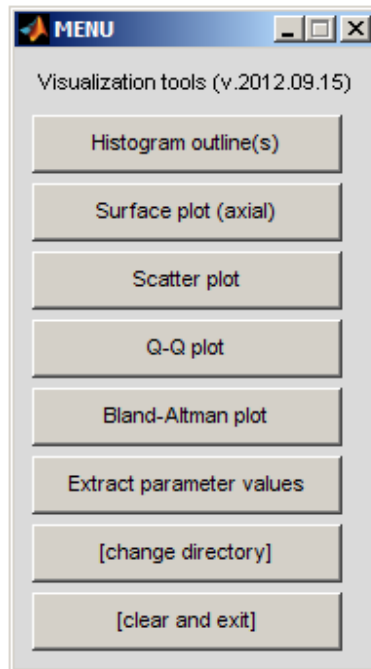


# Documentation for `vis`: histogram outlines, surface plots, and scatter plots for SPM 5/8

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## Updates (September 2012)

- If running in **SPM8**, will automatically reslice masks to match dimensions of the target image
- If running in **SPM5**, user should ensure that masks are already resliced to match the dimensions of the target image
- **Q-Q plot** requires the MATLAB stats toolbox; other functions should work independently of that toolbox

## Installation

1. Unzip `vis.zip` into your target directory (e.g., `matlab/spm5/toolboxes/`)
2. Make sure SPM and all sub-directories are part of the MATLAB path (`File > Set path` or `pathtool`)

Note: "sample data" are contrast images 006 and 007 from [http://www.fil.ion.ucl.ac.uk/spm/data/face\\_rfx/cons\\_can.zip](http://www.fil.ion.ucl.ac.uk/spm/data/face_rfx/cons_can.zip)

## General Instructions

1. In MATLAB, launch `spm` if you have not already
2. at the Matlab prompt, type `vis`
  - a. note: if the menu does not appear in a desired location, type `edit menu` and set `winTopGap` (line 128) or `winLeftGap` (line 129) to a more appropriate value


## For histogram outlines ...

3. In the `vis` window, select *Histogram outline*
  - a. *Select image to analyze:*
    - i. in the *sample\_data* folder, select `con_.0006.img`
  - b. *Use implicit mask?: [1] yes; [2] no:*

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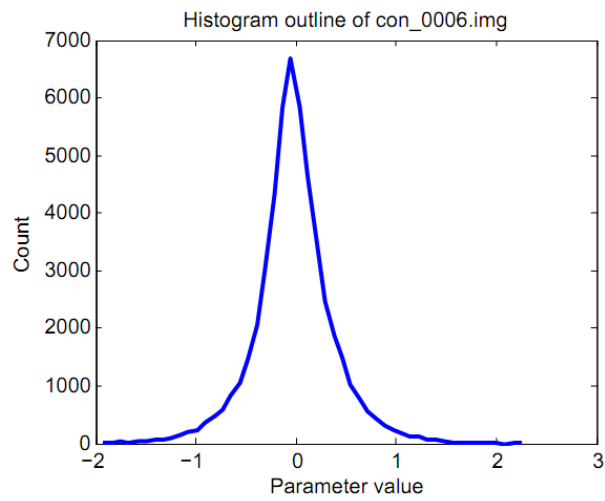
- i. [2] is the default; will read in all non-zero values in the image
- ii. If choosing [1], will be prompted to *Select inclusive mask*:
  - 1. all values in the to-be-analyzed image within the inclusive mask will be read in, and the histogram calculated on those values
- c. values will be read in, and saved under variables `fvals`
- d. Use default of 50 bins? [1] yes; [2] no:
  - i. Can select a different min, max, and bin step size
- e. The histogram outline will be displayed (**Figure 1**), and the mean, standard deviation, and skewness of the values will be displayed

#### For surface plots ...

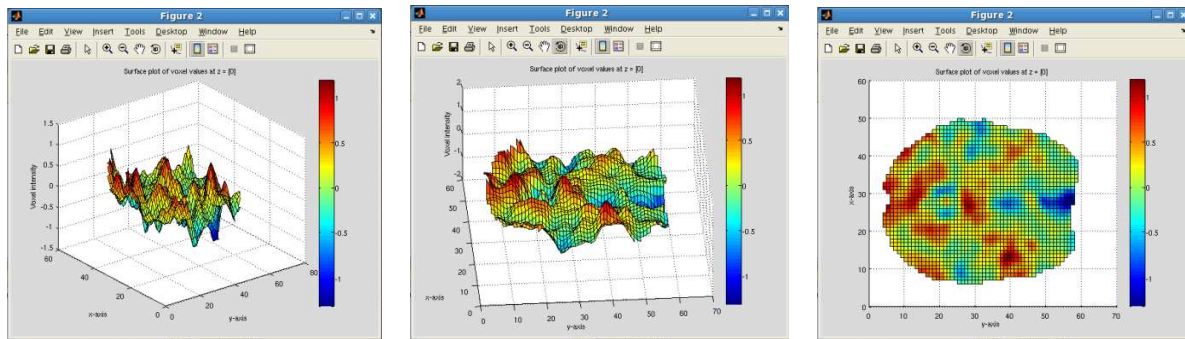
- 4. In the *vis* window, select *Surface plot*
  - a. *Select the .img to analyze*
    - i. in the *sample\_data* folder, select `con_.0006.img`
  - b. Enter the z slice location
    - i. default is the z origin (= 0 mm), specified within the file itself. To select another slice, enter the value in mm of the slice (e.g., 15 will return the slice at which z = 15 mm)
    - ii. Note: It is assumed that the user will enter a "valid" value based on the resolution of the image (e.g., 3 x 3 x 3 mm); however, in the case of a discrepancy, the program will round down to the nearest slice (e.g., if 1.6 is entered, the program will analyze z = 1 mm)
  - c. Results
    - i. see **Figure 2**
    - ii. The color axis of voxel values is plotted on the right.
    - iii. The image can be rotated in MATLAB using the  button:
      - iv. Note: in MATLAB, the x-axis values will increase from L to R

#### For scatter plots ...

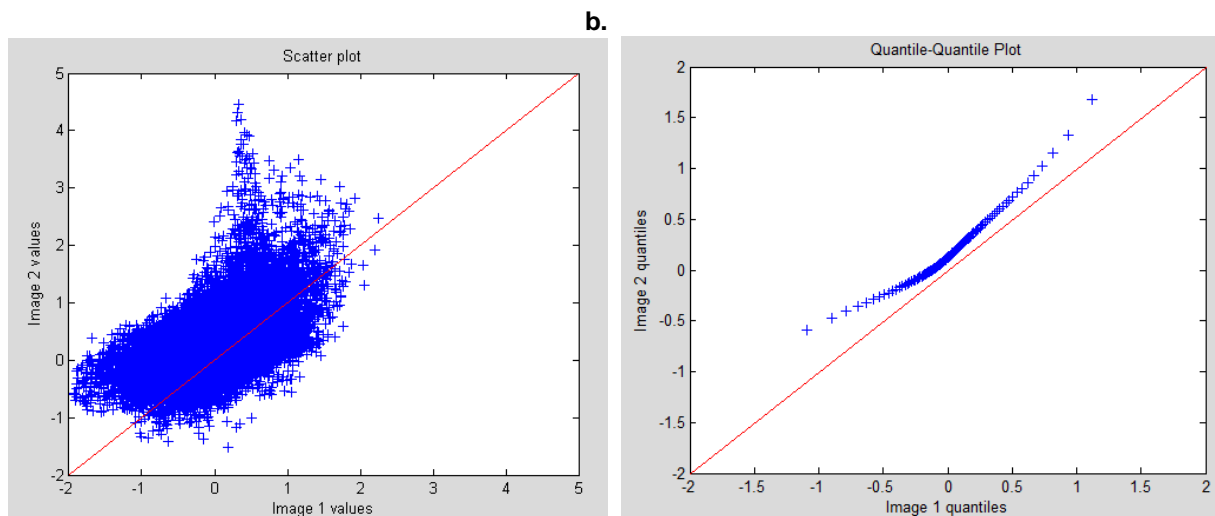
- 5. In the *vis* window, select *Scatter plot / Q-Q plot*
  - a. *Select 2 files (x,y) to compare*:
    - i. in the *sample\_data* folder, select `con_0006.img` and `con_0007.img`
  - b. *Only include values above V? [1] yes; [2] no*:
    - i. for example, only positive values
    - ii. if [1], enter the value at the prompt
    - iii. if [2], then all file values will be included
  - c. *Exclude voxels with zeros in [1] first, [2] second, or [3] either image?*:
    - i. [3] is the most logical choice; excludes voxels in which both images have value = 0
    - ii. That is, all non-brain voxels will be eliminated from this step
  - d. Program will check to make sure the 2 images have the same dimensions, and will terminate if they do not
  - e. Results
    - i. see **Figure 3a**
    - ii. Scatter plot will be created, with each axis labeled accordingly
    - iii. The command window will display the number of voxels plotted, the *r*-value, and the *p*-value.
    - iv. Note: given the likely large size of the images (e.g., > 50,000 voxels), *p*-values will be non-diagnostic.
  - f. Finally, a quantile-quantile (Q-Q) plot will be produced (**Figure 3b**), showing the 99 quantiles between .01 and .99



**Figure 1.** Histogram outline of all non-zero voxels in an image.



**Figure 2.** Different rotations of the surface plot.



**Figure 3.** (a) Scatter plot; (b) Q-Q plot.

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