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# Final Reflection on the 2020 Stanford AI4ALL Summer Program

This summer, I had the opportunity to attend Stanford AI4ALL, thanks to the Garwin Family Foundation. AI4ALL is an umbrella organization that organized 14 different summer programs, across the US and Canada, dedicated to educating diverse populations about artificial intelligence (AI) and its societal impact. This year, Stanford AI4ALL was organized by the Stanford Artificial Intelligence Laboratory. We learned about many different machine learning (ML) algorithms, heard about the limitless applications of AI from Stanford faculty, and built many friendships (which will hopefully last!).

**Classes/Research Project:**

The central part of Stanford AI4ALL is the group research project. I was in the Computational Biology group with 7 other girls from around the U.S. Our mentors were two Stanford PhD students who study machine learning. Every weekday, we attended class as a research group from 10:30 AM to 1:30 PM with a 30-minute break. Usually, we would have a lecture for the first half of class, and then use breakout rooms to work on coding in the second half. We would also get nightly homework assignments that were very exploration based and not at all boring. Some of my favorites were using Teachable Machine to easily train a network to recognize trees with no coding, making a hangman game in python, and writing our own proposals for a dataset we found online.

We covered a ton of material in three short weeks. Week 1 included lectures on conceptual AI, biology, and data and bias. In Week 2, we covered basic probability and statistics, as well as regression, K-nearest-neighbors, and K-means. In Week 3, we talked about decision trees and random forest. We also voted on two lectures in week 3, so we ended up also learning about deep neural networks and got an overview of natural language processing. Throughout the three weeks, we also did python coding everyday which allowed everyone to become familiar with the language and implement the algorithms we learned about.

As the Computational Biology team, our project was about predicting cancer given a patient's gene expression profile. Specifically, we used a variety of algorithms to distinguish between the ALL and AML types of leukemia. We basically used all the algorithms I mentioned above, except for deep neural networks. Since the dataset we used was so small (most medical datasets are), deep neural networks would have significantly overfit to the data. We compared the accuracy metrics of each algorithm to decide which one was best suited to our problem. We also used other gene expression/cancer datasets (prostate cancer and renal cell carcinoma) to verify that our results were repeatable.

The culmination of our project was a presentation to the rest of the camp on the last day. We worked hard on our slides outside of class, and we nervously/excitedly/confidently presented them to our fellow campers! There were three other groups presenting as well, so it was cool to see what everyone else was up to as well.

To conclude this section, I would like to express my gratitude to our research mentors because we could not have done it without them. Not only did they teach us complex concepts in an understandable way, they also shared their personal experiences with us and answered all of our questions (there were a lot!). Besides, they were just super fun to talk to and play games with, and I think I speak for our whole group when I say that despite the unfortunate circumstances, we all connected surprisingly well.

**Faculty Talks and Inspirational Panels:**

An important part of the program was the camp-wide faculty talks. From 4:30 to 6:30 PM, we had two one-hour sessions that mostly consisted of faculty talks, but sometimes also other activities. The faculty talks really exposed me to a huge range of applications of AI including computer vision, AI for healthcare, robotics, reinforcement learning, AI in aircraft, and using AI to combat poverty. We also had one lecture about ethics which was super eye-opening (and sparked a ton of discussion!). My favorite talk was the one about AI in aircraft since it combined elements of robotics and reinforcement learning, and it had a huge impact in the world. The professor who gave the talk designed the safety system that has been used on ALL commercial planes since 2018! Also, we had the chance to talk with Dr. Fei-Fei Li, one of the world's leading AI researchers and co-founder of AI4ALL, about her research as well as her path to AI. It was very inspiring to talk to such a prominent figure in technology that we campers could all somewhat relate to.

We also had a couple panels of speakers during these sessions. They were the Women in AI panel, AI4ALL alumni panel, and the AI industry panel. The Women in AI panel shared their path to AI, a brief overview of their research, and valuable advice. The AI4ALL alumni panel expressed to us the importance of bringing AI/CS to our own communities after the conclusion of the camp and gave us some ideas of how to do that. Lastly, the industry panel told us about their work in AI and why diversity is super important in a corporate setting.

From these talks and panels, I learned so much more about AI, both in terms of technical information as well as the ethical and social issues surrounding AI.

**Social Interaction:**

AI4ALL is super into "community-building" which is pretty hard to do virtually. However, I feel that I really did make friends and connect with people over the course of this camp. First of all, the relationships we built within our research group were amazing! During our break, we usually played games that started as random online games and eventually turned into charades with ridiculously hard words (who can guess "mousetrap"?) and impromptu renditions of random musicals. The people in my group also held random zoom calls outside of class time where we talked and watched three campers play an insanely complicated video game or

watched one girl make bubble tea. On our last day of class, we had a "pizza party" with our mentors complete with hand-drawn pizzas that ranged from actually looking delicious to my triangular sheet of notebook paper. To thank our mentors, our group ended up making a video that looked kind of professional!

We also had scheduled social times sometimes during the 4:30-6:30 PM window. Our whole camp group was pretty diverse, with people from all over the U.S. and also places like Hong Kong, England, India, Singapore, Romania, New Zealand, and Qatar. Thus, it was super fun to get to know everybody and play games like mafia or do a scavenger hunt. Sadly, because of the way things were organized, I did not get to talk to everyone, but those that I did talk to were all very cool. At the end of the camp, some people organized an Instagram group that everyone was eager to join. Thanks to them, I no longer have a social media free existence.

**Final Thoughts:**

Stanford AI4ALL was so much more than I expected. I learned so much about AI/ML, its applications, and its effect on society. Previously, AI/ML seemed like a scary entity to me, but as one of my fellow campers said on the first day of class: "It's less scary if you know how it works". Now that I have a basic understanding of AI and the technology behind it, it seems more like an opportunity to change the world. I realize now that AI has the potential to improve or exacerbate existing problems, depending on what people program it to do. As AI4ALL says, "AI will change the world, but who will change AI?" I am now much more aware of the ways AI will, or is already, affecting our lives, and I have been motivated to further explore AI and maybe change AI myself in the future.

The conclusion of the program was extremely sad, but my fellow campers and research mentors have promised to stay in touch. At the last class, our mentors told us, "This isn't the end; this is only the beginning". I hope that our paths will cross in the future (in-person hopefully!), and I am excited to continue to work on AI and see what we all will do next.

Finally, I want to say thank you so much to the Garwin Family Foundation for this amazing experience!!!