NIKHIL NAIK

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CURRENT APPOINTMENT

Director, AI Research, Salesforce Research 11/2018–01/2024

I built and led a team of researchers and engineers working on language, vision, and multimodal AI and their applications in enterprise SaaS. Our research focused on generative modeling and self-supervised learning. My team trained multi-billion parameter foundation models from scratch and open-sourced them. We developed the first generative AI co-pilots at Salesforce for sales, service, and marketing appliations that are now being used by hundreds of enterprise customers. We also developed novel AI models for protein generation and medical image analysis and deployed them at university labs and biotech companies. My team's work has been published in top AI conferences and Nature-family journals and covered widely in the press. I managed the AI Residency Program and AI Faculty Grants and assisted the Salesforce Chief Scientist on strategic planning, recruiting, and team management.

EDUCATION

MS/PhD, Massachusetts Institute of Technology, Media Lab 11/2016

Advisors: Ramesh Raskar, Alex Pentland, Kavita Bala, César A. Hidalgo

Developed algorithms that reduce the need for human expertise and labor in building deep learning systems, including meta-learning methods for automatic neural architecture search and training. Developed computer vision algorithms for scene understanding and applied them to large datasets containing billions of images. Collaborated with economists on using machine learning for analyzing geospatial images. Work published in premier computer science conferences along with economics journals; and featured in media outlets such as MIT Technology Review, New York Times, The Economist, and The Atlantic.

BTech, College of Engineering Pune 06/2010

Major: Electronics and Telecommunication

HONORS AND AWARDS

Webby Award for the Best Use of Machine Learning on the Internet	2018
Best Research Article of the Year, Economic Inquiry	2018
Prize Postdoctoral Fellowship, Harvard University	2016
Outstanding Reviewer Award, IEEE Conference on Computer Vision & Pattern Recognition	2016
Doctoral Consortium Award, International Conference on Computer Vision	2015
S.V. Chandrasekhar Aiya Memorial Prize for Best Undergraduate Project	2009
First Prize in Annual IEEE All India Project Competition	2009
Dhirubhai Ambani Undergraduate Scholarship (4 years)	2006
National Talent Search Scholarship, Government of India (6 years)	2004

PAST EMPLOYMENT

Prize Postdoctoral Fellow, Harvard University and MIT 10/2016–09/2018

As a principal investigator and scientist, I conducted research in machine learning and computer vision and their applications in economics. Raised $360,000 in funding, and co-supervised four students. Collaborated with AI teams at Google Research and Microsoft Research on meta-learning and scene understanding.

Visiting Research Scientist, Google, Mountain View CA 06/2016–09/2016

Mentor: Sacha Arnoud, Head of Perception, Self Driving Cars (Waymo)

Developed deep learning algorithms to extract built infrastructure indicators from billions of geospatial images

PhD Intern, Microsoft Research, Redmond WA 06/2014–08/2014
Mentor: Sing Bing Kang, Principal Researcher, Cognition Group
Developed a computer vision algorithm to improve 3D imaging for the Microsoft Kinect sensor

PhD Intern, Think Tank Team, Samsung Research, Mountain View CA 06/2012–08/2012
Mentor: Pranav Mistry, Global Senior Vice President, Samsung Electronics
Developed the optical design and computer vision algorithms for a novel 3D sensing technology

SELECTED PUBLICATIONS AND PREPRINTS

Please see Google Scholar for Full List (*#citations = 7,150+, h-index = 26*)

Diffusion Model Alignment Using Direct Preference Optimization
Bram Wallace, Meihua Dang, Rafael Rafailov, Linqi Zhou, Aaron Lou, Senthil Purushwalkam, Stefano Ermon, Caiming Xiong, Shafiq Joty, Nikhil Naik
*IEEE Conference on Computer Vision & Pattern Recognition (**CVPR**), (2024)*

BootPIG: Bootstrapping Zero-shot Personalized Image Generation Capabilities in Pre-trained Diffusion Models
Senthil Purushwalkam, Akash Gokul, Shafiq Joty, Nikhil Naik
arXiv preprint arXiv:2401.13974, (2024)

ConRad: Image Constrained Radiance Fields for 3D Generation from a Single Image
Senthil Purushwalkam, Nikhil Naik
*Neural Information Processing Systems (**NeurIPS**), (2023)*

End-to-End Diffusion Latent Optimization Improves Classifier Guidance
Bram Wallace, Akash Gokul, Stefano Ermon, Nikhil Naik
*International Conference on Computer Vision (**ICCV**), (2023)*

Large Language Models Generate Functional Protein Sequences Across Diverse Families
Ali Madani, Ben Krause, Eric Greene, Subu Subramanian, Benjamin Mohr, James Holton, Jose Luis Olmos Jr, Caiming Xiong, Zachary Sun, Richard Socher, James Fraser, Nikhil Naik
***Nature Biotechnology** (2023)*

EDICT: Exact Diffusion Inversion via Coupled Transformations
Bram Wallace, Akash Gokul, Nikhil Naik
*IEEE Conference on Computer Vision & Pattern Recognition (**CVPR**), (2023)*

CLIP-Lite: Information Efficient Visual Representation Learning from Textual Annotations
Aman Shrivastava, Ramprasaath R Selvaraju, Nikhil Naik, Vicente Ordonez
***AISTATS**, (2023)*

PreViTS: Contrastive Pretraining with Video Tracking Supervision
Brian Chen, Ramprasaath R Selvaraju, Shih-Fu Chang, Juan Carlos Niebles, Nikhil Naik
*Workshop on Applications in Computer Vision (**WACV**), (2022)*

Deep Extrapolation for Attribute-Enhanced Generation
Alvin Chan, Ali Madani, Ben Krause, Nikhil Naik
*Neural Information Processing Systems (**NeurIPS**), (2021)*

CASTing Your Model: Learning to Localize Improves Self-Supervised Representations
Ramprasaath R Selvaraju, Karan Desai, Justin Johnson, Nikhil Naik
*IEEE Conference on Computer Vision & Pattern Recognition (**CVPR**), (2021)*

Deep learning-enabled Medical Computer Vision
Andre Esteva *et al.*

Nature Digital Medicine, (2021)

Improving Out-of-distribution Generalization via Multi-task Self-supervised Pretraining
Isabela Albuquerque, Nikhil Naik, Junnan Li, Nitish Keskar, Richard Socher
*International Conference on Machine Learning (**ICML**) Workshops, (2021)*

Deep Learning-enabled Breast Cancer Hormonal Receptor Status Determination from Base-level H&E Stains
Nikhil Naik, Ali Madani, Andre Esteva, Nitish Shirish Keskar, Michael F Press, Daniel Ruderman, David B Agus, Richard Socher
***Nature Communications**, (2020)*

Progen: Language Modeling for Protein Generation
Ali Madani, Bryan McCann, Nikhil Naik, Nitish Shirish Keskar, Namrata Anand, Raphael R Eguchi, Po-Ssu Huang, Richard Socher
*Neural Information Processing Systems (**NeurIPS**) Workshops, (2020)*

Maximum Entropy Fine-Grained Classification
Abhimanyu Dubey, Otkrist Gupta, Ramesh Raskar, Nikhil Naik
*Neural Information Processing Systems (**NeurIPS**), (2018)*

Improving Fine-Grained Visual Classification using Pairwise Confusion
Abhimanyu Dubey, Otkrist Gupta, Pei Guo, Ramesh Raskar, Ryan Farrell, Nikhil Naik
*European Conference on Computer Vision (**ECCV**), (2018)*

Accelerating Neural Architecture Search using Performance Prediction
Bowen Baker*, Otkrist Gupta*, Ramesh Raskar, Nikhil Naik
*International Conference on Learning Representations (**ICLR**) Workshops, (2018)*

Designing Neural Network Architectures using Reinforcement Learning
Bowen Baker, Otkrist Gupta, Nikhil Naik, Ramesh Raskar
*International Conference on Learning Representations (**ICLR**), (2017)*

Computer Vision Uncovers Predictors of Physical Urban Change
Nikhil Naik, Scott Duke Kominers, Ramesh Raskar, Edward L Glaeser, César A Hidalgo
*Proceedings of the National Academy of Sciences (**PNAS**), (2017)*

Deep Learning the City: Quantifying Urban Perception at a Global Scale
Abhimanyu Dubey, Nikhil Naik, Devi Parikh, Ramesh Raskar, César A. Hidalgo
*European Conference on Computer Vision (**ECCV**), (2016)*

A Light Transport Model for Mitigating Multipath Interference in Time-of-flight Sensors
Nikhil Naik, Achuta Kadambi, Christoph Rhemann, Shahram Izadi, Ramesh Raskar, Sing Bing Kang
*IEEE Conference on Computer Vision & Pattern Recognition (**CVPR**), (2015)*

Streetscore–Predicting the Perceived Safety of One Million Streetscapes
Nikhil Naik, Jade Philipoom, Ramesh Raskar, César A Hidalgo
*IEEE Conference on Computer Vision & Pattern Recognition (**CVPR**) Workshops, (2014)*

SELECTED PRESENTATIONS AND INVITED TALKS

At Salesforce: NVIDIA GTC; Google Cloud ML Summit; Stanford University; Duke University; University of California Los Angeles; MIT Media Lab; Deep Learning Indaba, Nairobi; Machine Learning Colloquium, Microsoft Research New England; Facebook AML Research; Intel Intelligent Systems Lab; AWS AI Research; MIT-IBM Watson AI Lab; TTI/Vanguard Conference, Washington DC; Conference on Big Data, Harvard Center for Mathematical Sciences & Applications

At Harvard: University of California, Berkeley; Yale University; Boston University; Harvard Business School, Technology and Operations Unit; NIPS Workshop on Meta-Learning; NIPS Workshop on Learning with Limited Labeled Data; Imperial College London, Data Science Institute; Conference on Digital Experimentation, MIT

At MIT: New England Machine Learning Day, Microsoft Research; Zillow Inc; Summer Institute, National Bureau of Economics Research; Vision Seminar, MIT CSAIL; Conference on Economics Experiments in the Tech Industry, Stanford; Statistics Colloquium, Harvard University; Digital Economics Conference, Microsoft Research New York; Center for Research on Computation and Society, Harvard Computer Science; Machine Perception Seminar, Google Research; Summer Institute, National Bureau of Economics Research; Image and Video Computing Seminar, Boston University; Frontiers of Digital Data and Experimentation Conference, Harvard Business School; Federal Reserve Bank of Boston; American Economics Association Meeting, San Francisco; The World Bank, Innovation Labs; TEDxBeaconStreet; Visual Computing Seminar, Microsoft Research Redmond

RESEARCH GRANTS

Stanford AI Lab Human-centric AI Research Grant (co-investigator) ($50,000)	2018
NSF Methodology, Measurement, and Statistics Grant (co-investigator) ($160,000)	2018
Sloan Foundation Conference Grant (co-investigator) ($20,000)	2017
Harvard Star Family Award for Promising Scientific Research (co-investigator) ($120,000)	2016
International Growth Centre Small Projects Grant (co-investigator) ($10,000)	2015

INTERN/GRADUTE STUDENT ADVISING

At Salesforce: Clara Wong-Fannjiang (UC Berkeley), Akash Gokul (UC Berkeley), Brian Chen (Columbia), Aman Shrivastava (U. Virginia), Viraj Prabhu (Georgia Tech), Alvin Chan (NTU), Isabela Albuquerque (U. Montreal), Ankan Bansal (U. Maryland)
At MIT/Harvard: Abhimanyu Dubey (Meta AI), Bowen Baker (OpenAI), Karan Dwivedi (Harvard), Otkrist Gupta (Startup), Jade Philipoom (MIT)

PROGRAMMING SKILLS

Programming Languages: Python, C/C++
Libraries: PyTorch, TensorFlow

SELECTED ACADEMIC AND PROFESSIONAL SERVICE

Co-organizer: *ICLR 2020 Workshop on Neural Architecture Search (with Frank Hutter, Aaron Klein, Arbor Zela, Liam Li, and others); CVPR 2019 Tutorial on Meta Learning for Computer Vision (with Chelsea Finn, Frank Hutter, Nitish Keskar, Richard Socher, and others); CVPR 2018 DeepGlobe Workshop on Satellite Image Understanding (with Ramesh Raskar, Manohar Paluri, Lorenzo Torresani, and others); Harvard Center for Mathematical Sciences and Applications' Conference on Big Data 2018 (with Shing-Tung Yau, Scott Kominers, and others)*

Program Committee/Reviewer: *CVPR, ECCV, ICCV, NeurIPS, ICLR, ICML, Nature, PNAS*