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Capstone Experience

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**Basic Information**

The task I decided to take on was software development projects following my interests. I have created an artificial neural network to look into patterns of stock market. The input will be data on the stock: the open, low, high, close, and volume values on a particular day. It will also be a 1,7, and 30-day movement of the stock and the key market value from the NASDAQ. Output will be closing value of next day. The data I will be using is from <http://www.nasdaq.com/symbol/aapl/historical> where aapl is the stock I used for predictions. This contains full data sets of organized stock data. It also includes daily updates for new data that I will be using.

**Environment**

The physical environment used was my home and library. Just a quiet place for me to put my head down and get to work. There were no real social aspects to the environment because of the solo nature of the assignment. As for a development environment, working at home is a good environment. You can set your own hours and feel comfortable where you work. One downside of working solo is that it is harder to bounce ideas or find different solutions if you have mind set on one already. Also, distractions can easily pop up.

**Software and Hardware**

The software I used was Python 3.5. I used python because in my research for a good language I found that much work that is done in AI is done in python. I also found Pyrain which is uses python code. The core library I used to help build and train my neural network was Pybrain. Pybrain is a machine learning library that provided much of the algorithms for the task. One problem that occurred was that the code and API’s were for python 2.7 when I was using 3.5. I needed to use workarounds, find how to translate the code to 3.5, or go with another way to solve the problem. I found the environment to be easy to use. The example used was helpful but it was on the most basic level. I still needed to put thought into how I needed to solve my more advance problem. Here is a link to the API <http://pybrain.org/docs/> . I also used Microsoft Excel for creating some of my dataset and graphics used. The hardware I used was my personal computer which uses Mac OS X.

**Communication Skills**

My communication skills were limited in this project due to the nature of the assignment. Because it was a personal project, all of the work and research was done by me.

**Useful CS Courses**

CS 480- This is the course where I got my interest in neural networks and machine learning which is the basis of my project. I learned the language I used in my project, Python, in this class as well.

CS 260 and CS 370- These classes taught me about the importance of clean code and good coding practices which I tried to put into practice in this project.

CS 291- As for this course, I believe it has taught me the most about critical thinking in a computer science way. Because the focus in this class is at the core of programming, it forced me to think about problems in the most basic way possible which I found useful in this project.

**Useful Non-CS Courses**

Other than my computer science course, I did not find any other courses to be of use in my Capstone Experience.

**Three Things I Learned**

1. Extensive work with an API. In many of the classes at Truman, much of the time we work basic code and just receive the package or import we must use. In this project, I learned a lot about looking into API along with choosing and modifying methods that I needed to work with. Because of the problem I stated earlier about the version of python that pybrain used, I need to to look deeper into some of the methods that were not formatted for python 3.5.
2. My knowledge of neural networks. Before the project, I got a brief introduction into neural networks in CS 480. Much of the early part of the time allotted, I spent it learning more about neural networks, what it has accomplish, and the future of AI in general. From choosing the correct type of neural networks and finding what works for a particular problem.
3. Planning of Projects. This kind of goes along side what I have learned in CS 370, Software Engineering. While working on this project, I was learning about the different styles of project development. I could than translate this to my own project which I believe helped me learn the importance of the planning step of projects and not just going into coding of the project. I discuss in the next section what happens with minimal planning.

**Problem Encountered and Solution**

One problem that I encountered was at the earlier parts of project. I started coding without as much planning as I think should have been done. I coded at the same time as doing research about the topic. I soon found that I was using a different type of neural network than I should have been using. This meant I need to rethink my project so I decided to start over and plan more heavily. I think this helped my overall process and helped ensure good coding practices rather than just code.

**Things I Wish I Had Known**

I came into the project with the mindset that I would find a perfect neural network for predicting the stock market which was foolish on my part. I don’t think I realized the scope of the project. If this project did have a possible right answer right now, then it probably would have been done before. I probably should have focused on a broader spectrum of study. Instead of trying to find the perfect neural network, I would see which ones worked well and did not work as well. I would make it more of a research project then a development project.

**Overall Experience**

As I stated earlier, I don’t think it turned out the way I had anticipated. It did help me develop my problem solving skills and programming ability. I liked how it was separate from my classes because it pushed me to work more outside of my course work. I enjoyed working on something I am interested and I think that helped me to motivate myself to work hard on it. It is not expansive as I would have liked it to be but happy with what I have.