When I first came to Carnegie Mellon, I knew next to nothing about machine learning. I had never really programmed before, I didn’t know what computer science was, and I did not enjoy my time in AP Statistics. But, I was fascinated by the idea of machines learning to adapt and learn by themselves, and I wanted to know how it could be done. I realized that to understand machine learning algorithms I needed to know how to program, so I signed up for 15-112 and started reading about neural networks. After quite a bit of reading and a lot of confusion, I started to understand more about neural networks and how to implement them, and I soon built a neural network to evaluate moves for a chess AI. I was inspired by my progress and committed to learn more about the math and statistics underlying machine learning algorithms. I switched my major to statistics and machine learning, and since then I’ve had unique opportunities to learn and grow from machine learning projects and interesting classes at CMU.

10-701 was seminal for the evolution of my machine learning skills, because the class final project forced me to be an independent problem solver. After two of my teammates dropped the class, it was left up to me and my one partner to complete the entire project, with little guidance from our advisor. I was pushed to explore every aspect of the data analysis and modeling process myself, which made me comfortable with creating plans, putting them into action, and deriving insights given only very open ended questions. The skills I honed working on this project have translated into my work as a quantitative trader as well as my research in computational biology.

My work as a quantitative trader this past summer was focused on predicting optimal order cancellation strategies for ETF orders sent into the market. I drew on my experience in 10-701 to conceive of reasonable hypotheses for good order cancellations and concrete methods to test them. I was able to discover useful indicators of certain price shifts and engineer a profitable model for order cancellations, which was validated on future data. I enjoyed learning about machine learning applied to finance, and it was very enlightening to engage in machine learning projects in a work environment where I had to meet deadlines, consistently report my findings, and provide detailed explanations for my methods. I learned to make my code concise, organized, and fast and to test my code as I write it, instead of after. I also got the hang of articulating my work to a less technical audience, since I presented my findings to a varied audience of quantitative researchers, sales traders, and HR employees. I enjoy exploring the applications of machine learning to various fields (like finance), and I am currently learning a lot about the applications of machine learning to biology through my research.

When I started my research in computational biology in May, I had not taken a course in biology since high school. Initially, I struggled considerably to read research papers where I could barely understand the novel statistics and machine learning methods that were being designed, no less the biology underlying these methods. However, this strenuous process of reading prior work to better understand my research and how to contribute has given me a much better understanding of biology, machine learning, and research as a whole. I feel much more comfortable exploring new areas, regardless of my lack of experience in that area. I often still struggle to read new research papers, but I do not get deterred because I am eager to reread papers and ask questions to get to the root of my misunderstanding. Most importantly, I have learned how to recognize relevant prior work and adapt it to create new machine learning methods that are useful to my research inquiries. Building new models and adapting existing ones in novel ways is quite difficult. I enjoy confronting challenging problems, and I want to continue doing research and contribute to knew knowledge.

These experiences have prepared me to successfully study a rigorous graduate machine learning curriculum and have also solidified my passion for machine learning. I have come quite a long way since I was working on my chess AI in 15-112. I can think of so many ways to improve it (like having the next move follow a probability distribution instead of always making the same “best” move for each board), and I’m sure that by this time next year I will have even better improvements in mind. I have found these past few years at CMU to be the most transformative of my life, and I want to keep learning at CMU which has an incredibly diverse faculty who are eager to support their students and their explorations of different fields. The courses that I am taking now like Text Analysis (36-468) and Computational Perception (15-387) are giving me exposure to how machine learning is uniquely applied in the fields of linguistics and neuroscience. I hope to continue my research in computational biology and also keep learning about different applications of machine learning from faculty all throughout CMU’s diverse departments. I plan to make the most of my graduate education just like I have done for my undergraduate education, and I’m excited for whatever lies ahead.

Thank you for your consideration,

Michael Kronovet