Tathagat Verma

Master's in Computer Science at Stanford University

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EDUCATION

Stanford University, Stanford, USA *Sep 2022 - May 2024 (expected)*
Master of Science in Computer Science, Specialization - Artificial Intelligence GPA - **3.97/4**

Indian Institute of Technology Bombay, Mumbai, India *Jul 2018 - Dec 2021*
Bachelor of Technology in Computer Science and Engineering with Honors CPI - **9.64/10**

SCHOLASTIC ACHIEVEMENTS

- Secured **All India Rank 53** in **JEE Advanced** out of 200,000 candidates *2018*
- Secured **All India Rank 34** in **JEE Main** out of 1.2 million candidates *2018*
- **Clear Ventures Deeptech Fellow**: 6-month program connecting researchers and company builders *2023*
- Recipient of the **Quadeye Excellence Scholarship**, awarded on the basis of academic achievements *2021*
- Amongst top **30** in India selected for the **International Astronomy Olympiad** Selection Camp *2018*
- Amongst top **35** in India selected for the **International Mathematical Olympiad** Training Camp *2017*

PUBLICATIONS

1. Title: **VarScene: A Deep Generative Model for Realistic Scene Graph Synthesis** [paper]
   Authors: ***Tathagat Verma***, *Abir De, Yateesh Agrawal, Vishwa Vinay, Soumen Chakrabarti*
   Conference: International Conference on Machine Learning (ICML) 2022

RESEARCH EXPERIENCE

Object Importance Classification and Natural Language Explanation Generation *Autumn 2022*
Guides: Prof. Mykel Kochenderfer, Jiachen Li | Research Assistantship SISL, Stanford University

- Developed a deep learning model for importance classification and explanation generation in autonomous driving
- Utilized **CNN**, **Graph Neural Networks** and **attention** based **GRU** for image feature extraction, learning inter-object relationships and natural language generation respectively for the joint task in **PyTorch**

VarScene: A Deep Generative Model for Realistic Scene Graph Synthesis *Autumn 2021*
Guides: Prof. Soumen Chakrabarti, Prof. Abir De | R&D Project InfoLab, IIT Bombay

- Developed a deep generative model for novel scene graph synthesis using **VAE** and **Graph Neural Networks**
- Designed a goal oriented decoder for minimizing the maximum mean discrepancy between graph distributions
- Developed code in **PyTorch** and used the Visual Genome and Visual Relationship Detection datasets
- Significantly outperformed baselines on the Fréchet Inception Distances (**FID**), Inception Scores (**IS**) and achieved better results on the Shortest Path, Weisfeller Lehman and Neighborhood Subgraph Pairwise Distance kernels

Deep Learning for Medical Image Quality Enhancement *Spring 2021, Autumn 2021*
Guide: Prof. Suyash Awate | R&D Project, Bachelor's Thesis Project IIT Bombay

- Enhanced the quality of MRI images with sub-sampling and Gaussian noise in the frequency domain and PET images with Poisson noise in the sinogram domain under the weakly-supervised regime
- Trained models using the **RED-CNN** and **UNet** architectures with Bayesian learning in **PyTorch**

INTERNSHIPS

Bad Label Detection *Summer 2023*
Scale AI | Machine Learning Research Engineer Intern San Francisco, USA

- Developed a bad label detection framework to identify mislabeled data points for relabeling
- Proposed a data labeling pipeline for an IG Reel Genre Classification task using bad label detection
- Finetuned **multimodal video classification models** for bad label detection, getting **6%** labeling cost reduction

Student Venture Partner *Summer 2022*
Venture Highway LLP | Guides: Aviral Bhatnagar, Akul Jindal Bengaluru, India

- Gained exposure to sourcing and evaluating **seed stage startups** and interacted with many founders

Image Functionality in the Whiteboard Android Application *Summer 2021*
Microsoft India (R&D) Pvt. Ltd. | Software Engineer Intern Noida, India

- Integrated **Microsoft Lens SDK** into Whiteboard Android, to support image and OCR tools provided by Lens
- Worked in **Java Android** backend, building the bridge to send images from native Android to the web application
- Developed code in **React** for the web application, making the UI component for triggering image workflow

Attribute Value Extraction from Product Descriptions *Summer 2020*
Coupa Software India Pvt. Ltd. | Data Science Intern Pune, India

- Developed unsupervised and semi-supervised methods for extracting attribute values from product descriptions
- Implemented an **RNN** model for sequence tagging using **CRF**, **BiLSTM** and attention mechanisms
- Automated taxonomy creation by clustering on co-occurrence graphs using the **Chinese Whispers Algorithm**

TECHNICAL PROJECTS

Mitigating Scams and Catfishing on Dating Apps through Automatic Moderation   *Spring 2023*
Guide: Alex Stamos | Trust and Safety Engineering | Demo   *Course Project*

- Developed a **Discord bot** to mitigate scams and catfishing on a dating app simulation on Discord
- Built user-reporting and moderation workflows to handle multiple types of offences in different scenarios
- Leveraged **regex, image-captioning** and **GPT-3.5** to handle automated flagging and prevent adversarial cases

Blockchain Simulation and Applications   *Autumn 2021*
Guide: Prof. Vinay Ribeiro | Blockchains, Cryptocurrencies and Smart Contracts   *Course Project*

- Implemented a peer-to-peer cryptocurrency network simulation in **C++** following the **Bitcoin** protocols
- Simulated selfish and stubborn mining attacks, analyzing the effects of hash power and network connectivity
- Developed a decentralized payment application on top of **Ethereum** in Solidity, utilizing smart contracts

Foreshadow Attack and its Variants   *Spring 2021*
Guide: Prof. Bernard Menezes | Advanced Network Security and Cryptography   *Course Project*

- Studied the **Foreshadow** attack and its impact on **Intel SGX** and **VM** systems due to speculative execution
- Simulated the proof-of-concept attack on **Linux** kernel with **x86** processor in the absence of Intel TSX

Route Optimization Algorithm   *Winter 2019*
Inter IIT Technical Meet   *IIT Roorkee*

- Proposed solution for the Vehicle Scheduling Problem in the setting of buses, winning **gold** medal among 20 teams
- Reduced the problem to multiple instances of the Travelling Salesman Problem(**TSP**) using k-means clustering
- Generated routes while taking real time traffic into account using **Google Maps APIs** in Python

LEADERSHIP POSITIONS

Institute Student Mentor   *Jun 2021 - Jun 2022*
Student Mentorship Program   *IIT Bombay*

- Mentoring **12 freshmen**, helping them adjust to the institute environment, focusing on their holistic development
- Amongst 130 out of over 300 applicants selected through a rigorous procedure of interviews and peer reviews

Senior Department Academic Mentor   *Jun 2020 - May 2022*
Computer Science and Engineering Department   *IIT Bombay*

- Mentoring **6 sophomores** of CSE department to assist them in navigating department specific curriculum
- Working in a supportive, facilitative and developmental role for the student community in general as a mentor

Teaching Assistant

- **Design and Analysis of Algorithms** | *CS 161*   *Stanford University, Apr 2023 - Jun 2023*
- **Natural Language Processing with Deep Learning** | *CS 224n*   *Stanford University, Jan 2023 - Mar 2023*
- **Artificial Intelligence and Machine Learning** | *Prof. Ganesh R*   *IIT Bombay, Jul 2021 - Nov 2021*
- **Data Structures and Algorithms** | *Prof. Sharat C*   *IIT Bombay, Jan 2021 - May 2021*
- **Logic for Computer Science** | *Prof. Krishna S*   *IIT Bombay, Jul 2020 - Nov 2020*

Responsible for conducting doubt sessions, preparing problem sets, grading examinations, handling logistics for exams and poster sessions

Organiser in Corporate Relations   *Nov 2018 - Mar 2019*
Entrepreneurship Cell   *IIT Bombay*

- Responsible for speaker handling and handling overall logistics in multiple events
- Part of the execution team for **The Panel Discussion** at Entrepreneurship Summit, 2019

EXTRACURRICULAR

- Won **gold** medal in Route Optimization Competition at the **Inter IIT Technical Meet, IIT Roorkee** *2019*
- Represented IIT Bombay at the **34th Inter IIT Aquatics Meet, IIT Guwahati**   *2018*
- Awarded **second** position in **CoDecode** (coding competition) organized by Techfest, IIT Bombay   *2020*
- Covered a distance of **23.2 km** swimming for **12 hours** at Swimathon, IIT Bombay   *2019*
- Awarded Certificate of Merit for **winning** the Inter Department Football Tournament IIT Bombay   *2019*
- Awarded Diploma Certificate for competing in the **Gothia Football Cup, Gothenburg, Sweden**   *2011*
- Phonathon: Pitched to 50 alumni the events conducted by Student Alumni Relations Cell, IIT Bombay   *2019*