

Anuj Nagpal

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EDUCATION

Stanford University

Masters in Computational and Mathematical Engineering; GPA: 4.1/4.0

California, U.S.A.

Sep 2021 - June 2023

Indian Institute of Technology Kanpur

Bachelors in Computer Science and Engineering; GPA: 9.3/10.0

Uttar Pradesh, India

July 2014 - May 2018

WORK EXPERIENCE

Matic Robots, Inc.

Research Engineer

Mountain View, California

August 2023 - Current

- Designed robust and efficient **Visual SLAM** algorithms in **Rust** with support for loop closure, map merge, re-localization, and bundle adjustment using **Google's Ceres Solver**.
- Improved pose estimates by **60%** by replacing hand-engineered rules with **NetVLAD** for extracting global image descriptors, **SuperPoint** for keypoint extraction, and **LightGlue** for keypoint matching.
- Spearheaded **Odometry** model using wheel encoder data, removing failure points for keypoint tracking in featureless areas.
- Reduced **corrupted slamgraph instances** by **80%** by building evaluation platform and visualizer tools for **multi-threaded and non-deterministic** SLAM system in **Streamlit (Python)** and **eframe (Rust)**.
- Enhanced 3D object detection and semantic segmentation accuracy by designing **50+** realistic simulations using **Microsoft's AirSim C++ plugin with Unreal Engine 5**.

Facebook

Machine Learning Engineering Intern

Menlo Park, California

June 2022 - September 2022

- Improved search and recommendations for **Facebook Marketplace** by designing an **end-to-end Multimodal network in PyTorch** with a multi-head classification network for objects and attributes.
- Automated **machine learning pipeline** through **SQL data processing in Apache Hive** and **distributed training** using **FAIR's MultiModal Framework (MMF)**.
- Increased **precision (mAP)** for object-attribute **composition classification** by **3%** on internal marketplace data using **Swin transformer** backbone in image encoder.

Goldman Sachs

Associate

Bengaluru, India

June 2018 - July 2021

- Boosted trade volume on **electronic market exchanges** by developing **algorithms and infrastructure in Java** for automatic and manual trading of **fixed-income products**.
- Expanded e-trading inventory of **Credit Default Swap Indices** by **3 times in London** and **1.5 times in New York** by devising auto-pricing algorithms and constructing live trading channels.
- Built robust **microservices** for **auto-trading state machines** and **algorithmic price streams** using **Maven, Jenkins, GitLab and Kafka**, capable of handling **50K+ requests with millisecond latency** and rapid market movements.

RESEARCH EXPERIENCE

Stanford University

Graduate Student Researcher

Stanford, California

August 2021 - December 2022

- Decreased **text perplexity** by **63%** than maximum likelihood based models for **natural language generation** by devising an **adversarial-free imitation learning approach** in **PyTorch** - **Won the best project award**. [Project Link]
- Formulated a **multi-sample denoising autoencoder** approach for **score value estimation in diffusion models**, giving **training speedup with an inverse power-law (0.37 exponent)** and improved image generation quality. [Project Link]
- Constructed **neural Granger causality models** with sparsity inducing penalties on **MLPs, RNNs and LSTMs**, capturing **95%+ causal matrix entries** for time series having long-range non-linear relations. [Project Link]

TEACHING ASSISTANT EXPERIENCE

- CS224N**: Natural Language Processing with Deep Learning, Stanford University Winter 2023
- CME323**: Distributed Algorithms and Optimization, Stanford University Spring 2022
- CS236G**: Generative Adversarial Networks, Stanford University Winter 2022
- CME100**: Vector Calculus for Engineers, Stanford University Fall 2022, Spring 2023
- ESC101**: Fundamentals of Computing, IIT Kanpur Winter 2018

TECHNICAL SKILLS

- Languages**: Python, Rust, C++, C, SQL, Java, Scala, JavaScript, Ruby, Bash, R, Matlab, HTML, CSS
- Libraries/Tools**: PyTorch, TensorFlow, Protobuf, Docker, DVC, Grafana, Bazel, AWS S3, PyG, JAX, Unreal Engine