



Mohammad Yusuf

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EDUCATION





Degree	Institute	CGPA/Percentage	Year
M.Tech., Computer Technology	Indian Institute of Technology Delhi, New Delhi	8.15	2023 - Present
B.Tech., Computer Engineering	Aligarh Muslim University, Aligarh	9.38	2019 - 2023
Senior Secondary	Saiyyid Hamid Sr. Sec. School, AMU Aligarh	89.2%	2019
Secondary	Montfort Sr. Sec. School, Roorkee	10	2017

EXPERIENCE

- **Indian Institute of Technology Roorkee** June 2022 - July 2022
Summer Research Intern Roorkee, India
 - The topic of the research was an Application of Dynamic Graphs in Pangenomics, titled Incremental Computation of Safe Flow Path under the supervision of [Dr. Shahbaz Khan](#).
 - The problem was looked at from both a theoretical and a experimental point of view. The theoretical part looked at how safe paths change when there is an update, and the experimental part looked at heuristics using the properties of these variations to improve the practical performance on the tested graph instances.

PROJECTS

- **Brain Signal-Based Graph Neural Networks for Major Depressive Disorder** Jan 2024 - Present
Graph Machine Learning project
 - This project is part of M.Tech. Thesis under the supervision of [Dr. Sandeep Kumar](#).
 - In this, project we use functional MRI scans of the brain, REST-meta-MDD dataset, to extract time series which is used for graph learning of patients with major depressive disorder, a representation of brain as a graph, modifying objective function by adding decorrelation loss, proposing a skip connection neural network and technique to augment data and incorporate demographic features into them.
 - Comparison of performance of model with existing techniques on both binary and multi-class settings and detailed analysis for brain regions responsible in male and females for depression.
- **Implementing Neural Networks** Aug 2024 - Present
Deep Learning course project 
 - This project is part of Advances in Deep Learning (ELL891, IITD) course project under the supervision of [Dr. Sumeet Agarwal](#).
 - This project aims at implementing our own automatic differentiation engine from scratch. We further implementing fundamental building blocks of convolutional neural networks from scratch which include: Convolutional layer (forward and backward), Max-pooling (forward and backward), kaiming initialization of weights, Batch normalization (forward and backward) and Spatial Batch normalization (forward and backward).
- **Stauffer Grimson Background Subtraction** Jan 2024 - Feb 2024
Machine Learning course project 
 - This project is part of Introduction to Machine Learning (ELL784, IITD) course project under the supervision of [Prof. Sumantra Dutta Roy](#).
 - Implemented a Python-based background subtraction algorithm for real-time video analysis, using a probabilistic model to adapt to environmental changes and effectively isolate moving objects for applications like surveillance and traffic monitoring.
- **Real Time Scheduling Algorithms and Buffer Overflow attack in xv6** Jan 2024 - May 2024
Operating Systems course project 
 - This project is part of Operating Systems (ELL783, IITD) course project under the supervision of [Prof. S.R. Sarangi](#).
 - The current scheduler in xv6 is a round robin scheduler. Aim was to add the earliest deadline frst (EDF) and rate monotonic (RM) scheduling algorithms to xv6 kernel code.

- Wrote an exploit code which demonstrates a buffer overflow attack and implements address space layout randomization (ASLR) to mitigate this vulnerability.
- **System of linear equation solver using RISC-V assembly language** Aug 2023 - Nov 2023
Computer Architecture course project 
 - This project is part of Computer Architecture (ELL782, IITD) course project under the supervision of [Prof. Kaushik Saha](#).
 - This project involves implementing the Gaussian elimination method, also known as row reduction, to solve systems of linear equations using assembly code in RISC-V Instruction Set Architecture (ISA). In this project, we needed to translate the algorithm into RISC-V assembly code, handling matrix manipulations and arithmetic operations at a low level.
- **5-Stage pipelined processor using Logisim** Aug 2023 - Nov 2023
Computer Architecture course project 
 - This project is part of Computer Architecture (ELL782, IITD) course project under the supervision of [Prof. S.R. Sarangi](#).
 - This project involves designing and implementing a 5-stage pipelined processor using Logisim, a digital logic simulator. By dividing the processing of instructions into different stages, the pipeline allows for multiple instructions to be processed simultaneously, significantly increasing the processor's throughput. It also handles various data, control and structural hazards.
- **Network Analysis in Table Tennis Championships** Aug 2023 - Nov 2023
Social Network Analysis course project 
 - This project is part of Social Network Analysis (ELL880, IITD) course project under the supervision of [Prof. Sougata Mukherjea](#).
 - This project models and analyzes a network of table tennis players based on match data from 2013-23, including major tournaments. It verifies if the network follows real-world properties, calculates key metrics, detects communities, and ranks players using PageRank and HITS algorithms, comparing these rankings with official ITTF rankings.
- **Dark Web Traffic Detection and Characterization system** Aug 2022 - May 2023
Machine Learning project 
 - This project is part of B.Tech. Thesis under the supervision of [Mr. Mohammed Abdul Qadeer](#).
 - Nowadays adversaries are working on multi-layer encryption strategies in dark-web. For example, instead of just using Tor, they are using VPN and Tor together which make it more complicated and difficult to monitor and detect. In this project, ML algorithms like Decision Tree, KNN, Random Forest classifier are used to propose a novel ensemble voting technique for classification which gives better performance metrics for the CIC-Darknet-2020 dataset.

TEACHING ASSISTANSHIP

- **ELL305: Computer Architecture** July 2024 - Present
- **ELP101: Introduction to Electrical engineering Laboratory** Jan 2024 - May 2024

SKILLS

- **Programming Languages:** C, C++, Python, Java.
- **Assembly Languages:** 8085, 8086 and RISC-V.
- **Machine Learning:** PyTorch, TensorFlow, Scikit-learn.
- **Web Development:** React.JS, Express.JS, MongoDB, Node.JS
- **Tools:** LaTeX, Logisim, Gephi, Git, MS Office.

ACHIEVEMENTS

- All India Rank 1210, Graduate Aptitude Test in Engineering (GATE), CS-IT 2023, 98.40%ile
- All India Rank 4212, Graduate Aptitude Test in Engineering (GATE), CS-IT 2022, 94.54%ile

CERTIFICATIONS

- **Deep Learning with PyTorch : Generative Adversarial Network**, Coursera Sept 2022
- **Python Data Structures**, Coursera Sept 2020