Statement of Purpose

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I am applying to The University of Texas at Austin for pursuing Masters in computer science. My fascination with computer science stems from an innate desire to pursue a career in cutting-edge technological field. Since my formative years in school, I have found myself very interested in any application of logical analysis and reasoning. My keen interest in mathematics and computer science led me to join the department of Computer Science at Indian Institute of Technology, Delhi for my undergraduate education. My academic experiences over the period of four years have culminated into my predilection towards the field of Artificial Intelligence. I am particularly interested in areas of *Data Mining, Machine Learning, Computer Vision and Robotics.*

Since I walked into the hallowed portals of my alma mater, I acquired in-depth knowledge of a variety of fields in computer science. I indulged in projects as part of my coursework and also pursued my research interests independently. The insights developed in the domain of Artificial Intelligence have been the cumulative result of a multitude of life experiences and projects.

My tryst with data science began in my sophomore year, when I undertook a course named "Design Practices in Computer Science". The course project involved making sense of a hypothetical social media website data that kept on flooding the database everyday for a month. I created a dynamic dashboard that interactively displayed the trends and statistics of the data. This was my first encounter with a good amount of data and I was really attracted by the thought of how the huge amount of unattended, unexplored data flowing in the real world can be at the heart of solving numerous challenges in diverse fields.

Later, at the end of my sophomore year, I was granted a fellowship from L3S Research Center, Leibniz University, Hannover, Germany. I worked on ACM Recys Challenge,2013 organized by Yelp under the guidance of *Dr. Ernesto Diaz-Aviles*. The challenge was about creating a recommender system that would predict ratings for the businesses on yelp data-set. Here, I learned about state of the art collaborative filtering techniques and fundamentals of machine learning. I applied novel techniques of creating training data, ensembling neighborhood models with matrix factorization techniques and dealing with the cold start problem. I could achieve an improvement of 3% root mean square error over the baseline. The group sessions and weekly research seminars, where the seminal works and pioneering developments in the field of recommender systems were discussed, always inspired me to pursue research as a career field, and further explore this domain.

Inspired by my summer research experience, I opted for introductory courses on Artificial Intelligence and Machine Learning. I modelled the game of Blackjack as Markov Decision Process and implemented Monte Carlo tree search algorithms, minimax algorithms with novel heuristics for developing a bot for a variant of Connect-4 game. Through the course on Machine Learning, I developed a thorough understanding of learning algorithms. I started attending weekly seminars at my university where top influential papers in the field of data analytics were discussed. This exposure has ignited a strong interest in me to gain a deeper understanding of the nature of learning algorithms.

Curious to learn about application of data mining and machine learning in Neuro Science, I undertook an introductory course on NeuroImaging in my final semester. The course gave me valuable insights on techniques used in brain data analysis. I also contributed to an open source neuroimaging software 'AFNI' by creating a system that facilitated the interactive analysis of functional MRI data on AFNI, under the guidance of *Prof. Rahul Garg*. I created a GUI by understanding and editing huge volumes of AFNI source code. At the backend, the system computed correlation values that represent activation and deactivation patterns of brain voxels. Through the project, I learnt a lot about theoretical aspects of the functional MRI data analysis, and research work going on in the domain.

In my final year, I worked on "Facial Expression Recognition" as a part of my Bachelor's Thesis under the guidance of *Prof. K. K. Biswas*. I created a recognition system for expressions of people in videos. In the process, I did comparative study of several techniques used in the domain, figured out the best and tried to improve on the best. I enjoyed the experience of regularly meeting with the professor to discuss different approaches for tackling the problem, and subsequently implementing the most promising ones. This method of independent study provided me with an intellectual freedom unseen in regular undergraduate courses. In the same year, I took a course on Digital Image Analysis, where I learnt about image compression techniques such as Laplacian Pyramids, features like SIFT and HOG that intuitively capture the object information from images, ideas of Image Morphing. Over the interval, I learnt about the aspects of Image Processing and application of Machine Learning techniques in facial expression domain.

Inspired by my thesis, I was strongly motivated to work on other real world applications of computer vision. I worked with Automotive Research team of Cube26 Pvt. Ltd. on Mahindra: Spark the rise challenge that required the team to build a driverless vehicle. While the part of obstacle detection could be done exclusively using lidars and sensors installed on the vehicle, the team wanted to be sure of the type of obstacle so that the vehicle could make a more informed decision based on the property of the obstacle. My task was to create a ROS (Robot Operating System) package that correctly classified the pedestrians, cars and bicycles from the live street images. This has provided me with a clear insight of the intersection of machine learning algorithms with large robotic systems.

As a computer engineer, I have always loved to code, being always motivated by the final product and its utility. As an android developer and engineer at *Samsung R&D Institute India, Noida*, I have been working on development of Input Method Editor features for latest Samsung smart-phones. The lifecycle of product development has not only sharpened my development skills but also, taught me the importance of thought and implementation cycle in the overall product development. I am motivated to strengthen my research skills and apply my development skills in the domain of Artificial Intelligence. My career goal is to work in an industry position that provides ample opportunities to research innovative solutions to challenging problems in Data Mining, Machine Learning or Computer Vision. Masters program from The University of Texas at Austin will best equip me with the skills for the challenges of such a position.

On a personal front, my upbringing has been very simple. My parents had to struggle to get good education and a graduate degree. Though I did not have to face any such impeditions, my parents have kept me grounded through emphasis on higher education. The importance of family well being and happiness of people are ideals that I stand by. I have contributed towards the promotion of national schemes by working with Non-Government organisations. Interacting with underpriviliged people, and motivating them to indulge in education is something I have been a part of. I love to interact with people of diverse cultures. As a child, I participated in various sports, but it was my inclination towards cricket that I further pursued it. In my university, I was the part of Inter Hostel cricket team for 2 years. The game has taught me discipline, perseverance, team work and developed a never say die attitude in me.

I believe that The University of Texas at Austin is the ideal place to continue my education due to its vibrant research atmosphere, exceptional professors who are at the forefront of the fields of my interest. The university boasts of a lot of outstanding researchers with diverse research areas in a single strong AI group. The work of Kristen Grauman in the field of Computer Vision greatly aligns with my interests. I am also fascinated by the work of Learning Agents research group, especially on Robot Soccer. I am inclined towards working with Prof. Inderjit Dhillon and Prof. Raymond J. Mooney on challenging Machine Learning and Data Mining problems. I think a Masters from The University of Texas at Austin would provide me the necessary knowledge and research experience to go for a research career. I request the university to accept my candidature, and look forward to a fruitful and rewarding time on the enthralling campus in Austin.