

Vaibhav Arora

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B.Tech - Computer Science and Engineering

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Honors in Data Science and Artificial Intelligence

GitHub

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EDUCATION

Degree/Certificate	Institute/Board	CGPA/Percentage	Year
B.Tech. Honors	Indian Institute of Technology, Bhilai	8.9 (Current)	2020-Present
Senior Secondary	CBSE Board	97%	2020
Secondary	CBSE Board	91%	2018

SUMMARY

My profile encompasses ongoing projects in cutting-edge domains including the study of model poisoning, non-IIDness, and staleness in asynchronous federated learning, the development of a blockchain-based competitive coding platform using a peer-to-peer network etc. I have been actively involved in implementing machine learning algorithms, graph analysis, and fraud detection through graph neural networks. Additionally, I'm working on privacy enhancement techniques within the GAP architecture for federated learning. My academic achievements include top ranks in the JEE exams, leading Inter IIT Tech Meet 12.0 and gold medal recognition at Inter IIT Tech Meet 11.0, and securing the first position in an Image Clustering hackathon. My multifaceted research experiences reflect a dedication to academic excellence and innovation.

Domains of interest : Federated Learning, Reinforcement Learning, Graph Neural Networks, Distributed Systems, Natural Language Processing, Speech/Signal Processing, Computer Vision

TECHNICAL SKILLS

- **Programming Languages:** Python, C/C++, Bash, SQL
- **Machine Learning Frameworks:** Tensorflow, Pytorch, scikit-learn, Keras, Pytorch-geometric, DGL, FlowerFL
- **Python Libraries:** Numpy, Pandas, Matplotlib, Seaborn, Plotly, BeautifulSoup, imbalanced-learn etc.
- **Cloud Platforms:** Google Cloud Platform (GCP), Amazon AWS
- **Data Management:** InfluxDB, MySQL, Neo4j
- **Miscellaneous:** Git, OpenCV, NLTK, Gurobipy, Sagemath, Networkx, NS-3, Wireshark, Pycryptodome, Tkinter, Pillow, Latex Weights and Biases
- **Data Visualization:** Dash, Matplotlib, Plotly, Seaborn, Tensorboard
- **Big Data Ecosystems:** Hadoop, Hive, Spark, DataProc, BigQuery, Zookeeper

PROJECTS

- **Comprehensive study of Model Poisoning, nonIIDness and staleness in Async Federated Learning** *Ongoing*
Under Dr. Subhajit Sidhanta
 - Implemented modularized Asynchronous Federated Learning with various client selection strategies, nonIIDness simulations and Aggregation algorithms
 - Proposing a novel Aggregation Scheme for defense against different SOTA model Poisoning attacks
 - Studying the effect of different Client Selection Strategies on Model Poisoning, Staleness and nonIIDness
 - Preparing research paper for submission
- **Incentivized Decentralized Competitive Coding Platforms** *Ongoing*
Under Dr. Subhajit Sidhanta
 - Creating blockchain-based competitive coding platform over a peer-to-peer network.
 - Developing hash-based proof of execution and conducting fault analysis.
 - Preparing research paper for publication.
- **Privacy Budget Optimization for GAP Architecture** *Ongoing*
Under Dr. Gagan Raj Gupta
 - Implementing privacy enhancement techniques to optimize privacy budget.
 - Working on differential privacy within GAP architecture for federated learning.
 - Research and experimentation to enhance privacy in AI models.
- **Solving Iterated Prisoner's Dilemma using Genetic Algorithm** *February, 2023 - April, 2023*
CS518 course experiment
 - Implemented Iterated Prisoner's dilemma strategy using Genetic algorithm as part of a course experiment
 - The Agent defeated the other participating agents in maximizing the Total reward

- Major contribution lies in gene representation, translation and fitness function with only 3 Bytes per gene memory used
- **Multivariate Time Series Anomaly Detection System for Bhilai Steel Plant** *Feb 2023 - Apr 2023*
Under Dr. Gagan Raj Gupta
 - Performing exploratory data analysis on multivariate time series data from IoT signals and video feed.
 - Implementing LSTM, MCUSUM, PCA for baseline anomaly detection.
 - Utilizing KLL summarization algorithm for streaming data.
- **Wikipedia Graph Analysis** *Feb 2023 - Apr 2023*
DS-250 Course Project
 - Scraping textual data from Wikipedia for web graph analysis.
 - Extracting NLP features such as TFIDF vectors for nodes.
 - Training GNN models for node hardness prediction.
- **Fraud Detection Using Graph Neural Networks** *Feb 2023 - Apr 2023*
IBITF, IIT Bhilai
 - Conducting exploratory data analysis on the Elliptic Bitcoin dataset.
 - Implementing and experimenting with Graph Neural Network models.
 - Research on enhancing fraud detection in financial technology.

EXPERIENCE

- **Teacher's Assistant-ship** *February, 2023 - April, 2023*
CS 102 course Indian Institute of Technology, Bhilai
 - Assited Dr. Amit Kumar Dhar in the teaching Data Structures at IIT Bhilai
 - Coached and clarified students' doubts pertaining to the course and exam
 - Evaluated the students and gave individual feedback

KEY COURSES TAKEN

- **Advanced Machine Learning:** : A+
- **Machine Learning:** : A+
- **Natural Language Processing:** : A
- **Data Structures:** : A
- **Distributed Systems:** : A
- **Data Analytics and visualization:** : A

ACHIEVEMENTS

- **Badges, Google Cloud Computing Fundamentals @ Google Cloud Platform, Profile - Link** *2023*
- **Gold Medal, Cognitive Garage PS @ Inter IIT Tech. Meet 11.0, Kanpur** *2023*
- **IBITF Fellowship**, for Fraud Detection using GNN in Fin-Tech *2022*
- **First position**,@Infineon Hackathon for Image Clustering *2022*
- **Cleared JEE Advanced**, Achieved rank **5845** in first attempt *2022*
- **Cleared JEE Mains**, Achieved **99.03** percentile in first attempt *2022*

ADDITIONAL/CO-CURRICULAR ACTIVITIES

- **Deputy Contingent Lead**,Inter IIT Tech Meet 12.0 *October 2023 - Present*
- **Core Member**,Google Developer Student Club, IIT Bhilai *August 2023 - Present*
- **CS Department Respresentative**,Students' Senate, IIT Bhilai *April 2023 - Present*
- **Core Member**,DSAI Club, IIT Bhilai *Jan 2023 - Present*
- **Member**,DesignX Club, IIT Bhilai *Nov 2020 - Mar 2022*
- **Core Member**,Epsilon Club, IIT Bhilai *Mar 2021 - Mar 2022*
- **Member**,Managing Committee, Council of Student Affairs, IIT Bhilai *Mar 2021 - Mar 2022*