

Manish Kumar

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EDUCATION

IISC BENGALURU

M.TECH

Quantum Technology
2022- Present
CPI: 8.20 /10

IIT KANPUR

BS-MS IN PHYSICS

2015- 2020
MS CPI: 9.05 /10

COURSEWORK

QUANTUM TECH

Quantum Computation & Information
Quantum Communication & Crypto.
Quantum Error-correcting Codes

COMPUTATION

Design & Analysis of Algorithms[†]
Computational Complexity Theory[†]
Quantum Safe Cryptography

DATA SCIENCE & ML

Data Mining
Matrix Theory[†]
Computational Optimization
Deep Learning for NLP[†]

MATHS

Probability & Statistics
Group Theory
Mathematical Analysis
Differential Equations
Evolutionary Game Theory

HUMANITIES

Microeconomics
Philosophic Logic
Psychology of Adjustment
Art of Communication

SOFTWARE

PROGRAMMING

Python, C

QUANTUM

Qiskit, PennyLane
Tensorflow-Quantum

DATA SCIENCE & ML

PyTorch, TensorFlow
Scikit-Learn, OpenCV

[†] [Ongoing courses]

MASTERS PROJECT

INVESTIGATING QUANTUM ALGORITHM FOR DEEP LEARNING

ADVISOR: Prof. Apoorva Patel | AUG 2023- PRESENT [IISc]

- Ongoing masters project in Quantum Machine Learning

INDUSTRIAL INTERNSHIP

HYBRID QUANTUM-CLASSICAL SPIKING NEURAL NETWORK

LOCATION: TATA ELXSI, BENGALURU | MAY-JULY 2023

- Explored a hybrid Quantum-Classical Spiking neural network for noise robust image classification with Neuromorphic datasets
- Utilized parametrized Variational Quantum circuit (VQC) and trained it via Backpropagation (on PennyLane Simulator)
- Tested the model with the N-Cars dataset after a suitable modification with Gaussian and salt-pepper noise
- Observed enhancement in accuracy upto 5%, but at the expense of three-fold increase in training iterations (if compared to classical SNN)

ACADEMIC PROJECTS

GRADIENT DESCENT ALGORITHM CONVERGENCE ANALYSIS

COURSE: OPTIMIZATION FOR MACHINE LEARNING

Mentor : Prof. Sandip Chepuri | March 2023 [IISc Bengaluru]

LINK: Github Repo.

- Employed a Linear regression model to predict the height of a person using the weight-gender-height dataset
- Analyzed the convergence of gradient descent algorithms for the mean-squared error function for different learning rates
- Achieved the optimal learning rate for the (convex) function to be the reciprocal of its smoothness parameter(L)

TAXI FARE PREDICTION UTILIZING MACHINE LEARNING

COURSE: DATA MINING AND KNOWLEDGE DISCOVERY

Mentor : Prof. Faiz Hamid | May-July 2019 [IIT Kanpur]

LINK: Github Repo.

- Aimed to predict any potential trend in the taxi Fare of New York City from the 5 Million Taxi ride data-set
- Preprocessed the data by removing noise, and then creating fare-influencing attributes via Feature engineering
- Deployed machine learning models such as Linear regression, Random forest, XGBoost and Light-GBM to gain knowledge
- Achieved test and train RMSE of 3.79 and 3.30, respectively, as our best result in the case of LightGBM (by using bias-variance trade-off)

HACKATHON & SUMMER SCHOOLS

MIT iQuHack 2023: Quantum Machine Learning Hackathon

Git Repo.

IBM Quantum Summer Challenge 2023

Git Repo.

POSITION OF RESPONSIBILITY

Placement and Internship Coordinator: OCCaP [IISc] | Sep 2022- Present