RAHUL VISHWAKARMA

Int. MSc. - Mathematics & Computer Science

CONTACT

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SKILLS

Python 6+ yrs

Machine Learning 4+ yrs

PyTorch 3+ yrs

Lean Prover 3+ yrs

Web Development 5+ yrs

Machine Learning

- PyTorch
- Scikit-learn
- PyTorch Geometric
- PyTorch Lightning
- Transformers (Hugging Face)
- TensorFlow
- Keras

Web Technology

- Django
- HTML
- CSS
- JavaScript
- PostgreSQL
- SQLite
- Google OAuth
- Swagger
- Flask
- Selenium
- Beautiful Soup

PUBLICATIONS

IndoorGNN: A Graph Neural Network based approach for Indoor Localization using WiFi RSSI — BDA 2023

11th International Conference on Big Data and Artificial Intelligence

Authors: Rahul Vishwakarma, Rucha Bhalchandra Joshi, and Subhankar Mishra
Status: Accepted

Enhancing Neural Theorem Proving through Data Augmentation and Dynamic Sampling Method — arXiv

Authors: Rahul Vishwakarma and Subhankar Mishra
Status: Available on arXiv

PROJECTS

Digital Takshashila — Sept 24 - Ongoing

Tool: Django, Python, Beautiful Soup, LLModel

Currently, I am working as a JRF (Project Associate) at IIT Hyderabad, under Dr. Mohan Raghavan. Our project focuses on developing a digital library to preserve and share ancient Indian knowledge by scraping various sources and creating a public-facing interface. Our web interface for accessing the services is available at: Dhara Page

Neural Theorem Proving — Jun 23 - June 24

Tool: Python, PyTorch, ByT5 LLModel, Lean, LeanDojo, Flask

This was my MSc thesis, supervised by Dr. Subhankar Mishra. In this research, we fine-tuned LLMs (ByT5) and combined them with the interactive prover Lean to automate mathematical proof generation. Some of our contributions are - introduction of a dynamic sampling method, augmentation of the training dataset, and development of a tokenizer specific to Lean 4. Additionally, we developed a website for Neural Theorem Proving to make our method easily accessible through both web and API usage.

GNN-Based Indoor Localization with WiFi RSSI — Aug 22 - May 23

Tool: Python, Scikit-learn, PyTorch Geometric, Docker

In this project, we focused on improving the accuracy of location prediction in an indoor environment using WiFi RSSI. We trained machine learning models to capture intricate signal strength patterns unique to indoor spaces. We introduced a method called IndoorGNN, which utilizes Graph Neural Networks to achieve superior indoor localization performance, surpassing conventional algorithms such as kNN, SVM, and MLP. This project resulted in the publication of IndoorGNN.

Python Packages

- Pandas
- NumPy
- Folium
- Pillow
- Matplotlib
- Geopandas
- Seaborn
- OpenCV

Related Courses Taken

- Linear Algebra
- Probability Theory
- Graph Theory
- Statistics
- Discrete Mathematics
- Number Theory
- Theory of Computation
- Discrete Structure and Computation
- Design and Analysis of Algorithms
- Introduction to Machine Learning
- Advanced Machine Learning

ACHIEVEMENTS

JRF Scholar

I am a Junior Research Fellow at IIT Hyderabad.

DISHA Scholar

DISHA (DAE Incentive Scheme for Holistic Science Education and Augmentation) - 5 year scholarship for undergraduate studies, by Department of Atomic Energy (DAE), Government of India.

National Exams Qualified

- GATE 2024
Data Science and AI (DA)
Marks (out of 100) - 42
GATE Score - 418
All India Rank - 4146 out of 39210 total appeared

- NEST (National Entrance Screening Test) | Gen. rank: 223

- JEE (Joint-Entrance Exam) Mains | Percentile: 97.3

Change detection in Satellite Images — **Jan - June 24**
Tool: PyTorch, Pillow, Satellite Images

In this project, we used machine learning for change detection (for roads and buildings) in satellite images over time. We trained ML models to predict masks for roads and buildings, then compared them across different timelines to identify changes. We also launched a website where users can upload two images of a region to detect changes using our trained model.

Theorem Proving in Lean — **May - July 22**
Tool: Lean 4, TensorFlow

During my internship at IISc Bangalore with Prof. Siddhartha Gadgil, I developed skills in theorem proving using the Lean Interactive Theorem Prover. Additionally, we explored the use of machine learning models to predict proof steps for theorems.

Recommendation System — **March - May 22**
Tool: Django, HTML

Developed a file access pattern-based recommendation system for NISER Archive to suggest study materials.

NISER Bus Tracker — **June - Dec 22**
Tool: Django, HTML, CSS, JavaScript

Developed a web app for sharing the live location of the NISER buses with its members.

EDUCATION

Int. MSc. - Mathematics (Major) & Computer Science (Minor) — **2019 - 2024**
National Institute of Science Education and Research Bhubaneswar, Odisha (India)

CGPA - 7.63/10

Sainik School Nagrota, Jammu, J & K (India) — **2011 - 2018**
(Physics, Chemistry, Math, CS)

12th (2018) - 82.8%
10th (2016) - 9.6 CGPA

ONLINE COURSES

Deep Learning with PyTorch Step-by-Step A Beginner's Guide — **Aug 22 - Feb 23**
Book

IBM Data Science Professional Certificate Course — **Dec - Jan 21**
Certificate of Completion

Statistics for Data Analysis Using Python — **Nov - Dec 21**
Certificate of Completion

WORKSHOPS & CONFERENCES

AI to Assist Mathematical Reasoning: A Workshop — **June 12-14, 2023**
The National Academies of Sciences, Engineering, and Medicine

ACM India Winter School - Algorithmic Foundations of Data Science — **Dec 11-22, 2023**
NISER Bhubaneswar, India

Lean Together 2024 : Workshop — **Jan 9-12, 2024**
Virtually via Zoom

EXTRACURRICULAR

- **President of the Coding Club NISER** - Served as the elected president of the Coding Club NISER (August 2022 - May 2023).
- **Winner** of **Outreach Page Competition** conducted by Coding Club NISER.
- Active contributor as a core member of the Coding Club since August 2019.