Aditya Makkar

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Education

New York University — New York, US
Ph.D. in Reinforcement Learning (GPA: 4.0) — *Jan 2024 – Present*

Columbia University — New York, US
M.Phil. in Electrical Engineering (GPA: 4.05) — *2021 - 2022*
M.S. in Electrical Engineering (GPA: 3.98) — *2019 - 2020*
Relevant courses: Modern Analysis (A+), Topology (A+), Analysis & Probability (A+), Empirical Process Theory (A+), Concentration of measure, Modern Algebra, Statistical Inference, High-dimensional statistics, Analysis of Algorithms (A+), Foundations of Graphical Models, Bayesian Models for Machine Learning
A+ for exceptional performance (4.33/4)

Indian Institute of Technology Delhi — Delhi, India
B.Tech. in Mechanical Engineering (GPA: 7.638/10) — *2012 – 2016*
Relevant courses: Number theory, Natural Language Processing, Robotics, Linear algebra, Differential equations, Artificial Intelligence, Game theory, Control theory

Research Interests

Understand the interaction of several autonomous agents and study emergent intelligent behaviours. I am particularly interested in the settings of non-stationary environments and incomplete observations—like in multi-agent RL.

Experience

Morgan Stanley — June 2023 – December 2023
Quantitative Strategist — *New York, US*
- Trading interest rate products (US Treasuries, swaps, futures and options) using tools from stochastic analysis, stochastic control and statistics. Developing front end and back end for tools used by traders.

Goldman Sachs — June 2016 – June 2019
Machine Learning Engineer — *Bangalore, India*
- Member of statistical modeling team within Surveillance Analytics Group headed by Dr. Howard Karloff. Responsible for researching and developing **machine learning** and statistical tools for surveillance models which must process **terabyte-scale data** and flag anomalous activities.
- Worked closely with data curation team to design databases for efficient data retrieval for ML applications.

PhD Research Projects at Columbia

Fast Bayesian nonparametric ensemble: Developing a fast way to combine several regression models that allows adaptive weighing and uncertainty quantification using Bayesian nonparametric machinery, random Fourier features and conformal prediction. Paper here.
Kernel based nonparametric tests: Proving properties of statistical tests, like goodness-of-fit, homogeneity and independence testing, using the framework of reproducing kernel Hilbert space (RKHS) embedding of probability measures. This uses results from operator theory.

Awards

Summer schools: Received full funding to attend two summer schools: PIMS-IFDS-NSF Summer School on Optimal Transport (2022) & 50$^{\text{th}}$ Probability Summer School Saint-Flour, France (2022)
IIT Delhi Semester Merit Award (2 times): batch top 7%. 2012-2013
Indian National Mathematical Olympiad (INMO) finalist (2 times): 3$^{\text{rd}}$ rank in the state of Uttar Pradesh (largest state) in Regional Mathematics Olympiad. 2012
KVPY fellowship: 250 students awarded nationally by the Government of India. 2012
NTSE fellowship: 1000 students awarded nationally by the Government of India. 2008

Miscellaneous

Teaching Experience at Columbia University: Graduate Introduction to Machine Learning – Spring 2021, Fall 2021; Digital Signal Processing – Fall 2022
Programming: Python, Java, C++, JAX, PyTorch, Hadoop, Spark