

# Naman Jain

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## EDUCATION

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**University of California, Berkeley**

2022 - present

*Ph.D. in Computer Science*

**Indian Institute of Technology, Bombay**

2016 - 2020

*B.Tech (Honors) in Computer Science and Engineering*

## WORK AND INTERNSHIPS

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**Microsoft Research (MSR), India**

Aug '20 - Aug '22

*Research Fellow*

**University of Maryland, College Park**

June '19 - Aug '19

*Research Intern*

## PUBLICATIONS

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4. Jigsaw: Large Language Models meet Program Synthesis  
**Naman Jain**, Skanda Vaidyanath, Arun Iyer, Nagarajan Natarajan, Suresh Parthasarathy, Sriram Rajamani and Rahul Sharma  
*Proceedings of ICSE 2022, Pittsburgh, Pennsylvania* [paper]
3. Learning Accurate Decision Trees with Bandit Feedback via Quantized Gradient Descent  
Ajaykrishna Karthikeyan\*, **Naman Jain\***, Nagarajan Natarajan, and Prateek Jain  
*Proceedings of TMLR* [preprint]
2. What's in a Name? Are BERT Named Entity Representations just as Good for any other Name?  
Sriram Balasubramanian\*, **Naman Jain\***, Gaurav Jindal, Abhijeet Awasthi and Sunita Sarawagi  
*Workshop Proceedings of ACL 2020, Virtual Conference* [paper] [supplement]
1. On the Robustness of Human Pose Estimation  
**Naman Jain\***, Sahil Shah\*, Abhishek Sharma and Arjun Jain  
*Workshop Proceedings of CVPR 2019, Long Beach, California* [paper] [supplement]

\* joint first authors

## RESEARCH PROJECTS

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**Making Code Language Models Secure and Reliable**

Sep'21 - Present

*Microsoft Research, India*

*Research Fellow*

- Using CodeQL to mine javascript source, sink and sanitizer specifications in public GitHub repositories
- Learning AST transformations to evade or fix security vulnerabilities in language model outputs
- Training and adapting large GPT class models for reliable code generation by using combination of CodeQL marked secure scraped code, code obtained via transformations and mined sanitizers

**Jigsaw – Combining Language Models with Program Synthesis**

Dec'20 - Sep'21

*Microsoft Research, India*

*Research Fellow*

- Proposed an architecture for augmenting black-box models with program analysis and synthesis based post-processing block that provides correctness guarantees and also allows learning from user feedback
- Instantiated the architecture for Pandas with GPT-3/Codex and developed multi-modal synthesis tool
- Designed transformations for different error classes using enumerative search and Prose AST rule edits
- Released two datasets for benchmarking performance of system allowing offline and temporal evaluation

**DGT – Versatile Decision Tree Learning**

Sep'20 - Oct'21

*Microsoft Research, India*

*Research Fellow*

- Developed alternative conceptualization of decision tree problem that allows end-to-end gradient based learning while still performing competitive to SOTA tree methods and outperforming in bandit setting

- Combined straight through estimators (quantization), additive AND gates formulation, and linear over-parameterization to better condition the gradients and reach desirable performance with learnt trees

### **Robustness in Natural Language Processing**

August 2019 - June 2020

*IIT Bombay (with Prof. Sunita Sarawagi)*

*Bachelor's Thesis*

- Studied and designed training algorithms robust to synonym and named entity replacement attacks on tasks including sentiment analysis, grammar correction, coreference resolution and question answering
- Demonstrated non-robustness of BERT based models on various tasks and analysed potential causes
- Developed simple yet effective replacement-ensembling algorithm to defend against named entity attacks

### **Adversarial Examples in Human Pose Estimation**

Aug 2018 - Dec 2018

*IIT Bombay (with Prof. Arjun Jain)*

*Research Assistant*

- Released implementation of six SOTA pose estimation systems along with pretrained models
- Performed image agnostic & dependent adversarial attacks evaluating crucial design choices such as direct regression vs heatmap, imagenet pretraining, using compositional human body structure, etc.

### **Interacting Humans Video Prediction**

June 2019 - Dec 2020

*University of Maryland, College Park (with Prof. Abhinav Shrivastava)*

*Research Intern*

- Worked on multi-human video prediction via pose forecasting and subsequent frame generation
- Introduced novel framework for incorporating multi-person context via additive conditional batchnorm

### **Virtual Try On**

May 2020 - August 2020

*Uplara AI, Palo Alto*

*Remote Internship*

- Implemented image based virtual try on system using 2D warping and 3D mesh alignment methods
- Trained networks to warp cloth images to match human shape and pose using FLOW and TPS mappings

## **SELECTED SOFTWARE AND OPEN SOURCE**

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- Jigsaw server and Jupyter extension - Flask, SocketIO, React
- Human Pose Estimation - PyTorch (stats - ★>350, ♡>70) 
- `torch.randint` in PyTorch - open source contribution 

## **SCHOLASTIC ACHIEVEMENTS**

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- Awarded Undergraduate Research Award (**URA**) for Autumn 2018 (2 out of 121 students)
- Secured **All India Rank 36** in JEE Advanced 2016 among **0.15 million** candidates
- Awarded Gold Medal for being among top **35** students in Indian National Physics Olympiad (**INPhO**)
- Among the **top 300** in Indian National Chemistry and Astronomy Olympiads (**INChO & INAO**)
- Awarded KVPY Fellowship and NTSE Scholarship by Govt. of India

## **RELEVANT COURSES**

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- **Computer Science** - Automata Theory, Compilers, Parallelizing Compilers, Advanced Machine Learning, Learning Agents (RL), Computer Vision, Data Structures, Algorithms, Operating System
- **Mathematics** - Calculus, Linear Algebra, Differential Equations, Numerical Analysis, Discrete Maths

## **TECHNICAL STRENGTHS**

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<b>Strong</b>	Python, C, C++, C#, Racket, Prolog, Bash
<b>Web</b>	Flask, ASP.NET, Guicorn, Nginx, IIS, WebSockets, React, JSP
<b>Tools</b>	Git, L <sup>A</sup> T <sub>E</sub> X, OpenGL, OpenMP, Gnuplot, Doxygen

## **TEACHING & MENTORSHIP**

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- Teaching Assistant for the course Automatic Speech Recognition under Prof. Preethi Jyothi
- Teaching Assistant for the course Quantum Mechanics under Prof. Aftab Alam
- Mentored 6 students for project on statistical face recognition organized by WnCC, IIT Bombay