I am interested in Deep Learning. Deep learning algorithms are replacing the traditional algorithms in almost all the tasks which were before either impossible or had below human-level accuracy. This aspect of solving the impossible through deep learning is something that mesmerizes me and increases my passion for deep learning. I am currently working at Dcube Technologies, a software house providing ML solutions. Currently, we are working with Phelix.ai to automate document processing. Document processing includes the task of Document classification, Region detection, and Named Entity Recognition. We are using LayoutLM, an architecture that includes visual, textual, and positional embeddings, to provide a solution to all of these problems. I worked on Hybrid AI for my final year project under the supervision of Dr. Imran Malik and won the second-best project award in the Open House. Our research was to fuse the knowledge and data in Neural Networks and thus reduce the data dependency of neural networks. We delved into the concept of dark knowledge and Incorporated it into a separate network. Knowledge was incorporated into the network by adding knowledge at multiple layers. This approach was tested on medical datasets, and our approach produced superior results for both teacher and student on all datasets. This seems a possible research direction for unsupervised learning. I joined the TuKL lab, directed by Professor Faisal Shafait, in the summers to work with him on research projects. As I was a beginner in deep learning research I had to take the Machine Learning and deeplearning.ai courses by Andrew NG. Thereafter I had to work with a final-year student on his research. We worked on "Image Segmentation of satellite imagery". The data is the most important ingredient for a deep learning algorithm to generalize well but in

Image Segmentation High-Resolution ground truth labels are quite tedious to generate. Similarly, labels for "satellite imagery" are even more difficult to generate. After a rigorous literature review, we adopted a semi-supervised approach to complete our assigned task in which low-resolution labels are used instead. We needed to generate low-resolution images of the sentinel 1 & 2 datasets for which ArcMap10.3 was used. Pipeline included i. Segment mean shift. ii. K Means clustering. I implemented the proposed architecture in [1] and it is available at my GitHub link: Super Resolution Network. In the proposed method the joint distribution of low-resolution labels and high-resolution labels should be pre-calculated. Thereafter the difference between the joint distribution and the distribution produced by the model (low-resolution labels distribution) is minimized using the proposed loss function such that the produced distribution matches the joint distribution. Similarly, after completion of my first project, I was offered a Face Recognition project supervised by Ph.D. student Sir Ahsan Jalal. The first step was to design a basic pipeline that recognizes faces in videos. The pipeline has been implemented using OpenCV, CosFace paper, and MTCNN paper. The code link is Face Recognition on Videos. I continued to take courses side by side to further strengthen my Machine Learning skills. I took the course on probability and statistics by Sir John Tsitsiklis (6.041) from OCW MIT. This course provided an overview of Markov Chains, Classical and Bayesian inference. After this, I turned my attention to the Deep Learning Book by Ian Goodfellow. This book was awesome, it explained to me how statistics relates to Machine Learning. Moreover, it delved me deeper into exciting research domains in deep learning such as Energy Models, Monte Carlo Methods, Auto Encoders,

Generative Adversarial Networks, and much more. Then after grasping the basis of Machine Learning I am currently doing an online course on Machine Learning from CMU by Tom Mitchell (10-701). Up till now, I have learned the Naive Bayes algorithm, Gaussian Naive Bayes, and Logistic and linear regression with all the math behind it.