

Mr. Speice

Independent Study Mentorship

22 May 2020

From the Past, To the Future

Assessment 15 - ISM Reflection Assessment

Date: 22 May 2020

Personal Growth:

“In each loss, there is a gain, As in every gain there is a loss, And with each ending, comes a new beginning.” After 35 weeks of hard work, sweat, tears, and satisfaction, the ISM I journey have come to an end. However, it is not the fact that an end has come that is significant, but rather it is the skills we have gained, the relationships we have formed, and the ambition we have exhibited that are significant. ISM has been a core point in growth both personally and professionally. As ISM Students we have grown by confronting our weaknesses and learning from our mistakes. These transcend the time in ISM and serve to be applicable in the real world. We have not only learned about the technicalities of our own careers but have learned the basis of professionalism, public speaking, and so much more that will give us the upper edge as we walk forward in our lives. Looking back my mission statement of developing a nontrivial product for the computer science field that furthers the industry as a whole while improving my interpersonal skills, maturing my business personality, and ultimately transforming myself into a full-fledged professional, I firmly believe that the ISM program has assisted greatly in reaching the level of professionalism and technical ability that I had so desired. ISM has been an all-encompassing experience in the 9 months that I experienced it.

Original Work:

The original work served to be a basis or prototype for the final iteration of the final product. The original work had two primary features: face recognition and output to a text file. As simple as this sounds, the original work had much to offer in the learning process. From the face recognition process, one could learn about face detection, face encoding, face recognition, and optimization processes.

The face detection step utilizes haar cascading to detect features of the face, also known as weak classifiers, and combines them into a strong classifier, the face. The face encoding process is based on the idea that everything in the world can be turned into data. In the case of images, we can turn this into a data structure in programming known as a multidimensional array. In doing this, the computer is able to interpret the images numerically rather than look at the images themselves. This allows us to perform mathematical calculations on the image as needed. The face recognition step uses these pieces of data and then compares them to the webcam and finds the lowest variance among all the data. The final part of this process was optimization. Computer vision, in general, requires a lot of computing power and high-quality images. This causes computer vision applications to take a lot of time to execute on less powerful machines. Because of this, I optimized my algorithm to save the encodings into NumPy files that would reduce the startup time by 98.3%.

Additionally since most artificial intelligence projects are done using a programming language known as Python, it was necessary to be able to learn this language. I, now, use this programming language in a majority of my newer projects, hence, proving that the skills gained through the original work process go beyond just being used in the class.

Mentorship:

Mentorship, to say the least, was a unique experience from prior years. To start with normality, mentorships would generally take place in person and we would discuss different parts of the project along with progress. The most enjoyable part about my mentorship specifically was that it was more student-driven, meaning the mentor would not work on the project but rather he would oversee me as I did things my own way. He would also suggest ideas in ways to implement different aspects of the project.

Despite having only one workplace visit in the books, they were quite contrasting to what I had originally anticipated. Because my robotics team has worked in a startup environment, the environment of a larger corporation such as that of Raytheon was rather striking to me. However, this served as an excellent learning experience in terms of careers. As I get closer to going into the workforce, I will have a better understanding of the type of environment I would like to work in. Additionally, during workplace visits, I would have the opportunity to meet several different Raytheon engineers and build my connections. This was truly a moment that will have a profound impact on the course of my career going forward.

After the inception of the COVID-19 Crisis, mentorship changed dramatically. Mentorship had to be done completely virtually, something dramatically different from the norm. However, software developers are often expected to work remotely in their jobs and so the remote mentorship served as excellent experience to supplement the in-person work I had already done.

Final Product:

The final product was an extension and improvement of the original work. There were five extra features that were integrated: the graphical user interface, liveness detection, dynamic addition of faces, offline and online mode, and late mode.

The graphical user interface is based on the Flask framework that allows developers to use web development tools to create beautiful graphical user interfaces. Liveness detection was achieved by using a pre-trained model that was trained on images of photos and real-life faces. The dynamic addition of faces was accomplished through intense array manipulation. Online and offline mode was achieved through implementing outputs for both excel and sheets and then checking connections to the internet to see which to respectively output to. The late mode feature was achieved by implementing time stamps through Python's timeit library.

Through this whole process there were several valuable skills that I picked up. For example, the Flask framework is one of the most widely used frameworks in Python. It is sure to be invaluable going forward in my career. Additionally, through implementing liveness detection, I had to learn the Keras framework which is based on TensorFlow, the most prevalent machine learning frameworks out there, and is almost guaranteed to show up in the future of my career. Through the development of this product, I have gained the technical skills needed to start a career within the industry despite my age.

Concluding Remarks:

The ISM Journey has been an all-encompassing one. Regardless of how intelligent or brilliant a high school engineer is, I have gained the experiences and knowledge he or she cannot from simply engineering. ISM has allowed students to know their careers inside out while also gaining significant technical ability and that will prove to be especially beneficial when

competing with the brilliant. After all simply being brilliant won't bring success because success is not a straight line but rather a convoluted path that has many twists and turns. In ISM, we prepare for the success ahead of us by starting on the convoluted path so we can achieve success earlier.

[Final Product](#)

[Final Product Folder & Documentation](#)

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