CMPS 60M Project Review and Thoughts

For the final project I implemented Conway's Game of Life on a 3D surface. The idea of this project came about from having a fascination with Conway's Game of Life. I find the patterns that come about randomly particularly interesting. I thought that it would be interesting to simulate Conway's Game of Life in a world other than a flat, infinite surface. From this interest came the following project, a simulation of Conway's Game of Life in a 3D interactive world.

Methods

To make the implementation of my idea easier to manage, it was divided into two major divisions: a Conway's Game of Life class and a user interface to control and display the simulation. This made the construction a lot better and allowed me to work on two very distinct parts. Each part was built with the idea that it could be integrated with the other. This open design will allow me to add in other features and enhance the project.

The conwaylife class was created to encapsulate all the data and functions needed to simulate Conway's Game of Life. By doing it this way, I was able to test the class to make sure it functioned correctly before integrating it with the GUI. I am also able to reuse the conwaylife class in other projects, if I have a need to. Creating the conwaylife class introduced me to object oriented programming within MATLAB.

The second step to the project was the creation of the graphical user interface. This was my first attempt at creating a user interface and it was carried out with the built in tool Guide. Guide was very easy to work with in prototyping the layout of the GUI. The most time spent was on the callback functions of the GUI. It took a bit of research to understand how MATLAB works with GUIs. The most important thing to know about MATLAB and GUI's is that MATLAB interprets the GUI's accompanying m-file only when a button is pressed. This means that data within the m-file does not
persist between button clicks. The solution to this was to store all persistent data by declaring it as a
global variable by adding the global modifier to the variable declaration. When a variable is declared
global, it's value is stored within the main MATLAB workspace and is therefore always in the prescient
scope. The callbacks associated with the buttons took more time to implement than it took to design the
GUI in Guide.

**Functionality**

The program starts up by creating a random setup of conwaylife on a peaks surface plot and it also
brings up the control interface that was created in Guide. There are two modes of simulation a
continuous run and a step increment. The run is a toggle button and will simulate until the button is
pressed again. While the simulation is running, the user is able to use any of the camera view tools to
get a better view of certain areas of the map. The step button only computes and displays the next
generation of the simulation. At any time, the user can reset the map to its original state. There are two
controls that change the look of the map, the marker color and the marker size. The marker color lets
you switch the color of the conwaylife markers on the display. The user could select between blue, red,
and black. The marker size is a slider that lets the user set the size of the conwaylife markers. Both of
these controls can be changed while the simulation is running or stopped. The generate button allows
the user to generate a new conwaylife button.

**Further Ideas**

I designed the project so that it could be easily modified and enhanced. Some ideas to make the
project more interesting would be to allow the user to record a movie of the simulation. Another handy
feature would be to save each state of the game so that the user can step backwards in time as well as
forewords. This would allow the user to understand and interpret the simulation. The last idea I had for
an improvement would be to allow the user to use different 3D environments and allow the user to set
where life is on the map.

**Conclusion**

The project specification said that the size of the project should be about the size of two and a half homeworks. I feel I met this goal by dividing the project into two separate items. The design of the conwaylife class was more work than a single homework and. The creation of the GUI and the tying together of the two sides was worth the other half of the project time. I learned a lot from this project in both the class design phase and the GUI design phase. I referenced the MATLAB help files a lot and also searched the web for extra resources.