

**Statement of Purpose**  
**Vaishnavi Shrivastava, MS Computer Science**

The promise of AI automating tasks and empowering us to do more is what drew me to Natural Language Processing (NLP). Recent breakthroughs in NLP have been incredible, with pre-trained language models (PLMs) single-handedly performing many tasks. However, NLP techniques still struggle with issues like lacking common-sense reasoning and propagating social biases. I wish to address these challenges by gaining broad knowledge and in-depth research experience through a Master's in CS at UCLA. I am eager to bring my unique perspective of building real-world NLP systems to UCLA's incoming class of future technological leaders.

As an Applied Scientist at Microsoft, I gained expertise in infusing research into large-scale NLP systems. Working on the Suggested Replies team, providing users with automated responses to emails, I modernized our biLSTM-based system to instead leverage Transformer-based PLMs for their transfer learning benefits. To curb the large training and inference times of PLM models, I experimented with compression techniques and deployed a compressed PLM-based model to improve our user experience. I also conducted further experiments leading to interesting insights into how pre-trained models, domain adaptation, and dataset size affect compression. This work, [published](#) in Microsoft's AI Journal, gave me experience in making innovative contributions to the research community.

To allow our models to adapt to user needs, I explored the space of user-personalization. I trained user-specific embeddings to condition our GPT-2-based dialog system for personalized reply generation, allowing us to lower per-user model perplexities. Since it remained expensive to periodically update user embeddings, I was inspired by the prompting of models like GPT-3 to replace trained embeddings with non-trainable user-specific prompts. Through this work, I utilized the distinct constraints of the industry to research novel solutions, and my findings led to a [paper submission](#) at an upcoming NLP conference. I wish to use this experience during my Master's to explore open problems such as protecting user privacy during personalization.

My broad research interests lie in Deep Learning for NLP, but two areas that particularly excite me are improving PLMs and reducing social biases in NLP techniques. I aspire to collaborate with Prof. Kai-Wei Chang on pre-training for open-domain question answering and on integrating vision and language by improving visual common-sense reasoning. My interests also align with Prof. Violet Peng's work, and it would be great to collaborate on phrase grounding in vision and language models and on understanding bias measurements. My experience in compressing pre-trained models and desire to mitigate adversarial attacks also relates to Prof. Cho-Jui Hsieh's recent work.

As an Applied Scientist, I have worked with cutting-edge NLP techniques. In the future, I wish to join a research lab in industry or academia to conduct research that can significantly advance the field and have a more generalizable impact across applications. Pursuing a Master's at UCLA to obtain extensive research experience, acquire more structured knowledge of the field, and be surrounded by brilliant peers will be the best next step for my life goal of bringing the power of NLP to people worldwide.