Statement of Purpose

Application for M.S. in Business Analytics
The University of Texas at Dallas, Spring 2022

From the ideas of Mary Shelley in Frankenstein to Jarvis in Ironman the desire to create intelligence always fascinated me. In my first year of under graduation ”The Art of Computer Programming,” by Donald Knuth introduced me to the works of Alan Turing, John von Neumann, and the Hierarchies in algorithm complexity that mirror the difficulties of real-world problems. This became a cornerstone for me to pursue a research career. If I were to be frozen for 1000 years and woken up, the first thing I would want to know is if P=NP.

As a child of a teacher and a lawyer, I have had a simple and humble, yet intellectually enriching upbringing. I was always encouraged to speculate the whys and hows of everything I witnessed. I developed an interest in physics as it is at the core of most scientific fields. After taking the national entrance examinations, I was successful in securing an admission in MSc Physics and B.Tech in Electronics and Instrumentation at BITS, which has an acceptance rate of 1.47 percentage - the least in India for the undergraduate courses. The university’s holistic and well-rounded curriculum gave me a broader outlook, enabling me to explore various avenues, one of which was the photography club which I eventually went on to lead. It was here that I first learned how to utilize Python, to automate boring chores like renaming, resizing, and organizing hundreds of photos. While participating in a competition for surreal images, I came across style transfer and the wonderful world of neural networks. This was at the crossroads of my programming and photography interests, and it served as a springboard to a career in deep learning.

Subsequently, I asked my mentor Dr.Ravi Prasad Aduri regarding pursuing deep learning as an academic career. He encouraged me to do a thesis under his guidance. I did my undergraduate thesis on molecular property prediction. The challenge was to predict different quantum properties of molecules like atomization energies, internal energy, enthalpy, free energy, Dipole moment, etc from molecular structure. For this, I developed a graph convolutional network to represent the molecule structure, and a message passing pattern based on Gibbs sampling. Using this network I was able to achieve 98% accuracy. During this time, I learned how to read, absorb, and apply research papers, as well as significantly enhance my python and TensorFlow programming skills.

After gaining an appetite for working with neural nets, I wanted to implement my skills in an industry setting. So I joined Infinity labs at UST Global as a deep learning research intern. Here I worked on mitigating the bottom of the basket loss using the camera near the cashier. For this, I used object detection to detect a cart at the cashier and image classification to detect if the cart was loaded at the bottom. For this task, I gathered and labels 4200 images and trained a resnext50 using transfer learning, and deployed it onto AWS infrastructure. After this, I was given access to all the cameras in the store. I started with building a person reidentification model which could track and identify humans across multiple cameras. This was achieved first by detecting a person then segmenting different body parts like hands legs head, torso which

were then sent into a U-net-like variational autoencoder which gave signature for each individual.I used a Triplet kind-of loss function at the encoder part that would penalize the model heavily if two signatures of the same person from different cameras were far away and also if the signature of a different person is close by. Using this we could develop a heatmap of the most and least visited spots in the store, and also keep track of social distancing within the store.

During my work at UST Global, I noticed an immense gap between deep learning papers published and implemented in the industry, to bridge this gap I joined Blackbucks as an AI engineer. I started teaching deep learning to students from local colleges. Along with this, I worked on establishing AI Labs where students can work on projects that can be deployed by different companies. Currently, I am working on NLP based recommender engine that tests students on different ML concepts and gives a personalized learning path for each student. For this, I divided the course work into different difficulties and trained a quiz bot to summarise and ask questions from the context.

This path of mine, which began with a simple photography contest, has taught me a lot about research, particularly deep learning, and my ambition to pursue a Ph.D. in data science has grown with it. I am now ready to start a new chapter in this journey and masters at The University of Texas at Dallas will stere me in the right direction.

I believe the program offered will help me acquire the versatility to increase my potential. The state-of-the-art research facilities at your university appeal to me since I am sure that they will provide me with the guidance of the finest faculty, modern facilities, and a conducive and open atmosphere. It would also present an opportunity to meet intellectual students from other places and have an effective knowledge transfer with them. With the knowledge, experience and qualities acquired, I am confident of being able to measure up to the high standards of research work that the program has set. My extreme interest in programming has led me to choose research as my career option, and my selection into this program would elevate my opportunity to pursue a Ph.D. which would, in turn, help me achieve my goal of pursuing a research career.