# Neel Jain

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## RESEARCH STATEMENT

Explore the fundamental properties of NLP deep learning models to utilize its capabilities and better evaluate them

- Other Areas of Interest Include: Trust, Reliability, Efficient Training, and many others

## EDUCATION

Ph.D, Computer Science — 2021 - Present
University of Maryland, College Park — College Park, MD

- GPA: 3.86; Advisor: Prof. Tom Goldstein
- Selected Graduate Classes: Foundations of Deep Learning; Advanced Numerical Optimization; How and Why Artificial Intelligence Answers Questions; Human-AI Interaction

B.A, Honors in Mathematics — 2015 - 2019
Williams College — Williamstown, MA

- Thesis: Expanding Zero-forcing to Multi-color Forcing in Graphs
- Sigma Xi Honors Society (Associate Member); Varsity Men's Squash, Four years

## PUBLICATIONS AND PAPERS

Hard Prompts Made Easy: Gradient-Based Discrete Optimization for Prompt Tuning and Discovery, *Under Review* — February 2023
Y Wen, N Jain, J Kirchenbauer, M Goldblum, J Geiping, T Goldstein

How to Do a Vocab Swap? A Study of Embedding Replacement for Pre-trained Transformers, *Under Review* — September 2022
N Jain, J Kirchenbauer, J Geiping, T Goldstein

Multi-color Forcing in Graphs, Springer: Graphs and Combinatorics — June 2020
C Bozeman, PE Harris, N Jain, B Young, T Yu *(Note: authors are alphabetically order)*

Expanding Zero-forcing to Multi-color Forcing on Graphs, Thesis, Williams College — May 2019
N Jain, Advised by Dr. Pamela Harris

## RESEARCH EXPERIENCE

Thesis, Williams College — September 2018 - May 2019
Graph Theory, Pamela Harris — Williamstown, MA

Research Intern, Salk Institute For Biological Studies — May 2017 - August 2017
Computational Biology, Edward Stites Lab — San Diego, CA

## EMPLOYMENT

Teaching Assistant, University of Maryland, College Park — January 2023 - Present
Professor Tom Goldstein, Advanced Numerical Optimization — College Park, MD

Teaching Assistant, University of Maryland, College Park — September 2022 - December 2022
Professor Micheal Marsh, Advanced Data Structures — College Park, MD

Research Assistant, University of Maryland, College Park — June 2022 - August 2022
Professor Tom Goldstein — College Park, MD

- Explored techniques on faster adaptation of existing large language models to new languages, creating new foundational models. This work is currently under review.

Teaching Assistant, University of Maryland, College Park — September 2021 - May 2022
Introduction to Data Science, Professor John Dickerson and Jose Calderon — College Park, MD

Summer Math Tutor, Hamilton College Consulting — June 2020 - August 2020

- Tutored students for SAT/ACT math and other broad math skills; these students saw an increase by 300 points for the SAT and 5 points on the ACT math section

Data Scientist Senior Consultant, Booz Allen Hamilton — July 2020 - April 2021
Strategic Innovation Group, Analytics — Washington, DC

- Created math models such as agent-based models and simulations like Monte Carlo in python and excel for various different analyses and studies including program evaluations for DoD OSD CAPE in a research oriented approach to the problems
- Built a webapp using Flask alongside HTML, CSS, and JS to display various analyses of a curated dataset

Data Scientist Consultant, Booz Allen Hamilton — July 2019 - July 2020
Strategic Innovation Group, Analytics — Washington, DC

- Built an end-to-end audio analysis pipeline for an app in Dart using Tensorflow in Python
- Helped build a data pipeline from google trends to a S3 bucket that pulls every hour via a cron job for COVID-19 data lake

Summer Games Internship, Booz Allen Hamilton — June 2018 - August 2018
Strategic Innovation Group, Analytics — Washington, DC

- Analyzed spatial data through QGIS's python script runner to create shapefiles for the RShiny front-end
- Used R to clean data and create a RShiny front-end

Teaching Assistant, Williams College — September 2016 - December 2016
Introduction to Mechanics, Professor William Wootters — Williams College, Williamstown, MA

Internship, Anokiwave — July 2016 - August 2016
Silicon IC, Simulations — San Diego, CA

## RELEVANT COURSE RESEARCH PROJECTS

Studying Human Interactions with LLMs in QA Settings for Exploring Human Trust in LLMs — September 2022 - December 2022
Course: Human-AI Interaction — College Park, MD

Hallucinations in Closed Book Generative Question Answering — January 2022 - May 2022
Course: How and Why Artificial Intelligence Answers Questions — College Park, MD

Universal Adversarial Attacks on Meta-Learning Algorithms — September 2021 - December 2021
Course: Foundations of Deep Learning — College Park, MD

## LEADERSHIP AND CERTIFICATIONS

Co-Lead Machine Learning Reading Group at UMD — June 2021
Outstanding Graduate Teaching Assistant Award Recipient — January 2021
Dean's and Chair's Fellowship — September 2021
Moderated Panel on the Math Community for Minorities & the Application of Math for Social Good, Williams College — September 2020
Quantum Algorithms for Cybersecurity, Chemistry, and Optimization Certificate, MIT xPRO — April 2020
Introduction of Quantum Computing Certificate, MIT xPRO — February 2020
Foundations of Natural Language Processing Certificate, NVIDIA — December 2019
Foundations of Computer Vision Certificate, NVIDIA — October 2019
Minority Student Athlete Advisory Committee, Gaius C. Bolin Chapter, Williams College — 2018-2019
Student Athlete Advisory Committee, Williams College — 2016-2017

## SOFTWARE LANGUAGES AND TOOLS

Python; Pytorch; Transformers; Pandas; Numpy; Scikit-Learn; NLTK; Spacy; Tensorflow; Keras; Docker; Java