

# CS516 - Computer Vision

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## Assignment 1

### Group members :

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### Part 1: Python viewer

**Part 1a (50%):** Create a viewer function in python that displays a slice from a 3d image and allows for scrolling through the image slices using keypad or mouse wheel.

Users are allowed to scroll the image slices with mouse wheel, as is shown below. This function is implemented with Listener from pynput library.

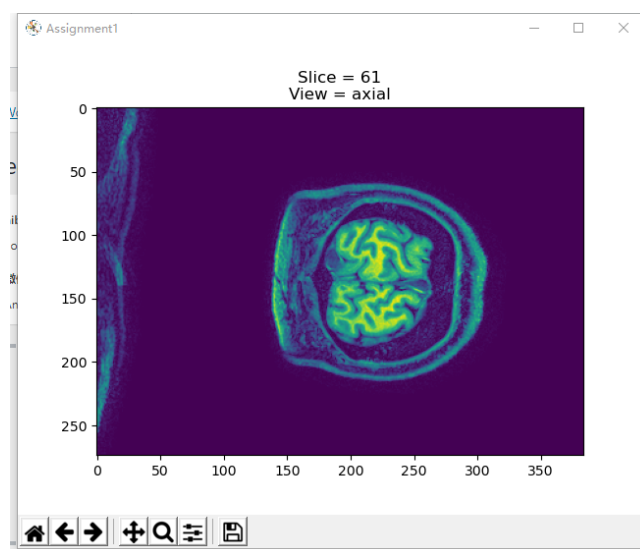


Figure 1.1 Slice = 61

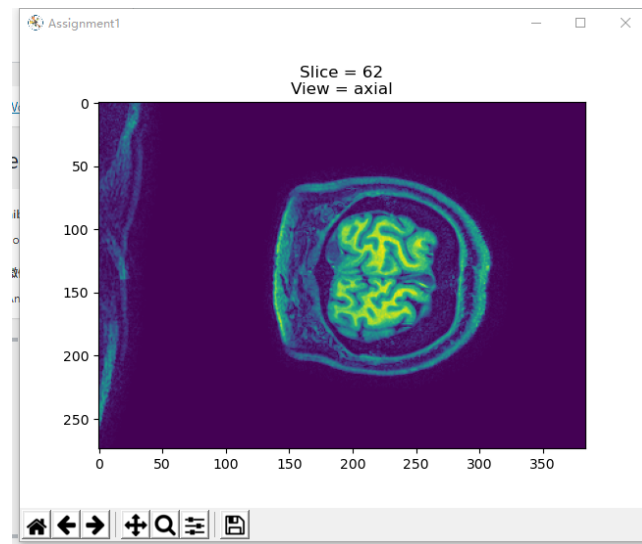


Figure 1.2 Slice = 62

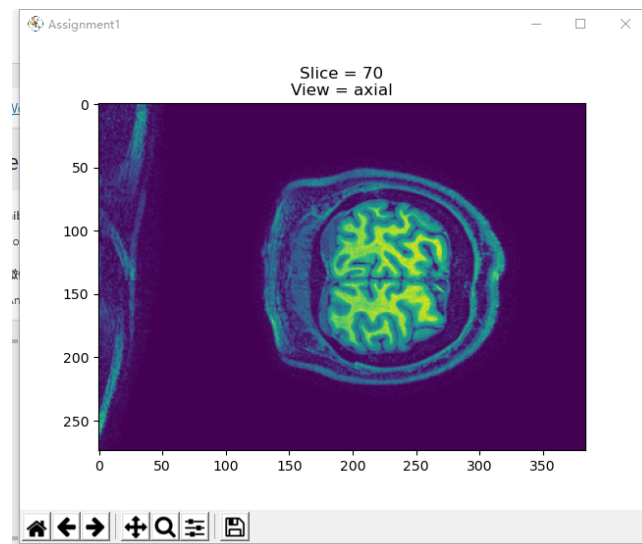


Figure 1.3 Slice = 62

**Bonus +2.5%:** add an option to display all views simultaneously in the same plot using sub-plots. When the user places the mouse over one of the subplots and rotates the mouse wheel, only the selected subplot slice will change.

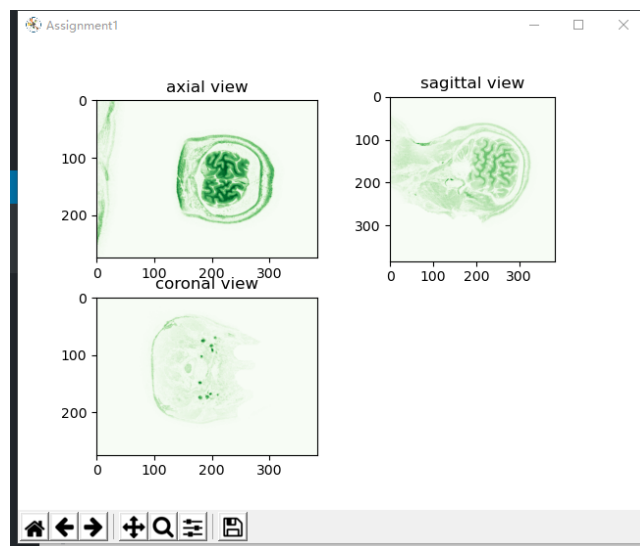


Figure 1.4

**Change color:** change the view color by editing the parameter of function `plt.imshow()`

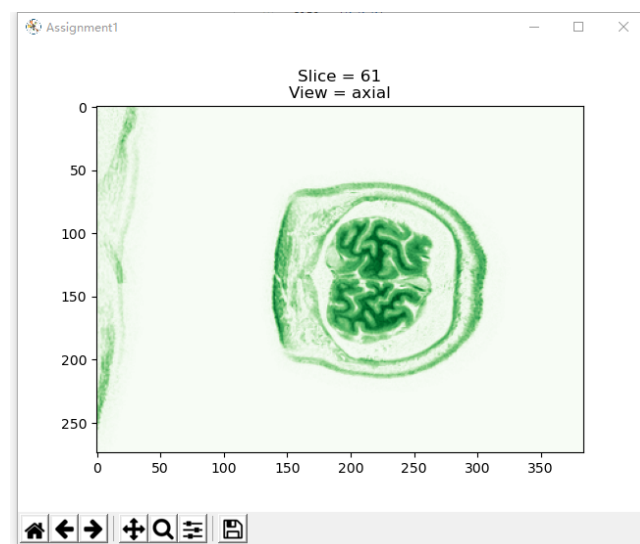


Figure 1.5

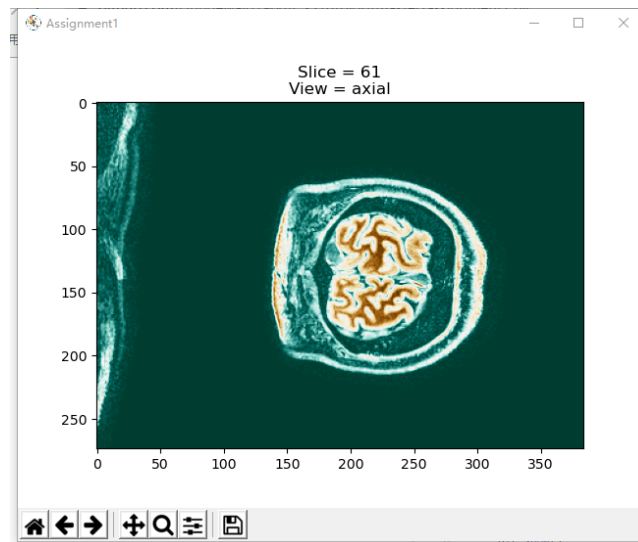


Figure 1.6

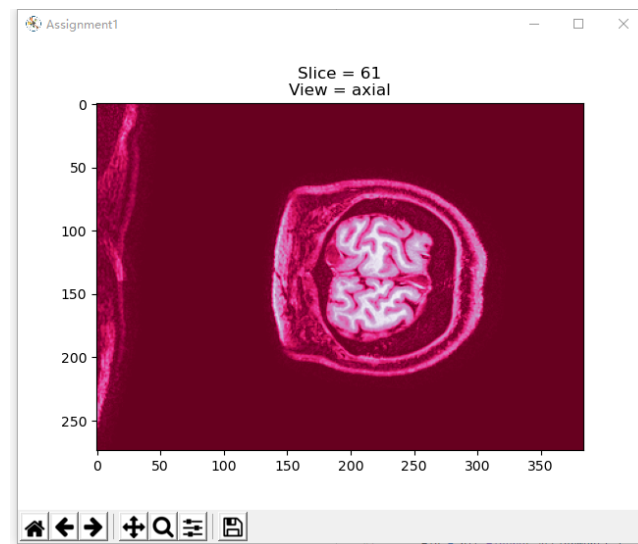


Figure 1.7

## Part 2: Modalities and frequency-domain filtering

**Part 2a (10%):** do a simple 2d FFT on one of the z-slices (axial slice) and display the result. You will need to use `fftshift` and the `logarithm` to correctly visualize the fft. It should look similar to below:

This function is implemented with `fft()`, `fftshift()` and `log()`.

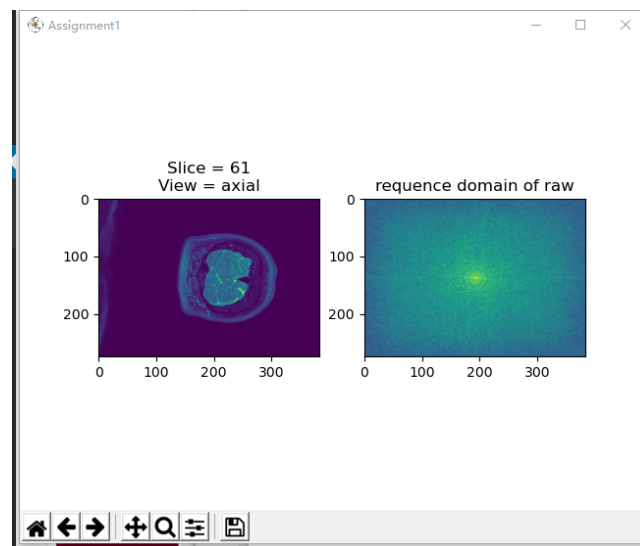


Figure 2.1

**Part 2b (20%): Generate frequency-domain gaussian filter using meshgrid and use to do frequency space filtering**

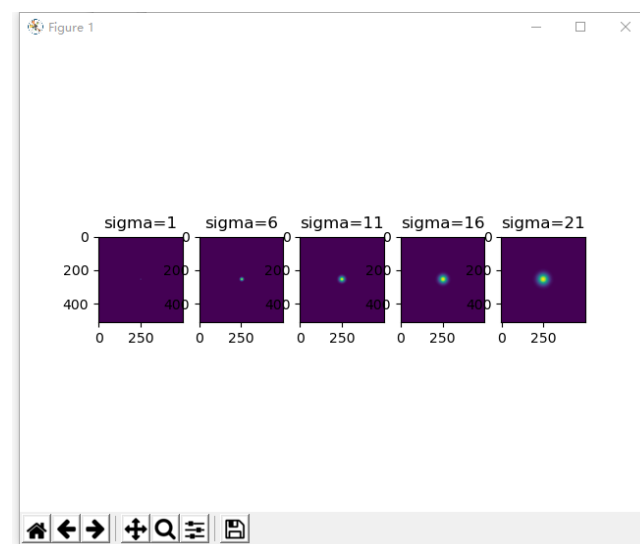


Figure 2.2

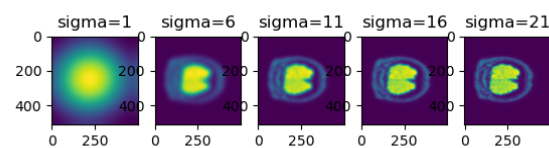


Figure 2.3

**Part 2c (20%): Load and display each modality in your viewer. Perform smoothing (As above) and also edge detection using frequency domain filtering on each modality. you may need to use fftn, or if you prefer just do a 2d version and show a single slice.**

The subplot 3 is implemented with prewitt operator, which is one of the edge detection filters.

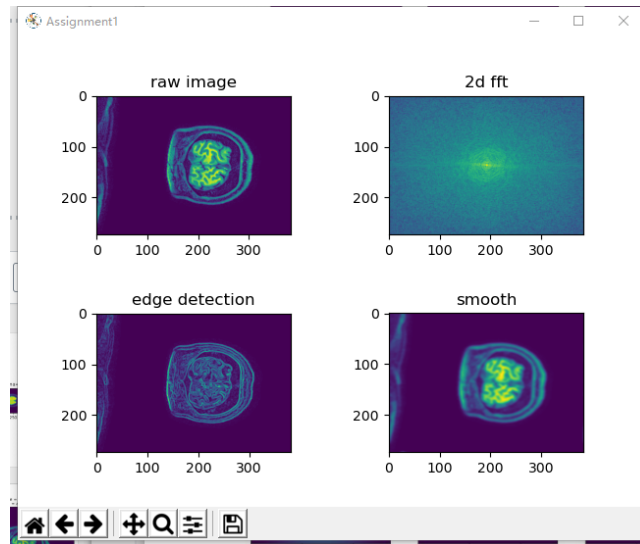


Figure 2.4 t1.nii

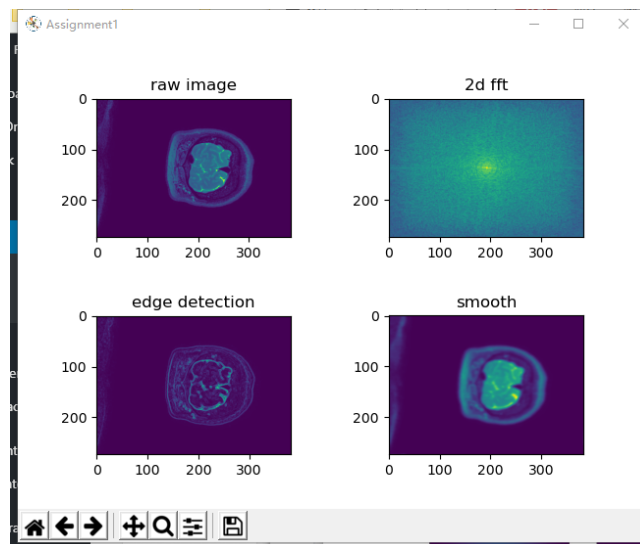


Figure 2.5 t2.nii

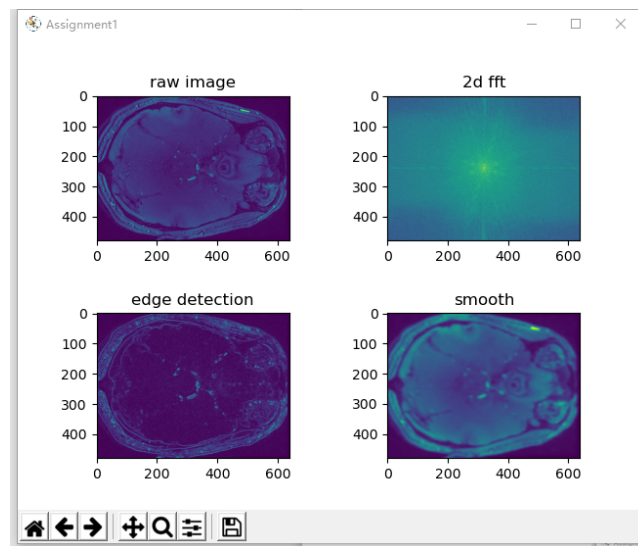


Figure 2.6 tof.nii

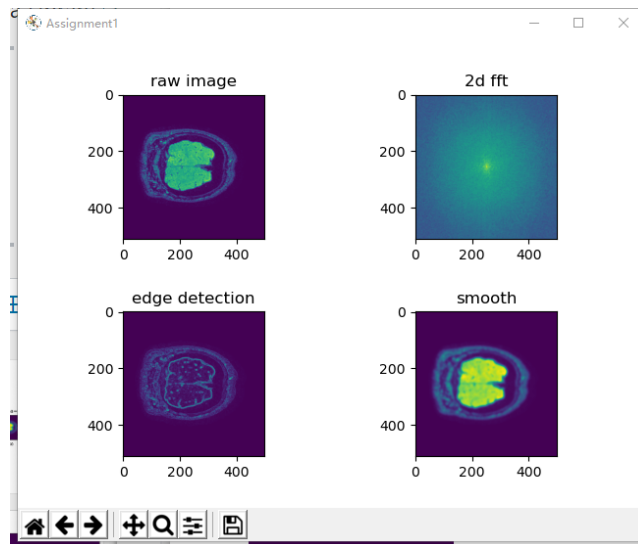


Figure 2.7 swi.nii

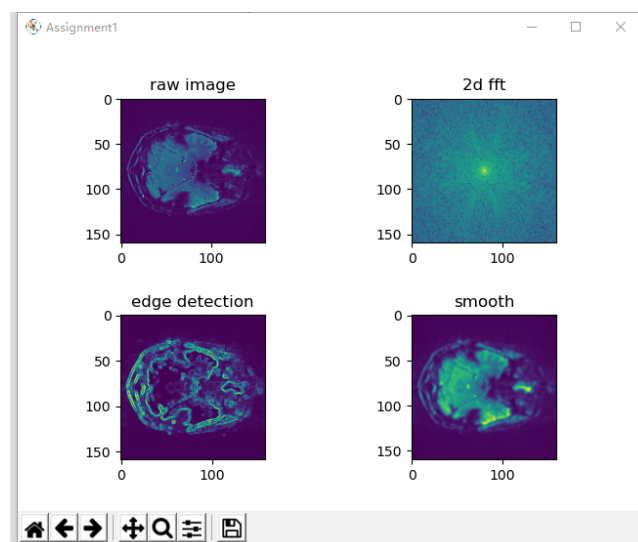


Figure2.8 bold.nii