

Personal Statement

My primary areas of interest are centered around machine learning and its diverse applications. Whether it be in academia or industry, I want to be at the forefront of ground-breaking research in the field and contribute to innovation that will help shape the future. Likewise, I am confident that participating in the Post-Graduation Fellowship Program is the next step in that journey.

My work ethic and commitment to the field of engineering and computing is evident from my performance during my bachelor's degree as I currently maintain a GPA of 3.9 out of 4.0. Additionally, I have strived to challenge myself by taking modules that lie beyond my expected curriculum such as those in machine learning and object-oriented programming and as a result I will be completing my degree with a semester's worth of extra credits. I have aimed to make my coursework as multifaceted as possible and have focused on cultivating a strong mathematical background through advanced classes in data science. Furthermore, I have supplemented my curriculum by completing a minor in computer science and taking a variety of computing courses such as computer networks and software engineering.

I have managed to explore my main area of interest – machine learning – through various projects. My first foray into the field was in the form of a music genre classification project in which I constructed a performance evaluation of widely implemented classification models. Moreover, I spent the summer of 2018 working as a research assistant at NYU's Visualization, Imaging and Data Analytics lab where I focused on increasing the interpretability of black-box machine learning models. Our solution used an algorithmic approach to identify the decision influencing features of tabular data and suggest changes necessary to invert the binary prediction. The project resulted in a working web application that was submitted as part of the Explainable Machine Learning competition organized by FICO in the United States. We achieved second place and a prize of \$2000 beating teams from international companies such as IBM and Accenture. The application also made use of various innovative solutions to handle multi-dimensional visualization which we are currently summarizing and drafting for publication.

My yearlong capstone builds upon these topics and uses deep learning to create data describing 3D visualizations. The solution utilizes an autoencoder inspired architecture to extract the fundamental features of large-scale datasets. By training and optimizing a multi-layered neural network it is possible to depict the intrinsic dimensionality of the data. Additionally, the interactive solution allows for the analysis of the reduced feature space to further understand the properties that were retained in the reduction.

The success I achieved in the VIDA lab and during my capstone project exemplifies my ability to work independently on a personal research project in a very limited timeframe. It has also reaffirmed my desire to continue focusing on research after graduation. I have had the opportunity to work in both industry as well as research and I have realized that my ambitions are better catered to in a career in academia. I hope to be involved with projects that will help push the boundaries of AI and machine learning which is currently one of the most rapidly growing fields in the world.

The research project I would partake in during the fellowship would let me build upon my past projects and explore a practical application of deep learning. By utilizing computer vision, I would work on identifying target drones from a spherical camera feed and

implement coverage control accordingly. Interestingly, the idea for this research is closely related to the underlying premise of my capstone project. In the data visualization application, the goal was to split the feature space into appropriate influence areas based on cluster centers. The same notion is applied in coverage control where after the drone localization it is important to correctly section the area of responsibility. Due to my experience working with machine learning I would be able to seamlessly transition to this project and thus achieve significant results in the limited time frame of the program.

After the fellowship I plan to continue in a graduate program in the field of engineering. Therefore, preparing and carrying out my own research in tandem with renowned professionals in the discipline would be the ideal preparatory experience. I also believe that to make the most out of a postgraduate degree it is essential to be confident of the exact specialization one wants to focus on. The diversity in my research therefore will help me narrow down and identify the deeper research challenge I would like to tackle in a future PhD program. In addition, completing a publishable full-scale project after only an undergraduate degree is an unrivalled opportunity that would help me significantly enrich my graduate school candidate profile.