Name:_____ EGR-150 Date: _____

In this practice exercise, we would like to locate an obvious hemorrhage in a computerized tomography (CT) scan. We wish to assign a false color to the region. In Figure 1, two pictures, one of a normal CT scan of the brain alongside one with an Intracerebral Hemorrhage, are presented. You are given two files, CT_scan01 and CT_scan02. We will assign a false color to the image on the right based on its location (no auto-detection).

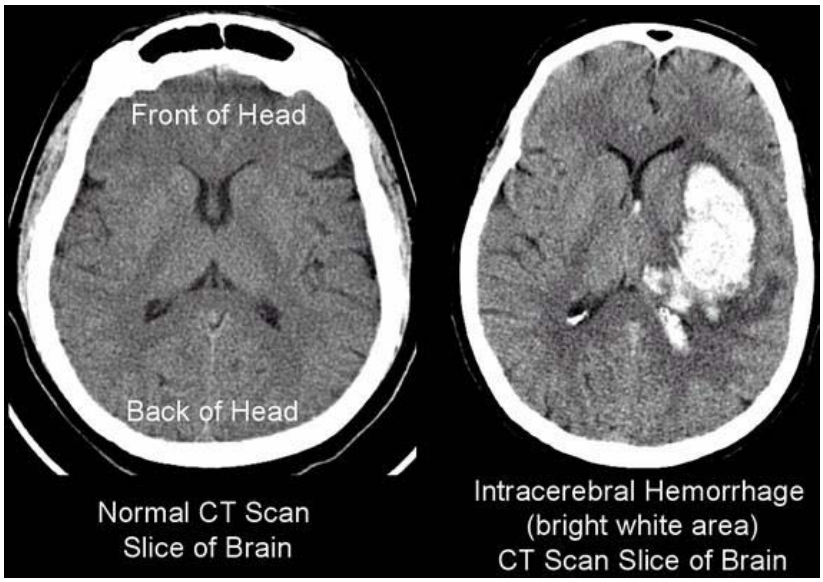

Figure 1: CT scans of a normal brain and a brain with a hemorrhage

In MATLAB, we wish to investigate

1. the subplot command,
2. three-dimensional arrays, and the
3. image read (imread) and image show (imshow) commands.

The subplot command partitions a figure window into a number of rows, m, and columns, n. For example, subplot(1,2,1) creates a 1 row by 2 columns figure window ready for plots, images, etc.

Try this:

```
>> x=linspace(0,pi,50); y=sin(x); z=cos(x);

>> subplot(1,2,1); plot(x,y);

>> subplot(1,2,2); plot(x,z);
```

Source for CT scan: http://uwmedicine.washington.edu/Patient-Care/eHealth-Articles/PublishingImages/CT-Intracerebral-Hemorrhage.jpg

An array of m rows by n columns may also have depth d. In some images, you will see an image composed of an array that has depth (red-green-blue filters, or RGB). See Figure 2 for a typical mxn image. See Figure 3 for a typical mxnxd image.

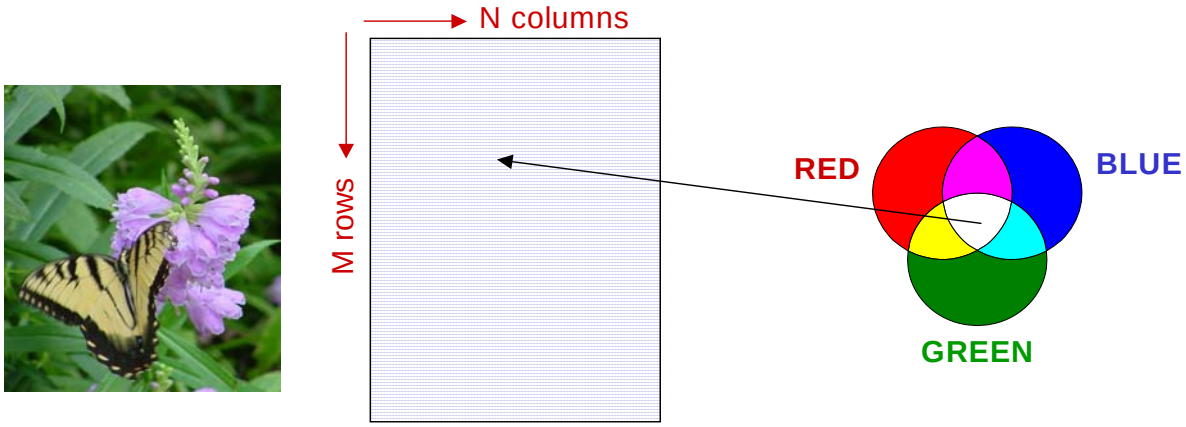

Figure 2: Image with RGB scaling in each pixel

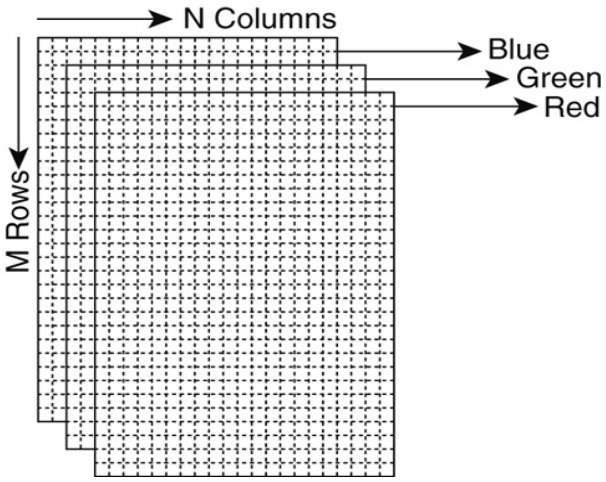

Figure 3: Image with individual RGB filters

Try this:

```
>> a=imread('ct_scan01.jpg'); figure; imshow(a);

>>figure; imtool(a)  %imtool has the Tools->Pixel Region

>> [rows columns pages] = size(a);

>> a(:,:,1)=0; a(:,:,2)=0; figure; imshow(a)
```

Essentially, you are taking the red and green filters (1 & 2), setting them to black, leaving the blue filter.

Let us proceed to the assignment. Open the image CT_scan02.jpg and assign it to a variable.

Since we do not seek to auto-detect at the moment, get location markers using the Data Cursor button to get a feel for where the hemorrhage is so that you may address it (see Figure 4).

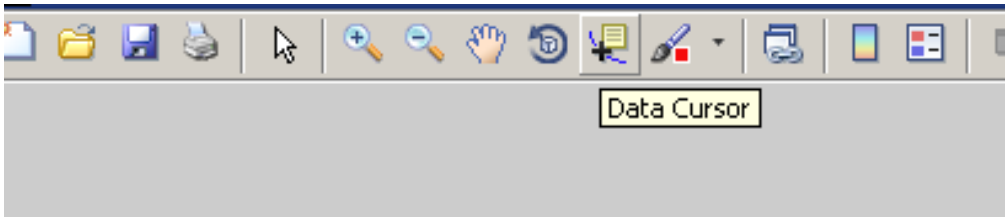

Figure 4: Image of the Data Cursor button

Save this script as my_ct_threshold.m.

Result:

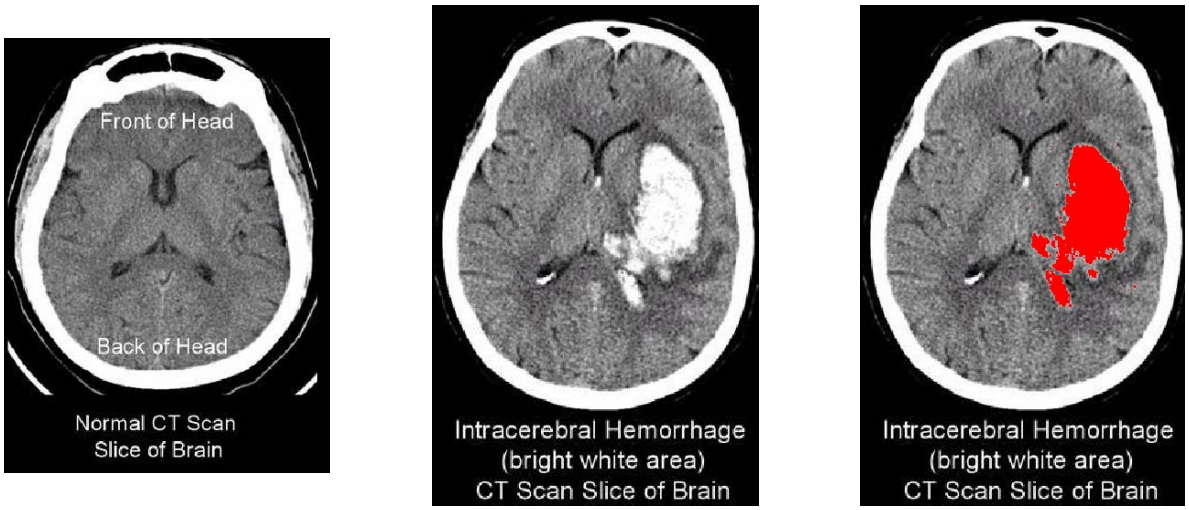

Figure 5: Subplot containing the picture of a healthy brain, one with a hemorrhage, and one with a false color map over the hemorrhage.