# Neel Jain

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## RESEARCH STATEMENT

Explore the fundamental properties of deep learning models in NLP 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: 3.87; 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

Bring Your Own Data!  Self-Supervised Evaluation for Large Language Models, *Under Review* — June 2023
N Jain, K Saifullah, Y Wen, J Kirchenbauer, M Shu, A. Saha,  M Goldblum, J Geiping, T Goldstein

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 &        September 2020
   the Application of Math for Social Good, Williams College
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