Statement of Purpose

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It is hard to find an application these days that does not boast having some sort of AI features, such as improving performance through machine learning. But most developers simply seek for some common features and deploy them on their apps. I fear this practice will eventually lead to saturation if no more advancement is made in the field of innovative applications and underlying mechanisms. We live in a time when machine learning has become integral part of our life. From home assistant to health care, everywhere we are enjoying the blessing of machine learning. Information retrieval and conversion from raw text to speech using natural language processing ease acquiring knowledge despite of language barriers. Newer type of cyber attack demands more dynamic and innovative security technique. "Machine intelligence is the last invention that humanity will ever need to make"-Nick Bostrom. I agree with Nick Bostrom because this quote reflects the importance of innovation in machine learning for continuation of the invention capability. But the innovation can come only as a result of endeavoring research. This leads to my research interests on machine learning, natural language processing and security.

I am a final year undergraduate student at the Department of Computer Science and Engineering at Bangladesh University of Engineering and Technology (BUET), the leading engineering university of Bangladesh. Due to its rigorous programs and excellent academic reputation, it has inspired me to aspire to the culmination of success. I have achieved Dean's award every previous year for my excellent academic performance. My university has introduced me to the fascinating research works in the field of computer science and provided me the opportunity to select my research interest.

My experience at different stages of my academic career has built and shaped my research interest. In the second year of my undergraduate program, I created an online educational platform as part of my course project where teachers and students of different educational institutions can share and discuss important topic. But I felt that, it would be more helpful for a student if I could provide exactly required topic for his/her from the flourish of shared information. I felt the necessity to suggest important study materials for a student based on the information retrieval from his/her discussion. When I was in third year, I built a web based application where people can access using their national ID card to complain problems of their own locality. Then I realized that, prioritizing problems before resolving them could be major issue and an automated system for prioritization based on people voting, budgeting feasibility with scheduling decision could tackle that issue. Later in that same year, I built software to measure code review usefulness from open-source Gerrit where I extracted features from reviews to predict usefulness using machine learning and for the first time I explored a little space from the fascinating universe of machine learning. Unsurprisingly, I decided to focus my scholarship in the field of machine learning from this point onwards.

My research interest has influenced me to choose my undergraduate thesis area. I am currently working with Professor Anindya Iqbal and Dr. Sadia Afroz on "Automated Fake News Detection and Tracing User Propagation on Social Media". This work focuses on detecting fake news and tracing its propagation on social media and creating a benchmark on currently existing fake news detection approaches. Existing works mostly focus on political news but we have built up a combined corpus that covers other topics as well. To the best of our knowledge, we are the first to experiment an extensive performance analysis of various traditional machine learning and deep neural network approaches on three different datasets with topic variance. We have explored different features that have shown promising results in other research works. We have also investigated performance of some deep learning approaches like convolutional long short-term memory or convolutional hierarchical attention network which have been introduced in text classification but not in fake news detection yet. We have completed this benchmark study within six months of my thesis topic selection and we are the first in the current undergraduate thesis course who are going to submit their work for review. Now, we are concentrating on tracing propagation of biased news on social media initiated by popular political figures. The proliferation of news sources without authentication on social media makes it quite impossible to check reliability of each and every source. So our current focus is to closely monitor rapidly propagated news and how it carries biased information.

In my recent undergraduate projects, I also tried to utilize my research based knowledge to solve real world problems. For my Digital System Design project, I worked on face detection to reduce the number of road accidents which are caused by lack of attention on part of the driver. For this I used a Raspberry Pi with a camera module attached to the dashboard to detect a driver's focus i.e. head orientation, eye gaze using Python OpenCV Haar-cascade based classifiers. The Raspberry Pi would sound an alarm in the event of the driving turning his/her head or eye away from the road or falling asleep on the wheel. I implemented smart staircase in my Microcontroller project to save energy in staircases through human detection

and automated regulation of electronic devices. Moreover, I created a project named 'Numta DB' that recognizes Bengali Handwritten Digits using deep learning. In this project, I used deep convolutional neural network using Keras library and handle data augmentation to create transformation invariant model over 60,000 samples. Theoretical knowledge can only be accomplished through practical applications. These projects have developed my skills and enriched my insight about machine learning.

My knowledge and skill on my research domain have led me to get some working experience in this field. My thesis mate and I are the only two students from the undergraduate program who have been recruited as research assistant at Samsung R&D Institute Bangladesh, the most prestigious research and development organization in Bangladesh. My vision and expertise in applied machine learning and natural language processing have helped me to secure this position. I am currently working with Professor Anindya Iqbal and Professor Amiangshu Bosu on "Autonomous Code Review Usefulness Measurement and Review Categorization with Code Correction Suggestion". As the first part of the project, we successfully crawled data from organization's authenticated Gerrit server and built a text based code review classification system. My software for automated extraction of reviews and instant classification with reviewers' performance analysis has been appreciated and accepted by the organization. Now we are focusing on review categorization and automated code correction suggestion. If we can accomplish this research project, our organization will be the first one to deploy this advanced system. I believe that, working in such a sophisticated research organization can gift me an invaluable experience to enhance my research vision.

My vision is to actively contribute to the research and advancement of cutting edge techniques. When I was looking for prospective Ph.D. programs, the Department of Computer Science at the University of XYZ has stood out with its amazing reputation of research opportunities offered in the field of machine learning, natural language processing and security. I am highly inspired by Professor XYZ's research on XYZ. His works on XYZ have fascinated me. I am also familiar with Professor XYZ's works on XYZ. His recent works on XYZ strongly match my research interest. I had also studied some of Professor XYZ's works on XYZ, which strongly match my research interest as well. I am also interested to work with any other faculty in my research field. With my vision and performance, broad interest in research, I am confident that I can meet the academic high standard of XYZ. For these reasons, I have applied to the Computer Science Ph.D. program at the University of XYZ.