

DEVESH SHARMA

Pre-doctoral Research Assistant at Indian Institute of Science

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EDUCATION

BS-MS: Indian Institute of Science Education and Research

Bhopal

Major in Data Science & Engineering — Minor in Economics Sciences

Aug 2019 – May 2024

GPA: 8.27/10

- **Coursework (Major):** Optimization, AI, Data Structures, Discrete Mathematics, Econometrics, Game Theory, Linear Algebra, Multivariable Calculus, Probability, Statistics, DS-ML, Algorithms, Databases, Computer Vision, Deep Learning, NLP, Spatial Data Science, Transfer Learning, Accelerated AI.
- **Coursework (Minor):** Microeconomics, Macroeconomics, Mechanism Design (Algorithmic Game Theory), Political Economics, Time Series Analysis and Forecasting.
- **Relevant Course Projects:** PCL Detection, Effects of Sampling on the HSIC Dependence Measure, Algorithms for Fire Evacuation Planning, Image Segmentation using Colour based clustering, Visibility Prediction over Indo-Gigantic Planes, Federated Learning in Graphs.

RESEARCH WORK

•Link Prediction in Multiplex Network

working paper

BS Thesis under Dr. Jasabanta Patro

A novel attention based framework for predicting links in a layer of a multiplex network. In this work we introduced two deep learning frameworks for processing the information from $n-1$ layers of a multiplex network to predict the edge between two nodes. The objective is to:

- Learn a model f that takes L number of subgraphs each one corresponding to the L layers of multiplex network, to predict the relationship in our target subgraph.
- Model f should generalize well for unseen subgraph U' not seen while training.

•A graphical approach for workflow discovery in Task Oriented Dialogues.

MS Thesis under Dr. Jasabanta Patro

The primary objective of this work was to create a framework for more effective workflow extraction. A workflow can be defined as a series of actions required to complete a specific task. We framed the problem as one of graph structure prediction. By generating a graph from the given conversation, we aim to learn an appropriate graph structure for workflow prediction. This involves utilizing a Graph Updater Algorithm to learn the structure, along with the embeddings for the graph using a Graph Neural Network (GNN) to enhance embeddings. At the core of our model, we use a Large Language Model (LLM) for classification.

EXPERIENCE

•Predoctoral Researcher

Dec. 2024 - Present

Indian Institute of Science

Bengaluru, India

- Gaussian Process in Higher order graphs, Signal Processing in Heterogeneous graphs. (**working paper**)
- Working on Big Data graph analysis, Project in association with **National Payments Corporation of India (NPCI)**

•Predoctoral Researcher

Aug. 2024 - Nov. 2024

IIT Delhi

New Delhi, India

- Led the development of a machine translation model for a tribal language project, sponsored by the Government of India at IIT Delhi.
- Developed and deployed multiple versions of models for a low-resource language.
- Developed a Speech-to-Text (STT) module for video processing, translation, and subtitling. The module supports multiple input modalities, including audio files, videos, and text, providing high-quality translations powered by models developed in-house.

•Master's Thesis, Data Scientist - Intern

Jun. 2023 - Dec. 2023

Uniphore Systems Ltd.

Bengaluru, India

- Initial development of a Lang-chain Based Autonomous Agent.

- Worked with multiple teams for RAG based product development.
- Developed a novel graph based framework for the use of Large Language Models (LLMs) to extract knowledge from task-oriented dialogues. Focused on intent classification, workflow extraction, and action execution for multi-step task-oriented-dialogues.

•Teaching Assistant

Jan. 2023 - Apr. 2023

IISER Bhopal

Bhopal, India

- Teaching Assistant for the spring semester 2023 Data Science and Machine Learning Course under Dr. Tanmay Basu of Data Science and Engineering Department of IISER Bhopal.

•Teaching Assistant

Aug. 2023 - Nov. 2023

IISER Bhopal

Bhopal, India

- Teaching Assistant for the fall semester 2023 Natural Language Processing Course under Dr. Jasabanta Patro of Data Science and Engineering Department of IISER Bhopal.

•Data Analyst Intern

May 2022 - Sep. 2022

Varahe Analytics

Bengaluru, India

- Collaborated across product teams to design and implement a Pollster Analysis Ranking system for Indian companies.
- Performed data analysis on real-time survey data to inform the ranking system.
- Developed Python packages for firm-specific modules within the ranking system.

SELECTED PROJECTS

•Patronizing and Condescending Language Detection

Course Project

[Link](#)

- Developed a system to identify patronizing and condescending language in media directed at vulnerable communities.
- Both Statistical NLP and Deep Learning Approaches have been used for the task.
- Deep Learning Architecture used: Transformers, LSTM, RNN, Feedforward Network

•Spatiotemporal extreme event prediction over the Indogangatic plane.

Course Project

[Link](#)

- Utilized machine learning to analyze historical meteorological data (1950 - present) from Indian observation stations, identifying seasonal and long-term trends in visibility across the country.
- Developed a machine learning model to predict monthly variations in visibility at different Indian locations, leveraging long-term meteorological data.

•Color Clustering and Image Labeling Model

Course Project

[Link](#)

- Developed a system using OpenCV and machine learning to automatically identify and group similar color regions within an image.
- Extended the segmentation approach to assign labels to these color-based regions, facilitating further image analysis.

TECHNICAL SKILLS

- **Programming Languages:** Python,C
- **Tools/Frameworks:** PyTorch, PySpark, Deep Graph Library, PyTorch Geometric, TensorFlow,Numpy, Pandas, Network X
- **Miscellaneous:** Git, Shell, Latex, HPC*, Web Scraping, REST API*, MySQL*, MongoDB*, Hugging-face, Flask*, HTML*, CSS*
- **Other:** Mathematical Modeling, Quantitative Research

* Elementary proficiency

POSITIONS OF RESPONSIBILITY

- Member**,ACM Student Chapter, IISER Bhopal Oct. 2021 - Sep. 2022
- Core Committee**,Cultural Council, IISER Bhopal Sep. 2021 - Apr. 2022
- Management Committee**,Inter IISER Sports Meet, IISER Bhopal Dec. 2022

AWARDS

- Best Poster Presentation Award**, DSE Day - IISERB symposium. 2023