

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

Relevant Coursework

- Linear Algebra
- Advanced Operating Systems
- Deep Learning
- Parallel Programming
- Probability and Statistics
- Numerical Optimization
- Tensor Computations for Data Science
- Financial Instruments and Risk Management Strategies

Mentorship

Linux Kernel Development

Mentee

Jan 2023 – May 2023

The Linux Foundation

- 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 equation. 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, ImageNet*

Aug 2023

- Designed an encoder-decoder architecture, incorporating self-attention, for image classification at scale. Used image preprocessing techniques to extract patches from images.
- Trained the model on the ImageNet-21K dataset and achieved 3% higher accuracy than that of ResNet-50.

RNNs for 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 tokenization and embeddings to transform the raw data.
- Designed a series of experiments to compare different models for the given task. The best-performing model achieved an F1-score of 89.9 on the PubMed-200k dataset.

Rotating Staircase Deadline Scheduler | *C, Linux-6.0.19, Git*

March 2023

- Built and integrated Rotating Staircase Deadline Scheduling (RSDL) policy with the existing Linux kernel.
- Registered a new system call in the kernel to isolate a CPU core. Tested the RSDL scheduler on the isolated core.

Efficient Parallel Bi-Conjugate Gradient Algorithm | *MPIC++, Linear Algebra*

April 2023

- Designed an efficient algorithm for solving large and sparse system of linear equations on distributed memory systems.
- Achieved an average speed-up of 3.2x compared to the standard parallel algorithm by minimizing the communication cost between processors.

Major Assignments

- k-means clustering in CUDA
- Tensor Singular Value Decomposition

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

Leadership / Extracurricular

- 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.