

## LAB 12

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### Overview

Cell arrays, script programming, and learning MATLAB on your own.

### New Variable type in MATLAB - cells

A new type of variable in MATLAB is the cell array. A cell array is a data type with indexed data containers called cells, where each entry can contain any type of data, such as a matrix, character, another cell. For example,

```
>>T = cell(2,3); %defines a cell array of dimension 2x3
>>T{1,1}=rand(5,2); %writes a random 5x2 matrix into the first entry of T
>>T{1,2}=sin(1); %writes sin(1) into the (1,2) entry of T
>>T{2,3}='Wowowow'; %writes a string into the (2,3) entry of T
```

Accessing entries of a cell is similar to a matrix, but use {} brackets instead of ().

```
>>T{2,3}
```

### Programming Scripts

"When you have a sequence of commands to perform repeatedly or that you want to save for future reference, store them in a program file. The simplest type of MATLAB program is a script, which contains a set of commands exactly as you would type them at the command line. To run the commands, type the script name at the prompt. For additional programming flexibility, create functions, which accept inputs and return outputs."

### Assignment

Perform the sequence of tasks written below by using the help tool built into MATLAB (it's quite useful) and the other resources online (mathworks.com is where most of the MATLAB documentation is located and google searches for MATLAB will generally take you there). Once you have determined all of the necessary commands and tools to perform these tasks, write a script file with all of the commands to perform them automatically. Turn in the script file, successful execution of the script, and the image from step 5 (black and white is okay). Turn in the assignment stapled by Thursday, April 23rd to my box on the 4th floor of Leconte.

#### Tasks

1. Create an empty  $4 \times 1$  cell array and call it  $S$ .
2. Generate a  $50 \times 50$  matrix where the entries are random numbers between -5,000 and 5,000 using a built in MATLAB function for random matrix generation. Store this matrix into  $S\{1,1\}$ .
3. Determine the index and value of the largest entry of each column of  $S\{1,1\}$  using the sort function. Store these indices and values as vectors of length 50 into  $S\{2,1\}$  and  $S\{3,1\}$ .
4. Determine the dot product of  $S\{2,1\}$  and  $S\{3,1\}$  and store this value into  $S\{4,1\}$ .
5. Use the "imagesc" function to visualize  $S\{1,1\}$ . (MATLAB has many image processing tools).