

Nikita Saxena

Predoctoral Researcher, Google India

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in nikita-saxena

📍 Citizen of United States of America (USA)

Education

July 2023	Birla Institute of Technology and Science Pilani	Pilani, India
Aug 2018	B.E. (Hons.) Computer Science, M. Sc. Physics Graduated with <i>Distinction</i>	CGPA: 9.43/10

Experience

Present	Google Deepmind	Bangalore, India
Aug 2023	<i>Predoctoral Researcher</i> Advisors: <i>Evan Shelhamer, Isabelle Guyon</i> <ul style="list-style-type: none">> Implemented a super-resolution pipeline (> 8x upsampling) that inputs a timeseries of imagery at 10 meters (m) resolution and performs segmentation at 1m resolution.> Performed large-scale distributed training (with TPUs) of geo-foundational model (FM).> Exploring FM embeddings for downstream task of pan-India panoptic crop segmentation.> Integrated LLMs and T2I models to generate editable infographics to assist human-AI co-creation.> Designing auto-evals for infographics generated by T2I models.	
May 2023	Mila-Quebec AI Institute	Montreal, Canada
Sept 2022	<i>Research Fellow</i> Advisor: <i>Prof. Yoshua Bengio</i> <ul style="list-style-type: none">> Discovered diverse molecules and peptides with specific properties in an active learning setting using multiple cheap approximations (oracles) of the target function.> Enhanced GFlowNets to sample candidates proportional to rewards given by a multi-fidelity acquisition function based on mutual information.> Proposed algorithm identifies desirable candidates within <50% computational cost expended by the single expensive oracle.	
Aug 2022	Bloomberg	Pune, India
May 2022	<i>Software Engineering Intern</i> <ul style="list-style-type: none">> Designed a C++ infrastructure that abstracts the database accessor pipeline and provides clients with detailed information on the corporate actions that have impacted their securities.> Designed the UI and monitoring dashboard on Humio for the service.	
Sept 2021	Tufts University, IAIFI	Boston, USA
May 2021	<i>Research Intern</i> Advisors: <i>Prof. Taritree Wongjirad, Prof. Shuchin Aeron</i> <ul style="list-style-type: none">> Designed a generative network to simulate neutrino events conditioned on the particle's momentum.> Implemented vector-quantized variational autoencoder (VQ-VAE) and auto-regressive model.	
Sept 2020	Space Applications Center, ISRO	Remote
May 2020	<i>Research Intern</i> Advisor: <i>Dr. Neeraj Agarwal</i> <ul style="list-style-type: none">> Implemented a two-stage Super Resolution Convolution Neural Network to increase the spatial resolution of Sea Surface Temperature (SST) fields from 15 km to 5km and then from 5km to 1km.> Predicted images achieved a 12 dB higher PSNR (Peak Signal to Noise Ratio) than input images.	
July 2020	CureSkin.ai	Remote
June 2020	<i>ML Research Intern</i> <ul style="list-style-type: none">> Detected and classified five wrinkle classes across diverse human faces using RetinaNet and focal loss.> Experimented with image processing techniques to achieve a final Mean Average Precision (maP) of 0.8.	
June 2020	Couture.ai	Remote
May 2020	<i>ML Research Intern</i> <ul style="list-style-type: none">> Devised a structural similarity index (SSI) based algorithm to filter non-redundant frames from videos.> Implemented CRAFT detection module for text recognition from scene images (video frames).> Formulated a logic using spaCy and TextRank to extract contextually significant phrases from text.	
May 2020	Xplorazzi Technologies	Remote
Apr 2020	<i>ML Research Intern</i> <ul style="list-style-type: none">> Built a pipeline to detect price tags from images of supermarket shelves and interpret prices from them.> Integrated Feature Pyramid Network (FPN) with YOLO to achieve a Mean Average Precision (mAP) of 0.8.	

Publications

Multi-Fidelity Active Learning with GFlowNets [paper]

Alex Hernandez-Garcia*, Nikita Saxena*, Moksh Jain, Cheng-Hao Liu, Yoshua Bengio

Accepted to TMLR'24; Accepted to Workshop on Adaptive Experimental Design and Active Learning in the Real World, NeurIPS'23.

Learning to Detect: A Semi Supervised Multi-relational Graph Convolutional Network for Uncovering Key Actors on Hackforums [paper]

Nikita Saxena, Vinti Agarwal

2021 IEEE International Conference on Big Data

[IEEE '21]

Towards Designing and Exploiting Generative Networks for Neutrino Physics Experiments using Liquid Argon Time Projection Chambers [presentation]

Nikita Saxena, Paul Lutkus, Taritree Wongjirad, Shuchin Aeron

2021 Meeting of the Division of Particles and Fields of the American Physical Society

[DPF '21]

Efficient Downscaling of Satellite Oceanographic Data With Convolutional Neural Networks [paper]

Nikita Saxena

In Proceedings of the 28th International Conference on Advances in Geographic Information Systems. Association for Computing Machinery, New York, NY, USA, 659-660.

[ACM '20]

Implementation and Validation of Murrell's Version Kalman Filter for Attitude Estimation. [paper]

Gaurav Sharma, Tushar Goyal, Aditya Bhardwaj, Nikita Saxena, Jeet Yadav

71st International Aeronautical Conference, Adv. Astronaut. Sci. Technol. 4, 91-106 (2021).

[IAC '21]

Selected Projects

Graph Based NLP Approach for Forum User Classification

Aug'21 - Dec'21

Project Advisors: Dr. Vinti Agarwal, BITS Pilani, India

- > Adapted semi-supervised learning to classify darkweb users using a multi-relational graph convolutional network (GCN).
- > Experimented with different document embedding generation to achieve a classification accuracy of 80%.
- > **Tools:** Natural Language Toolkit (NLTK), BERT, Keras, Python.

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Contrastive Learning for Particle Jet Classification

Aug'21-Dec'21

Project Advisor: Dr. Tilman Plehn, Heidelberg University, Germany

- > Trained a self-supervised model to map particle jets to a representation space.
- > Performed classification on the obtained embeddings to obtain an AUC of 0.8.
- > **Tools:** scikit-learn, TensorFlow, Python.

[code]

Graph Neural Network for Position Reconstruction

Oct'20-Feb'21

Project Advisor: Dr. Kaixuan Ni, University of California, San Diego

- > Reconstructed the position of collisions within XENON1T detector with a graph neural network (GNN).
- > GNN achieved a RMSE of 1.936 outperforming the conventional reconstruction framework, *Straxen*, by 67%.
- > **Tools:** Spektral, *Straxen*, Keras, Python.

[code] [details]

Honors and Awards

2023	Department Rank 1 , Among students graduating with B.E. Comp. Sc. and M. Sc. Phy.	BITS Pilani, India
2018 - 23	Institute Merit Scholarship , Awarded to top 2% academic achievers in batch of 1500.	BITS Pilani, India
2022	Globalink Research Award , Awarded \$6,000 for undergraduate thesis proposal.	MITACS, Canada
2021	Charpak Lab Scholarship , Among 15 students awarded funded internships in France.	Campus France
2021	DAAD-WISE Scholarship , Funded internship at a research lab in Germany.	DAAD
2020	Best Student Paper Award , Undergraduate Track at ACM SIGSPATIAL'20.	ACM
2018	INSPIRE Scholarship , Awarded to top 10,000 high school academic achievers in India.	Govt. of India
2016	Underwriter Laboratories , Granted \$750 to carry out a road safety campaign.	Youth Service America

Skills

Relevant Coursework	Deep Learning, Data Structures and Algorithms, Object Oriented Programming, Linear Algebra, Probability and Statistics, Discrete Mathematics, Quantum Information Computing
Programming	Proficient: Python, C++, Latex Familiar: C, MATLAB, Java, MySQL
Frameworks	Proficient: TensorFlow, Pytorch, Keras Familiar: JAX