E E / CPR E / S E 491 - Weekly Report 01

09/10/19 – 09/27/19

Group number: sdmay20-41
Project title: Machine Learning for Understanding Aging
Client &/Advisor: Dr. Julie Dickerson
Team Members/Role:

- Ian Simon / Chief Engineer
- Jacob Laing / Chief Engineer
- Nathan Carter / Test Engineer
- Samantha Williams / Meeting Scribe
- Scott Rose / Meeting Facilitator
- Thomas (Aria) Sheets / Report Manager

Weekly Summary:

Our group did research on machine learning the past couple weeks by reading the free online book, *Neural Networks and Deep Learning*. We researched what campus hardware we can use to allow us to run machine learning code. We have yet to come to a conclusion of whether we should use TensorFlow or PyTorch, but we have made progress in understanding both the technologies a bit. A team process was created to guide our team on producing code for the project.

Past Week Accomplishments:

- Ian Simon: Worked on installing pytorch, learning about TensorFlow and Pytorch. Learned about back propagation as it relates to this project.
- Jacob Laing: Worked on researching machine learning and reading through the information provided by our contact. Also gathered information about possible hardware the team would be able to use at the request of our contact.
- Nathan Carter: Worked on researching machine learning topics and tools. Researched about topics such as gradient descent and backpropagation. Gathered information on TensorFlow and Pytorch to help the team come to a decision on what tools would be good for the project.
- Samantha Williams: Worked on researching Pytorch and TensorFlow as tools for developing our Machine Learning platform. Found that Pytorch is more beneficial for small projects where TensorFlow is better for large-scale projects. Read the chapters regarding neural networks and backpropagation.
- Scott Rose: Worked on learning about how Neural Networks work by reading chapters in the book given to us by Dr. Dickerson. Since we are working with medical data, I spent time researching what we need to comply with when working on medical data. For a project of our scale, the rules we have to follow are simple. We have to make sure that our data is anonymized and, if we transmit it, we have to make sure that it is encrypted.

- Thomas (Aria) Sheets: Worked on researching machine learning. This included reading chapters 1 & 2 of *Neural Networks and Deep Learning*, and watching a YouTube series about deep learning (https://www.youtube.com/watch?v=aircAruvnKk). Spent time researching the differences between PyTorch and TensorFlow to see which technology would work best for our team. Spent time designing a team process that would work well with our team.

Pending Issues:

- Ian Simon: Continue to read material on Deep Learning, and build understanding with using PyTorch. Need to look into installing TensorFlow as well.
- Jacob Laing: Continue reading through the information provided and start looking into which tool we want to use.
- Nathan Carter: Only current issue is a minor one. We need to decide what tool we will use to develop our machine learning program with.
- Samantha Williams: No unexpected complications yet. Both frameworks are free and have their strengths. It sounds as though PyTorch is easier to familiarize with, but TensorFlow is better for industry and large-scale projects. If we wanted to continue developing this project after our end date, TensorFlow would be a better option.
- Scott Rose: The only pending issue is our decision to use Torch or TensorFlow. We plan on concluding this issue by the end of the week.
- Thomas (Aria) Sheets: I'm leaning more towards TensorFlow (on deciding whether to user TensorFlow or PyTorch for this project), but we still have yet to come to a final conclusion on which technology to use.

Individual Contributions:

Name	**Individual Contributions**	**Hours this week**	**Hours Cumulative**
Ian Simon	Installed PyTorch. Build understanding of machine learning	Week 1: 2 Week 2: 3	5
Jacob Laing	Researched more on machine learning and different hardware that would be available to us to use on the project.	Week 1: 3 Week 2: 3	6
Nathan Carter	Researched topics on machine learning and neural networks. Most research was done by reading the book *Neural networks and deep learning.*	Week 1: 3 Week 2: 3	6
Samantha Williams	Researched different machine learning platforms/frameworks and machine learning topics, specifically neural networks and backpropagation.	Week 1:3 Week 2:3	6

Scott Rose	Researched medical data laws, and what standards we would have to comply with to use medical data. Contributed to our team's lightning talk. Researched Neural Networks.	Week 1:2 Week 2:3	5
Thomas (Aria) Sheets	Research on machine learning by reading the book suggested by our client and watching YouTube series. Contributed to the designing of our team process.	Week 1: 3 Week 2: 4 Total: 7	7

Comments and Extended Discussion (Optional):

- Our client/advisor wasn't feeling too well for the scheduled meeting this week, so we're going to read more of the book and do more research. We will attempt to communicate to her via email for more instruction, but she is traveling from Wednesday (09/25/19) to Friday (09/27/19).

Plans for the Upcoming Week:

- Ian Simon: Works on installing TensorFlow. Attempt some Machine Learning basics in both TensorFlow and PyTorch.
- Jacob Laing: Continue reading and look into/ contact the relative people on the hardware we need to acquire.
- Nathan Carter: Research more about machine learning, including reading more chapters from the book *Neural networks and deep learning* and watching youtube videos. Find more information on Tensorflow and PyTorch.
- Samantha Williams: Read into machine learning more to better understand the mathematics behind it. As a team, we are going to learn more about the data we will be using for our project at our next meeting.
- Scott Rose: More research on Neural Networks, and experimenting with the resources that Dr. Dickerson gave to us.
- Thomas (Aria) Sheets: More research on deciding whether to use TensorFlow or PyTorch. More research on machine learning as a whole by reading more of the suggested book and hopefully find other resources to learn more about the topic.