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 **250,000+** 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, achieving a reduction in fitting errors and more stability
- Contributed to an offset fitter reliant on options **call-put parity** using **linear regression** for estimation and Kalman filtering for smoothing
- Designed a volatility futures pricing library, addressing **numerical instability** and **algorithmic precision** in performant financial systems
- Developed a model to account for **variance due to macroeconomic events** and incorporated this in enhancing our pricing accuracy
- Implemented **Python, C#, and Julia wrappers** to extend the core **C++ pricing library's** applicability for downstream applications
- Developing a library to analyze **discrepancies between system-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

DEEP NEURAL NETWORK APPROXIMATION FOR IMAGE DENOISING

Bachelor's Thesis Project | Advisor: 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

PARKINSON'S DISEASE DETECTION USING MULTIMODAL DATA

Data Mining | Advisor: Prof. Niladri Chatterjee — *January 2021 - April 2021*

- Constructed a novel hybrid multimodal dataset by combining speech and 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 SoTA of 93.5%; Extended abstract presentation at **WiML, NeurIPS, 2021**

TEXT EXTRACTION & SYNOPSIS GENERATION USING REINFORCEMENT LEARNING

NLP | Advisor: 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**

TECHNICAL SKILLS

Languages: Proficient: C++, Python, C# | **Familiar:** Julia, C, Java, Javascript, TypeScript, LaTeX, SQL, MATLAB, HTML5, Ruby, Haskell
Software & Tools: PyCharm, Rider, VS Code, Eclipse, Atom, Sublime, TensorFlow, Keras, ClickHouse, Git, JupyterLab
Coursework: Data Structure & Algorithms, Discrete Mathematics, Operating Systems, Computer Architecture, Functional Programming, Machine Learning, Data Mining, Probability & Stochastic Processes, Parallel & Distributed Programming
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 freshmen 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 local **coding dojo initiative**, fostering interest in technology and empowering young women in the field.