

# MUKUL MEHAR

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## EDUCATION

### Indian Institute of Science

*M.Tech., Computational and Data Sciences*

Aug. 2022 – July 2024

*Bengaluru, Karnataka*

### Jaipur Engineering College and Research Centre

*B.Tech., Computer Science and Engineering*

Aug. 2018 – July 2022

*Jaipur, Rajasthan*

## MENTORSHIP

### Linux Kernel Development | The Linux Foundation

Jan 2023 – May 2023

*Mentee*

- Designed a system call for **memory check-pointing** in the Linux Kernel. Achieved a speed-up of 12.3 compared to the fork-based implementation.
- Made an **open-source contribution** by getting the patch accepted in the linux-staging tree.
- Explored ways to visualize and send a daily report of test results to team members using git.

## PROJECTS

### Option Pricing using Physics-Informed Neural Networks | *M.Tech Dissertation Project* May 2023 - Present

- Objective:** To find the fair value of different types of options that are traded in the financial market by solving their corresponding PDEs using Physics-Informed Neural Networks.
- Progress:** Implemented PINNs architecture in python for pricing European Put options by solving Black-Scholes PDE. Tested the model by using simulated data generated from the FTCS scheme. Achieved an at-par accuracy of that of classic ML methods using less data.

### Large Scale Image Classification using Vision Transformer | *Transformer, TensorFlow*

Aug 2023

- Designed an encoder-decoder architecture, incorporating **self-attention**, for image classification at scale. Used image preprocessing techniques to extract patches from images.
- Pre-trained the model on the ImageNet-21K dataset and achieved 2% higher accuracy than that of ResNet-50, when transferred on CIFAR-100.

### Joint Sentence Classification in Medical Paper Abstracts | *LSTM, TensorFlow*

May 2023

- Developed a sequential sentence classification model using bi-directional LSTMs. Performed text data analysis, and used **tribrid embeddings** i.e., token + character + positional encodings, to transform the raw data.
- Designed a series of experiments to compare different models, such as **tf-idf**, **1-d convolution**, for the given task. The best-performing model achieved an F1-score of 89.9 on the PubMed-200k dataset.

### Potential Customer Identification | *Ensemble Learning, scikit-learn*

Oct 2023

- Performed exploratory data analysis on Bank customer data, and used methods such as **data binning** for feature selection.
- Tested various ensemble models, such as **bagging** and **boosting**, on the analyzed data to classify potential customers for a campaign. Achieved 88% accuracy with the recall value of 41%.

### Hybrid CPU-GPU KMeans clustering | *CUDA, MPI, OpenMP*

April 2023

- Implemented hybrid CPU-GPU KMeans clustering on a 1-billion dataset involving **MPI**, **OpenMP** and **CUDA** parallelization, using CPU cores and GPUs of multiple nodes simultaneously.
- Experimented with different values of K, and different numbers of threads, processes, and nodes. Performed experimental comparisons against CPU-only and GPU-only implementations.

## RELEVANT COURSEWORK

- |                              |                          |  |                              |
|------------------------------|--------------------------|--|------------------------------|
| • Linear Algebra             | • Deep Learning          | • Scalable Systems                     | • Parallel Programming       |
| • Probability and Statistics | • Numerical Optimization | • Tensor Computations for Data Science | • Advanced Operating Systems |

## TECHNICAL SKILLS

**Programming Languages:** Fluent in C, C++, and Python; Prior Experience in JavaScript and Solidity

**Libraries and Frameworks:** Tensorflow, Keras, Scikit-learn, Numpy, Pandas, MPI, CUDA

**Other:** SQL, Linux, Git

## ACHIEVEMENTS

- Captained district U-19 cricket team in a state-level tournament organized by Rajasthan Cricket Association. Achieved 2nd position in the pool.
- Gold medalist in CBSE Table Tennis State Championship.
- Represented district U-25 football team at the open state tournament.