Nirlipta **Pande**

nirliptapande@protonmail.com | nirliptapande.github.io | nirliptapande

Education

TU Graz — *Graz, Austria*

ELLIS Doctoral Candidate, Advised by Prof. Robert Peharz — *April 2025 - Present*

- Developing compositional RL system using MCTS-guided policy networks with object-level transformations in grid-based reasoning in ARC-AGI

Birla Institute of Technology and Science Pilani (BITS Pilani) — *Pilani, India*

(Dual Degree) B.E. in Computer Science, M.Sc. in Economics — *Aug. 2017 - July 2022*

- CGPA: 8.66/10
- Relevant coursework: Linear Algebra, Multivariate Calculus, Differential Calculus, Probability and Statistics, Design and Analysis of Algorithms, Object Oriented Programming, Artificial Intelligence, Database Systems, Operating Systems

Publications

Brain Inspired Discrete Representations for GRN Inference using GFlowNets — *NUS Singapore, UT Austin*

Nirlipta Pande, Raghav Arora, Dianbo Liu — *16 December, 2024*

NeurIPS 2024, Women in ML Workshop

Investigating causal effects of anthropogenic factors on global fire modeling — *TU Wien, Austria*

Nirlipta Pande, Wouter Dorigo — *28 April, 2023*

EGU General Assembly, 2023

Effect of Socioeconomic Variables in Predicting Global Fire Ignition Occurrence — *TU Wien, Austria*

Tichaona Mukunga, Matthias Forkel, Matthew Forrest, Ruxandra-Maria Zotta, Nirlipta Pande, Stefan Schlaffer, Wouter Dorigo — *10 May 2023*

MDPI Fire

Relevant Research

Traversing Low Rank Manifolds with GFlowNets — *NUS Singapore*

Prof. Dianbo Liu — *February 2024 - Present*

- Developed Scalable techniques for Bayesian Inference of Gene Regulatory Networks for dynamic cyclic causal structures using GFlowNets
- Experimentally proved that RNA sequencing datasets lie on a manifold whose dimensionality is lower than observed dimensionality
- Implemented a 2x speed up with comparable accuracy in a 50 variable RNA system with feedback loops
- These results shared in the NeurIPS WiML 2024 workshop

FURNACES — *TU Wien*

Prof. Wouter Dorigo — *August 2022-August 2023*

- Developed deep learning techniques for modeling anthropogenic effects on global ignition models
- Proposed and incorporated causal learning to account for the confounding and mediating effects of climatology, vegetation and socioeconomic factors in global ignition models
- Increased runtime efficiency by 4x through extensive code profiling. Gap-filling using splines increased the accuracy by 5%
- Presented our results at EGU 2023

Scalable OPTRAM and Forecasting of Sentinel-2 Tiles — *BOKU, Vienna*

Prof. Clement Atzberger — *Fall 2021-Summer 2022*

- Deployed an end-to-end machine learning pipeline for forecasting Sentinel-2 products
- Implemented neural processes for gap filling and additive variations of Prophet and, AutoARIMA. for forecasting.
- Optimized Optical Trapezoid Model (OPTRAM) for mapping remote sensing observations to soil moisture content resulting in 5x speed up which was deployed to provide faster real-time crop assessments
- Defended the project as my bachelor thesis

GDP Nowcasting — *BTH, Karlskrona*

Prof. Prashant Goswami

- Implemented Deep Dynamic Factor models for GDP forecasting using 2-step aggregation and autoencoders
- Demonstrated improved in-sample and out-of-sample predictions using leading and contemporaneous indicators like housing sales and the number of newly registered startups

Honors, Awards and Scholarships

NeurIPS Women in ML travel grant	Awarded by Women in ML to present at WiML NeurIPS 2024
Undergraduate Overseas Research Award	Awarded by IPCD, BITS Pilani for pursuing senior thesis at BOKU Vienna in Fall 2021
France Excellence Charpak Lab Scholarship	Awarded by the French Government for pursuing an internship during Summer 2020

Learning Projects

Autonomous Driving Scenario Generation using Large Language Models — *SimDaaS*

Learning Project

- Incorporated in-context learning and chain-of-thought prompting using DSPy to automate the generation of open scenario description files from natural language prompts
- Integrated semantic understanding capabilities to ensure generated scenarios adhered to traffic rules and physical constraints

Evaluation of Temporal Coherency in Diffusion based Video Models — *BTH, Karlskrona*

Prof. Prashant Goswami

- Review of metrics for text-to-video generation models
- Proposed a novel metric to measure spatio-temporal coherency in generated videos. We evaluate the frame-to-frame consistency and the adherence to long-term motion dynamics
- Analyzed performance trends across different diffusion-based video generation approaches, identifying their key strengths and limitations

Detection of LLM Generated Text from Human Generated Essays — *Kaggle*

Learning Project

- Approached two alternative hypotheses, one, that tokens sampled by an LLM follow a statistically distinct distribution than a human generated text and two, human-generated text by humans of age range 11-15 are generated from the same distribution because of similar vocabulary and references.
- Implemented an ensemble of quantized models from the DeBERTa-family on PERSUADE corpus with 90.24% efficiency

Crop Yield Prediction — *BITS Pilani*

Prof. Navneet Goyal

- Developed a hybrid model in PyTorch to model spatiotemporal data by combining ARIMA and LSTM to extract the underlying linear and non linear distributions
- Implemented a CNN based architecture for crop yield forecasting on custom datasets on lines of You et al.

Air Pollution Modeling — *CEERI, Pilani*

Summer Internship, 2019

- Designed fusion nets using LSTMs and CNNs for spatiotemporal air pollution modeling

Compiler Construction for a Custom Language — *BITS Pilani*

Compiler Course

- Created a compiler for a strongly-typed language that supports basic datatypes, arithmetic expressions, functions and iterations
- Implemented the working of a lexer, semantic analyzer (for AST generation, type checking, etc) and assembly code generator

Skills

Programming	Python, JAVA, C, R, MATLAB, Javascript, Stata, LaTeX
Frameworks	Pytorch, TensorFlow, Keras, Scikit, Django
Areas of Interest	Causal Learning, Bayesian Inference, Representation Learning

Leadership and Volunteering Services

Geo-Tag — *TU Wien*

Volunteer — *June 2023*

- Organized the open day for Geodesy and Geoinformation at TU Wien
- Worked on event presentations, chaperoned school groups, facilitated ice-breaking activities, and helped set up the event to ensure a smooth and engaging experience for attendees.

Student Faculty Council — *BITS Pilani*

Core Team Member — *January 2021 - August 2021*

- Collaborated with faculty and administration to facilitate online learning and served as a student representative during COVID-19

BITS Embryo — *BITS Pilani*

Website Development Team Head — *January 2019 - May 2020*

- Created the official BITS Embryo Website with 5 other team members. It was made in Django and JavaScript