of ticks to include on the y axis of the plot. If this keyword isn't used, the default ticks will be used.

sigticks [list or np.ndarray, optional] A list/array of ticks to include on the colorbar of the plot. If this keyword isn't used, the default ticks will be used.

loglticks [list or np.ndarray, optional] A list/array of ticks in loglikelihhod to add to the log likelihood colorbar. If this keyword isn't used, the default ticks will be used.

xlim [list, optional] A length 2 list containing the [min, max] range for the x axis of the plot. If this keyword isn't used, the default range will be used.

ylim [list, optional] A length 2 list containing the [min, max] range for the y axis of the plot. If this keyword isn't used, the default range will be used.

siglim [list, optional] A length 2 list containing the [min, max] range for the colorbar of the plot. If this keyword isn't used, the default range will be used.

markpoints [dict] Used to add crosshairs to points on the 2d plot. Must be a list of length 2 tuples. The tuples are of the form (d,e) where d is the point to mark on the x axis in data coordinates and e is the same for the y axis.

cmap [matplotlib.pyplot.cm.<colormap>, default=matplotlib.pyplot.cm.bone] The colormap to use for the plot.

norm [list, np.ndarray or None, default=None] If not None then this specifies the boundaries along which to discretize the colormap.

logl.**logl_to_sig**(*dof*, *zero_point*)

This returns a function that converts the log likelihoods to significance. zero_point is the log likelihood of the null model and DOF is the difference in the number of degrees of freedom between the null model and the alternative model.

Parameters

- **dof** (*int*) – The difference in the number of degrees of freedom between the null model and the alternative model.
- **zero_point** (*float*) – The log likelihood of the null model.

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