Personal Statement

Prospective Ph.D. Student
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Dr. Frederick Sanger famously stated, "Scientific research is one of the most exciting and rewarding of occupations," and those words have reverberated within me, igniting a powerful aspiration in my heart. Starting from modest origins in my home country, Bangladesh, I set out on a journey to the USA for my master's degree, but that was only the beginning. As I delved deeper into my studies, my curiosity grew stronger, propelling me toward a loftier goal: a PhD. This evolution from an eager student to a resolute researcher has been a deliberate journey, not a mere coincidence.

From the outset, my commitment to academic pursuits has been unwavering. During my formative years, an affinity for mathematics and physics guided me towards the realm of engineering. This inclination led to my acceptance into both a reputable medical institution and a distinguished engineering university. The importance of this accomplishment is amplified when seen through the perspective of my country's limited educational possibilities for young women, where pursuing a career in engineering remains an unusual decision. Undaunted by societal expectations, I embraced the challenge and became the first female engineer in my family.

My path commenced at Bangladesh University of Engineering and Technology (BUET), a place well-known for its academic excellence, and laid the foundation for my research journey. I got involved in various projects and academic events during my time as an undergraduate, and that sparked my love for research. The recognition I got from publishing research papers on international platforms laid a solid foundation for the research work I continue to do. This journey reflects my determination, supported by a strong belief in the importance of education and research.

Transitioning to the USA, the exposure to a diverse array of backgrounds significantly broadened my horizons. My tenure at Texas A&M University introduced me to the Sketch Recognition Lab (SRL) under the guidance of Dr. Tracy Hammond. This environment nurtured my academic growth and became the fertile ground for exploring my research interests. My focus gravitated toward projects involving eye tracking and educational technologies. Beyond their technical dimensions, I was captivated by the inherent humanitarian implications of these initiatives. This realization solidified my aspiration to apply my knowledge to effect tangible change in people's lives. This sentiment was further reinforced by witnessing a lab mate, who is visually impaired, actively pursuing a Ph.D. to contribute to disability-focused research.

As I sought to dive deeper into different fields of computer science, I explored Natural Language Processing (NLP) under the direction of Dr. Ruihong Huang. This quest led me to work on a project on multi-evidence natural language inference for clinical trials. Moreover, I participated in Dr. James Caverlee's Information Storage and Retrieval (IR) course to extend my knowledge and worked on a project that aims to boost clinical trial effectiveness by improving patient-trial matching. The successful completion of these two projects encouraged me to explore the application of NLP and IR techniques in the clinical domain as my master's thesis. My thesis has two primary objectives: firstly, to determine textual entailment or contradiction of some clinical hypothesis with respect to corresponding clinical trial reports, and secondly, to retrieve a set of factual information from the trial reports conducive to effective reasoning of the relation.

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The potential impact of this research is significant, as it aims to greatly enhance the capabilities of healthcare professionals in aligning the latest evidence with personalized treatment approaches. To realize the ambitious goal of effective evidence retrieval, I have undertaken an extensive analysis focused on the effective integration of context considering the limitations of the maximum input number of tokens of SOTA language models. I have submitted my findings from this study to one of the most prestigious AI conferences, the AAAI Conference on Artificial Intelligence 2024. Furthermore, my efforts have encompassed the infusion of disease knowledge into language models. I have also explored the application of contrastive learning techniques to devise an efficient method for natural language inference, particularly when dealing with lengthy and intricate clinical trial data. These combined endeavors represent a concerted effort to advance the state-of-the-art in healthcare information processing and reasoning, with the ultimate aim of benefiting both practitioners and patients in the medical domain.

Continuing my commitment to skill improvement, I decided to dive into a comprehensive course on Data Analytics and Visualization. Under the guidance of experienced mentors, Dr. John Keyser and Dr. Ann McNamara, I undertook a project focused on the analysis of traffic collisions in the bustling city of New York. The encouragement and support I received from the mentors motivated me to participate in the Disney Data and Analytics Conference 2022. It is with great pride that I share the accomplishment of winning the Disney Data and Analytics Women Award for 2022. This milestone not only granted me firsthand exposure to the transformative power of data analysis but also enhanced my practical expertise in the field of data science. To complement my academic pursuits, I set foot in the industry through internships as a Machine Learning Engineer at Tenstorrent Inc. and as a Data Scientist at Amazon Robotics. These roles gave me the chance to apply the theoretical knowledge I had gained to real-world scenarios, thereby refining my technical skills and nurturing effective teamwork and communication abilities. Concurrently, my role as a teaching assistant allowed me to further polish my project management, leadership, and teamwork skills.

Throughout my transformative journey in the USA, which has encompassed diverse experiences ranging from intensive research projects, and demanding coursework to valuable internships, I can confidently assert that this path has been anything but smooth. Balancing teaching, research, and coursework amidst COVID-19 disruptions and a change in major from bachelor's to master's degrees has taught patience, resilience, and adaptability. Notably, I had the privilege of undergoing the CliftonStrengths psychometric assessment from Texas A&M University, which illuminated my core strengths—maximizer, relator, and empathy. Fueled by these attributes, I am steadfastly dedicated to achieving both personal and collective excellence, as I diligently prepare for the forthcoming Ph.D. journey that lies ahead.

As I contemplate the next stage of my academic journey, my attention is firmly fixed on Columbia University, an institution of great renown distinguished by its size, reputation, and commitment to academic excellence. With a profound research interest in harnessing the powers of machine learning, natural language processing, and information retrieval to drive transformative change, I see Columbia University as the ideal stage for nurturing my aspirations. I am particularly captivated by the opportunity to engage in collaborative research within Dr. Noémie Elhadad's lab. Their research resides at the intersection of machine learning, natural language processing, and medicine, aligning seamlessly with my prior MSc. research experience. My passion lies in developing techniques that empower clinicians, patients, and health researchers to streamline their information workflows and derive invaluable insights from clinical data. Dr. Elhadad's research, focused on supporting clinical decision-making, truly intrigues me. In addition, I am keenly interested in the research of Dr. Elias Bareinboim, whose expertise centers on causal inference and its applications in the biomedical domain. His recent work on fairness analysis in the context of causal inference greatly motivates me and closely aligns with my own research interests. Furthermore, I find Dr. Zhou Yu's research particularly compelling. Her work delves into the intersection of natural language processing with real-world applications, which greatly piques my interest. Several

of her research endeavors resonate with my research interests, experience, and expertise. This potential collaboration promises a robust platform for exploring and unraveling intricate patterns within extensive datasets, shedding light on complex interconnections.

In summary, my journey—from Bangladesh to the USA—has shaped an individual characterized by unwavering dedication, a passion for research, and adeptness in navigating challenges. I have become more resilient as a result of experiencing hardship and learning. The epitome of academic greatness is Columbia University, where I want to continue my journey, expand my knowledge, and genuinely leave my imprint via my contributions to research.

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