Stanford Statement of Purpose

* Your reasons for applying to the proposed program at Stanford and your preparation for this field of study
* Your research and study interests
* Future career plans and other aspects of your background and interests which may aid the admission committee in evaluating your aptitude and motivation for graduate study

Innovation has rapidly advanced the field of artificial intelligence in recent years, yet socioeconomic inequality remains a persistent problem. As a computer scientist, I want to learn how to apply AI to better understand and ultimately solve critical social issues that contribute to current inequities. My specific interests for graduate study and research are fairness methods in machine learning, deep learning interpretability, and natural language processing. Through the specialized coursework and research opportunities offered by Stanford’s master’s program in CS, I hope to build upon my academic and industry experience in AI and quantitative modeling as well as my experiences applying tech for social impact in order to learn and innovate in these evolving fields of AI research.

As the use of ML algorithms becomes more ubiquitous, it is necessary to understand how they encode human biases and how we can better achieve algorithmic “fairness.” I hope to comprehensively explore different approaches to ML fairness (e.g. evaluating data bias vs. algorithmic design) and different fairness definitions (e.g. anti-classification, classification parity, and calibration) to understand the advantages and shortcomings of each. I am particularly excited by the Stanford Computational Policy Lab’s work applying ML techniques to solve complex and current social issues, such as its work on blind charging for mitigating racial bias in charging decisions. At a more theoretical level, I also strongly believe in the exigency of critical, forward-looking research such as Professor Sharad Goel’s paper on “The Measure And Mismeasure of Fairness: A Critical Review of Fair Machine Learning” which outlines the obstacles to fairness in ML that we have yet to tackle.

Additional fields of study I am interested in due to their relevance to ethical AI usage are deep learning interpretability and natural language processing. I believe that transparency of algorithms in the deep learning space should be a prerequisite to real world application. Therefore, I am excited by courses such as CS335 Fair, Accountable, and Transparent Deep Learning, which addresses emerging technical approaches to deep learning interpretability and acknowledges the important social implications of these topics. I also am interested in learning more about how NLP can be applied to textual data to uncover valuable analysis (e.g. sentiment analysis, valuable feature sets), especially given that a significant amount of public record and social media data is in the form of unstructured text. I would like to explore and build upon Professor Dan Jurafsky’s work at the intersection of NLP and social science, dissecting how cutting edge NLP technologies can be used to both understand and unintentionally perpetuate social biases.

My strong academic record and undergraduate focus on Intelligent Systems have both prepared me academically and shaped my graduate study interests. As an undergraduate, I demonstrated excellence in my computer science classes, and was awarded the Computer Science Department’s Scholarship Award for outstanding academic achievement. However, I was most intrigued by my graduate level Intelligent Systems courses such as Artificial Intelligence, Machine Learning, Natural Language Processing, and Advanced Spoken Language Processing. To nurture that interest, I served as a teaching assistant for Artificial Intelligence taught by Professor Tony Dear. In this role, I demonstrated my strong domain knowledge and pedagogical ability to clearly distill key AI concepts to students. As I gained more exposure to different areas of study, one of the most impactful projects I worked on, which influenced my passion for ML fairness, was constructing a hiring algorithm based on a historical biased dataset to explore how algorithms can combat gender and racial bias. I performed feature analysis and selection, then used a costing approach based on cost-proportionate rejection sampling and ensemble aggregation (from Zadrozny e.t. al.) in order to train the algorithm. The most promising outcome of the project was that the algorithm performed \_\_\_\_\_.

As a quantitative software engineer at Two Sigma, my leadership of projects from scientific design to production demonstrates that I am well prepared for rigorous quantitative study. At Two Sigma, I have worked in a hybrid research and engineering role to interpret and implement anomaly detection methods, convex optimization techniques, and proprietary mathematical financial models. In the past year, I have quickly picked up numerous complex mathematical concepts and translated them to production-ready code. While I have been challenged by the work I have done, I have also grown to understand the importance of believing in the social impact of my work. I hope to apply the skills I’ve learned to graduate study and research in fields both closely aligned with my academic interests and which have the potential for positive social change.

Throughout the past few years, I have driven the success of several projects which have leveraged tech for good. In 2018, I was selected to participate in the Vatican Hackathon under the Social Impact category, and worked with a team of five to create an app for disabled individuals to experience personalized tours of places they wish to explore. I led our team’s presentation to Vatican and tech leadership, winning third place. I also currently volunteer for Two Sigma’s Data Clinic, a pro-bono arm which aims to leverage research and data science expertise to help local organizations and nonprofits. I have led the development and optimization of an anomaly detection pipeline used to detect abnormal water usage and preserve costs for multiple districts. I am committed to improving diversity in the field of computer science. This past summer, I served as a technical mentor for Rewriting The Code’s summer internship program, where I mentored a group of six female college students as they worked on GenderMag, an open-source gender-inclusivity software.

After graduate study, I plan to concentrate my work on leveraging tech for social impact. My goal is to conduct AI research in industry, focusing on reducing bias in ML systems and leveraging data science and AI to solve critical social issues. I am interested in companies like Recidiviz, which focuses on data-driven interventions in criminal justice, and labs like Stanford’s Computational Policy Lab, which uses technology to address criminal justice, education, and voting rights issues. I also aspire to eventually start my own initiative to evaluate and improve the fairness of algorithms already in production. I know that Stanford’s unique courses and research opportunities, as well as its emphasis on understanding the social implications of AI, will equip me with the resources to tackle challenging problems that will influence the course of AI’s impact on society.