

Keerat Kaur Guliani

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CAREER INTERESTS

Applied Machine Learning—Data Science—Computational Healthcare—Reinforcement Learning—Causal Inference. Self-motivated & quality-oriented, I am driven by my work's impact. Currently working as a graduate researcher at the Vector Institute with Dr. Rahul Krishnan. Will begin my internship at Vanguard AI Research in May 2023.

EDUCATION

University of Toronto, Canada

Sep 2022 - Dec 2023 (Expected)

MSc - Applied Computing (Data Science), Department of Computer Science

Coursework: Topics in ML: Causal Inference, Methods of Applied Statistics, Data Science: Methods, Collaboration and Communication, Communication for Computer Scientists, Natural Language Computing, Technical Entrepreneurship

Indian Institute of Technology (IIT), Roorkee, India

Jul 2018 - May 2022

Gold Medallist, B.Tech - Civil Engineering (Major), Computer Science (Minor)

Class Rank: 1/151 GPA: 9.55/10

Relevant Coursework: Machine Learning, Probability & Statistics, Linear Algebra & Calculus, Numerical Methods & Computing, Data Mining for Business Intelligence, Algorithms, Database Management Systems, Artificial Intelligence, Computational Geometry

TECHNICAL SKILLS

- **Languages:** Python, R, C++, Git, Shell Scripting
- **Frameworks:** Pytorch, TensorFlow, Keras
- **OS:** Windows, Linux, macOS
- **Tools and Libraries:** Pandas, scikit-learn, NumPy, LaTeX, Streamlit, GIS, VAST, Mujoco.

PROFESSIONAL EXPERIENCE

DAAD WISE - Deep Learning Research Intern

Jul 2021 - Sep 2021

Machine Learning Lab, University of Freiburg, Germany (Remote)

- **AutoRL:** Worked on a Novel Population-Based method for Hyperparameter Optimisation using Reinforcement Learning.
- Extensively reviewed codebases to merge two previous algorithms PBT-BT and PB2.
- Resulted in an improvement of agent performance in two RL task environments w.r.t. baseline parent algorithms.

Learning Analytics - Data Science Intern

Summer 2021

Plio@Avanti Fellows, India (Remote)

- **Data Science:** Analysed the learning behaviour of students using Plio (interactive video platform).
- Derived actionable insights about different types of users from platform engagement data and made interactive dashboards for enhanced analytical experience using streamlit.
- Discovered varied learning patterns and identified a set of power users to boost platform engagement, amongst other findings.

Synaptic Connectivity Detection - Deep Learning Research Intern

Jun - Dec 2020

Lichtman Lab, Harvard University, USA (Remote)

- **Deep Learning & Developmental Connectomics:** Performed synaptic location & connectivity detection to get synaptic segmentation in the mouse cerebellum using 3D Computer Vision models (U-Net & CNN).
- Ran end-to-end experiments: model training, inference, proofreading predicted voxels to generate better quality feedback data. Learnt a new software VAST for the latter.
- Identified methods like masking to reduce the extremely high False Positive Rate from the model's first training.

CoronaActionIndia - Machine Learning Research Intern

Summer 2020

MEDAIME, IIT Delhi, India (Remote)

- **Reinforcement Learning & Public Health:** Proposed a novel Reinforcement Learning-based pipeline 'VacSIM' to ensure optimal distribution of vaccines developed against Coronavirus.
- Developed an RL environment compatible with OpenAI gym to capture the vaccine distribution dynamics at a time when vaccines were yet to be released. Model concatenated Deep RL algorithms with contextual bandits.
- Demonstrated the possibility of preventing an additional 9039 potential infections over 45 days, over a naive distribution policy.

PROJECTS

Effect of Bias on Treatment Effect Estimation (Causal Inference Course, UofT): Compared response of different causal inference methods to bias in real world data. Used RCT data as baseline to test a novel algorithm (2022).

Synthetic Data Generation [Slides][Code] (Volunteer at Data Dive, DataKind): Used ML to generate & assess synthetic patient data & provided recommendations for its development via statistical hypothesis testing (2021).

PAPERS (FULL LIST OF CO-AUTHORS AVAILABLE ON MY WEBSITE)

VacSIM: Learning Effective Strategies for COVID-19 Vaccine Distribution using RL [Paper] (Joint First-Author)

Less Wrong COVID-19 Projections With Interactive Assumptions [Preprint]

DEAP Cache: Deep Eviction Admission and Prefetching for Cache [Preprint]

Universal Adversarial Perturbations - A Survey [Preprint]

HONORS AND AWARDS

- Graduated First Division with Distinction from IIT Roorkee, Department Gold Medal and Best Project Award (2022).
- DAAD-WISE Scholar (Supervisor: Prof Frank Hutter) (2021).
- Awarded the IITR Heritage Foundation Award & ENCORE Scholarship for outstanding all-round achievements (2021).
- Awarded the Summer Research Fellowship by the Indian Academy of Sciences (2020).
- National Talent Search Examination Scholar, India (2016).

EXTRA-CURRICULAR

Co-President, Vision & Language (DL Research) Group, IITR — Additional Secretary, The Debating Society, IITR