

Bhumika Chopra

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EDUCATION

Indian Institute of Technology, Delhi

BACHELOR OF TECHNOLOGY MATHEMATICS & COMPUTING

GPA: 9.35/10 | JULY, 2018 - JULY, 2022

Sri Sathya Sai Vidya Vihar, Indore

CBSE XII BOARD

PERCENTAGE: 94% | 2014-2018

SCHOLASTIC ACHIEVEMENTS

- Extended-abstract in the 16th Women in Machine Learning Workshop co-located with **NeurIPS, Australia, Dec. 2021**
- Selected for **ML Research Internship** and participated in **CS REU Lunch & Learn** organized by **UIUC** in Summer, 2020
- Awarded **IIT Delhi Merit Scholarship** for standing among the **top 7%** students in the batch in 2021 and 2022
- Selected for the **Bolt ML & IoT Scholarship Program** and awarded an all-access pass to **The Things Conference, India, 2020**
- Awarded **Design Innovation Summer Award (DISA), 2019** by the HRD Ministry, Government of India and IIT Delhi
- Secured **All India Rank 647** out of a total 200,000+ participants in **Joint Entrance Examination (JEE) Advanced, 2018**
- Awarded **KVPY Fellowship, 2017** with **All India Rank 293** among **100K+** candidates by the GoI to young research aspirants

WORK EXPERIENCE

MAVEN SECURITIES | SOFTWARE ENGINEER

LONDON, UK/CHICAGO, US | JUNE 2022 - PRESENT

- Optimized **Kalman Filter** error functions used in our event-based **volatility** fitter, thereby accelerating the **Jacobian computation** and **stochastic gradient descent loops**, reducing fitting errors while maintaining speed and accuracy in competitive markets
- Contributed to an offset fitter reliant on European options **call-put parity** using **linear regression** for estimation and Kalman filtering for smoothing. Enhanced robustness, added submission throttling, and currently working on adding support for non-European options
- Led the design and implementation of a volatility futures pricing library, addressing **numerical instability** and enhancing **algorithmic precision** in **high-performance financial** systems. Scaled the library by adding Python, C#, and Julia wrappers for downstream apps.
- Developing a library to analyze discrepancies between model-generated and market-implied volatility curves during economic shocks

APT PORTFOLIO | DATA MANAGEMENT AND RESEARCH INTERN

DELHI, INDIA | MAY 2021 - JULY 2021

- Achieved **95% reduction** in latency & **82% reduction** in storage by adding **ClickHouse OLAP** database support to order book validator
- Built a tool for monitoring and analysis of **network packet drops** observed in raw market data pipelines using **Flask** and **Chart.js**

UNBXD | DATA SCIENCE INTERN

DELHI, INDIA | MAY 2020 - JULY 2020

- Devised **synonym generation algorithms** to improve query understanding and return more relevant search results
- Performed **data mining** and **query extraction** on clickstream data with **Sklearn, NLTK** using statistical and linguistic parameters

PROJECTS

PARKINSON'S DISEASE DETECTION USING MULTIMODAL DATA

Data Mining, Prof. Niladri Chatterjee

January 2021 - April 2021

- Constructed a novel hybrid multimodal dataset by combining speech and hand-drawn image data using **Generative Adversarial Networks**
- Trained a **Multi-Layer Perceptron (MLP)** on imputed speech data and a **Convolutional Neural Network (CNN)** on imputed image data.
- Proposed a hybrid classification algorithm; Achieved accuracy of 93.5%; **Accepted at WiML, NeurIPS**

DEEP NEURAL NETWORK APPROXIMATION FOR IMAGE DENOISING

Bachelor's Thesis Project, Prof. Sivananthan Sampath

January 2022 - April 2022

- Investigated image noise reduction techniques for real-world applications, with a focus on improving quality in medical imaging
- Experimented with a **GAN consisting of a U-Net generator and a CNN discriminator**, achieving an SSIM score of 0.92 on MNIST
- Applied image denoising to **unmask human faces**, contributing to advancements in security and privacy technologies
- Used the Johnson-Lindenstrauss Lemma for dimensionality reduction, and **convergence proofs** for **SGD** on non-smooth convex functions.

TEXT EXTRACTION & SYNOPSIS GENERATION USING REINFORCEMENT LEARNING

NLP, Prof. Niladri Chatterjee

October 2019 - December 2021

- Explored RL using **RNNs** and **LSTMs**, proposing an objective function that combined **cross-entropy loss** with **policy gradient optimization**
- Awarded grant by **Nokia** for combining **GRU, LSTM & CNN** architectures to obtain hybrid models & experiment with **deep learning**

OTHER PROJECTS: Custom Linux mini-shell | Image captioning system | Basic Haskell Parser and Type-checker | Process Scheduler

TECHNICAL SKILLS

Programming Languages: Proficient: C++, Python | Familiar: Julia, C, C#, Java, Javascript, \LaTeX , SQL, MATLAB, HTML5, Ruby, Haskell

Software & Tools: PyCharm, Rider, VS Code, Eclipse, Atom, Sublime, TensorFlow, Keras, ClickHouse, Git, JupyterLab

Certifications: Advanced Machine Learning and Signal Processing (Coursera, IBM), CNNs for Visual Recognition (Stanford)

TEACHING EXPERIENCE

Teaching Assistant for COL100 & MTL100: Introductory Computer Science and Calculus courses

2021-22

Art of Problem Solving: Grader, message board moderator, and TA for Introductory Probability course

2021-22

Academic Mentor, Board for Student Welfare: Mentor for 1st year students enrolled in an Introductory Linear Algebra course

2019

EXTRA CURRICULAR ACTIVITIES & POSITIONS OF RESPONSIBILITY

- Elected as the **Sports Secretary** in November 2020 and led the hostel to winning the **General Sports Championship, 2021**
- Awarded **Best Female Athlete** from among 200 candidates and contributed to the contingent standing **2nd** in **Inter-IIT, 2019**
- Events Coordinator**, Software Development Club (2019) | **Events Executive**, Tryst (2020) | **Hospitality Executive**, Sportech (2020)
- Member of **GirlsWhoCode** and **TechLadies** | Instructed high school students in programming concepts and coding skills as part of a **local coding dojo initiative**, fostering interest in technology and empowering young women in the field.