Vikhyat Agrawal

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Education

2024 – Present **École polytechnique fédérale de Lausanne (EPFL), Switzerland** Grade: **5.78/6.0**
Master of Science in *Data Science*

2020 – 2024 **Indian Institute of Technology Bombay, India** Grade: **9.03/10.0**
B.Tech. *Engineering Physics*
Minor in *Artificial Intelligence and Data Science*

Publications

2024 Federated Learning and Differential Privacy Techniques on Multi-hospital Population-scale Electrocardiogram Data. **V Agrawal**, S Kalmady, V Malipeddi, M Manthena, W Sun, S Islam, A Hindle, P Kaul, R Greiner. International Conference on Medical and Health Informatics (**ICMHI 2024**) [pre-print][paper]

2023 Deep Multi-task Learning for Early Warnings of Dust Events: Evidence from The Middle East. R Sarafian, Nissenbaum D, Raveh-Rubin S, **V Agrawal** & Rudich Y. **NPJ Climate and Atmospheric Science** [paper]

Professional Experience

2025* **Research Assistant** ***Oracle Labs, Zürich***
- Developing Oracle WayFlow, an open-source framework for Agentic Large Language Models (LLMs) to automate and streamline complex workflows, while still maintaining flexibility.
- Implementing **Retrieval-Augmented Generation (RAG)** powered agents integrated with **Oracle Database** and external tools to enable efficient knowledge retrieval.
- Designing automated tests to evaluate the efficacy and robustness of LLM-based agents, improving their reliability and dependability.

2024 **Machine Learning Intern** ***Wadhwani AI: AI for Social Impact***
- Addressed the Active Case Finding problem of Tuberculosis (TB) in India, with the aim of reaching an estimated 500,000 missing cases of TB in the country
- Utilized geospatial data to identify and map TB hotspots by using grid-based predictive modelling

2022 **Data Science Intern** ***Marsh McLennan***
- Explored and reviewed various **Differential Privacy** and **Synthetic Data** generation algorithms
- Experimented and tested the limitations of data synthesizers such as GoogleDP, YData, Gretel
- Experimented, compared and quantified the performance of various generative models (CGAN, WGAN,etc) for generating synthetic tabular data and synthetic time series data

Research Experience

2024* **Kolmogorov–Arnold Networks (KANs) for Image Recognition** ***LIONS Lab @ EPFL***
- Neural Architecture Search (NAS) on Kolmogorov–Arnold Networks (KANs) for Image Recognition tasks by replacing MLPs with KANs in MLP-based vision models
- Adapted Kolmogorov–Arnold Networks (KANs) to scale for ImageNet-1k, with the manuscript for publication in progress

2023 **Hospital Re-admissions with Neural TPPs** *Guide: Prof. Russell Greiner* | ***University of Alberta***
- Performed analysis on censored hospital re-admission data between state of the art **Temporal Point Process models** and Individual Survival Distribution models for **survival analysis**
- Enhanced transformer-based time-series prediction TPP models (HYPRO, DualTPP) for right-censored patient data by integrating event/patient meta-data and multi-label sequence generation
- Worked on implementing Federated Learning and Differential Privacy techniques for diagnosing cardiovascular diseases using ECG data

Research Experience (continued)

2022 **Explainable AI for Multi-task learning** ***Weizmann Institute of Science***
- Employed meteorological data of 18 years for predicting dust storms in Israel, 24 hours ahead
- Developed model interpretability visualisation tools for various model outputs
- Explained model performance by implementing Explainable AI tools like **Integrated Gradients, Saliency Maps, GradientSHAP** and demonstrated cluster formation by model embeddings
- Improved Recall by 9% and Precision by 20% compared to prior state-of-the-art models in literature

Projects

2025 **Ranking Experts in Beer Reviews Dataset** [🌐] *Academic Project, Applied Data Analysis*
- Developed an expertise metric based on standardized beer flavor terminology in text reviews.
- Analyzed expertise progression over time, across different countries, and in relation to beer styles.
- Identified top reviewers and exploring the impact of popular beer events on review quality.

2023 **Grammatical Error Correction** *Academic Project, Deep Learning for NLP*
- Designed and evaluated two models for Grammatical Error Correction (GEC) on the C4 dataset
- Adapted and improved a Multi-layer Convolutional Encoder-Decoder Neural Network for GEC
- Achieved a BLEU score of 0.732 along with an F0.5 score of 0.693 using GloVe word embeddings
- Fine-tuned the T5 model for GEC and achieved a BLEU score of 0.871 and a F0.5 score of 0.832

Modelling Tuberculosis in India *National Disease Modelling Consortium*
- Modelled transmission of Tuberculosis (TB) transmission dynamics using differential equations
- Estimated key indicators of data by calibrating model parameters to equilibrium
- Adapted a Bayesian Synthesis framework to capture real-life uncertainty in the model inputs

2022 **Assesing Solar Wind Synergy in India** *Supervised Learning Project*
- Assessed the Spatio-temporal synergy between wind and solar energy resources for India
- Quantitatively assessed hybrid solar-wind power plant feasibility as an alternative to coal plants
- Used parallel computing frameworks (e.g., DASK, XArray) for resource-intensive computations

2021 **Analysing Spatiotemporal COVID-19 Data** *Guide: Prof. Mithun Mitra | IIT Bombay*
- Evaluated and Assessed the success of Contact Tracing Program deployed by MCGM(Government)
- Cleansed large spatio-temporal COVID-19 government data and visualised its spread
- Extracted key insights by modelling the spread by using a tree-based transmission graph model

Relevant Coursework

Core ML/AI: Reinforcement Learning, Advanced Topics in Machine Learning, Deep Learning for Natural Language Processing, Automatic Speech Recognition, Foundations of Intelligent and Learning Agents

Theory: Learning Theory, Mathematics of Data: From Theory to Computation, Optimization in Machine Learning, Statistical Physics of Computation

Data Science: Applied Data Analysis, Statistics for Data Science

Scholastic Achievements

2024 Awarded the prestigious **J.N. Tata Endowment Scholarship** to pursue graduate studies

2023 Secured **Department Rank 8** out of 66 students in Bachelor's

Awarded the **MITACS Globalink** fellowship for pursuing undergraduate research in Canada

2020 Secured **All India Rank 590** in **JEE Advanced** among 150,000 aspirants (Top 0.4%)

Secured **99.80 percentile** in **JEE Main** amongst 0.92 million candidates (Top 0.2%)

Technical Skills

Programming	Python, C++, FORTRAN, R
Software	MATLAB, LTSpice, Git, AutoCAD, Google Cloud, AWS, Azure
Machine Learning	PyTorch, TensorFlow, Captum, OpenCV, Scikit-learn, NumPy, Pandas, Scipy