

Tarun Gupta

B.Tech - Computer Science and Engineering
Indian Institute Of Technology Indore

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EDUCATION

| Degree/Certificate | Institute/Board | CGPA/Percentage | Year |
|--------------------|---------------------------------------|-----------------|-----------|
| B.Tech. | Indian Institute of Technology Indore | 9.80 | 2018-2022 |
| Senior Secondary | CBSE Board | 94.2% | 2018 |
| Secondary | CBSE Board | 10 | 2016 |

EXPERIENCE

Software engineer at D. E. Shaw India

July 2022 - Present

Software engineering.

- Developing internal cluster and public cloud orchestration platform.
- Creating pipeline to submit ML workloads to public cloud, following security first principles.

Research Intern at NTU Singapore

Aug 2021 - Dec 2021

Multilingual speech processing.

[Paper](#)

- Built bi-encoder transformer mixture model for estimation of speaker age and height from speech signal.
- Achieved relative improvement of 18.5% in male age estimation and 8.6% in female age estimation over the current state-of-the-art on TIMIT dataset.

Research Intern at Carnegie Mellon University

Jan 2021 - May 2021

Unsupervised learning, Deep learning.

[Paper](#)

- Built contrastive self-supervised learning workflow for macromolecular structure classification based on Electron cryotomography (CryoET) data.
- Used techniques such as SwAV, MoCo and SimCLR to achieve state-of-the-art classification results for CryoET data.

Research Assistant at IIT Indore

Jan 2020 - Mar 2020

SVM, Clustering, Convex Programming.

[Paper](#)

- Designed a novel plane-based clustering algorithm based upon principles of SVM. Utilised pinball loss to improve generalization performance on noise-corrupted datasets. Used Concave-Convex Procedure (CCCP) for optimization.
- Tested the proposed algorithm and achieved better performance on noise corrupted UCI datasets than existing plane-based clustering algorithms. Performed statistical analysis of the results obtained.

PROJECTS

- **Parallelising Red Deer Algorithm (RDA) – A Nature Inspired Meta-heuristic Algorithm** April 2021
Parallel Programming, MPI [Github](#)
 - Implemented Red Deer Algorithm (RDA) for solving Travelling Salesman Problem (TSP). RDA is a meta-heuristic algorithm inspired by the unique mating process of Scottish red deer.
 - Used Message Passing Interface (MPI) for parallelising the algorithm, achieving speed-up factor upto 4.
- **Automated Headline and Sentiment Generator** March 2021
Inter IIT Tech Meet 9.0. [Github](#)
 - Employed DistillBERT transformer model for binary classification of tweets and articles and obtained 0.89 F1 score.
 - Used Aspect Based Sentiment Analysis driven Ada-BERT model to identify brands and their sentiments.
 - Generated headlines for articles using Pegasus, T5, BART models achieving 37% average similarity score
- **Adversarial Attack on Brain Tumour Segmentation** April 2020-June 2020
AI for Medicine, Deep Learning. [Github](#)
 - Implemented 3D-UNet architecture using TensorFlow library and trained it on BraTS brain MRI data.
 - Successfully implemented Fast-Gradient Sign Method (FGSM), Iterative Fast-Gradient Sign Method (iFGSM), and Carlini & Wagner (CW) adversarial attacks from scratch using TensorFlow library.
- **Sentiment Analysis of Movie Reviews in Hindi Language** May 2020 - July 2020
NLP, Flask framework, Web Scraping. [Github](#)
 - Created largest Hindi movie review dataset, containing 1714 movie reviews using web-scraping techniques.
 - Used Universal Language Fine-tuning (ULMFiT) transfer learning method to achieve test-accuracy of 75.70%.
 - Created back-end APIs using FLASK framework.

- **Cache Oblivious Algorithms**

May 2020 - July 2020

Design and Analysis of Algorithms.

[GitHub](#)

- Implemented various cache oblivious algorithms including Van-Emde-Boas search tree, Funnel-sort and Median of medians algorithm.
- Analysed memory-transfer complexity of above algorithms. Used Valgrind to calculate cache hit-miss ratio of cache oblivious algorithms and compared it with their cache ignorant counterparts.

ACHIEVEMENTS

- **CSE Department Rank: 1/66** and **Institute Rank: 2/273** at IIT Indore.
- **Awarded AP grade:** for exceptional performance in **5** courses including Numerical Methods and Database & Information Systems.
- **Summer Research Fellowship:** Awarded research fellowship at Centre for Neuroscience, **IISc Bangalore**.
- **Softbank Forex Algorithm Challenge 2019:** Secured 4th rank among 115 teams from all IITs.
- **Inter IIT Tech Meet 9.0:** Awarded Silver medal in Bridge2i's NLP competition.
- **Inter IIT Tech Meet 8.0:** Awarded Bronze medal in BITGRIT's data-science competition.
- **JEE Advanced 2018:** Secured All India Rank 1055 among 150,000 candidates (top 0.7%).

KEY COURSES TAKEN

- **Computer Science:** Optimization Algorithms & Techniques, Operating Systems, Computer Architecture, Parallel Computing, Design & Analysis of Algorithms, Software Engineering, Automata Theory & Logic, Logic Design, Data Structures & Algorithms, Database & Information Systems, Discrete Mathematical Structures.
- **Mathematics:** Numerical Methods, Complex Analysis & Differential Equations II, Linear Algebra & Differential Equations I, Real Analysis.
- **AI for Medicine:** AI For Medical Diagnosis, AI For Medical Prognosis & AI For Medical Treatment. *[Coursera](#)

TECHNICAL SKILLS

- **Programming:** C++, Python, MATLAB, SQL, VHDL.
- **Technologies/Tools/Libraries:** Machine Learning, Deep Learning, Tensorflow, Keras, Xilinx, Matplotlib, Jupyter Notebook, LaTeX.

POSITIONS OF RESPONSIBILITY

- **President of Cynaptics Club,** AI and ML student club of IIT Indore. *Aug 2020 - Jun 2021*
 - **Department Undergraduate Representative,** Discipline of Mathematics at IIT Indore. *Feb 2020 - Oct 2020*
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