# Vansh Kapoor

+1 412-606-5875 • vanshk@cs.cmu.edu • vansh28kapoor.github.io
in vansh28kapoor

## Education

**Carnegie Mellon University (CMU)** — Pittsburgh, PA
*Master of Science in Machine Learning* — Dec'25

**Indian Institute of Technology Bombay (IITB)** — Mumbai, India
*Bachelor of Technology in Electrical Engineering with Honors* — May'24
*GPA:* ***9.76/10*** *(Department Rank* $\mathbf{6^{th}}$ *amongst 200+ students)* — *Honors GPA:* ***10/10***

- Received *Undergraduate Research Award* for outstanding research conducted in *Partially Observable MDPs*
- Awarded AP Grade (*Course Topper*) in *Online Learning & Optimization*, *Advanced Topics in Deep Learning*, Advanced ML (*Probabilistic Graphical Models*), Intro to ML, Image Processing, EM Waves, Biology
- Created and graded assignments/quizzes for Error-Correcting Codes as a *Graduate TA* for 40+ students

## Professional & Research Experience

**Google Research** | *Collaborator* | Bangalore, India — Jun'23 - Aug'24
- Developed the Look-Ahead algorithm utilizing **crowd-signals** with performance guarantees for **rumor detection**
- Adapted algorithm for large-scale networks to **nullify coordinated bot attacks** spreading rumors on social platforms

**IIT Bombay** | *Research Assistant (AAAI'25 Submission)* | Mumbai, India — Jan'23 - Aug'24
- Formulated theorems and designed heuristics to compute **optimal policies** for **MDPs with state sensing costs**
- Derived computable **bounds on suboptimality** associated with optimal policies corresponding to truncated MDPs

**Google** | *Silicon Engineering Intern* | Bangalore, India — May'23 - Jul'23
- Optimized **design verification** process by **15%** with toggle coverage analysis using Python-based automation
- Developed **automated checkers** for data retention flops in low-power mode applications, streamlining verification

## AI & ML Projects

**Indian Institute of Technology Bombay** — Mumbai, India

***Text-to-Image Diffusion Models with Enhanced Semantic Understanding*** — Jan'24 - May'24
- Devised SUR (Semantic Understanding & Reasoning) architecture utilizing **LLAMA-based prompt enrichment**
- Boosted **multi-modal** visual question answering accuracy (counting/color/action) by **20%** over baseline CLIP

***Deep Recurrent Q-Learning for Partially Observable MDPs*** — Aug'23 - Dec'23
- Implemented **RL-LSTM-Q network**, integrating **Transfer Learning** & LSTM for playing flickering Atari games

***RL in Billiards and Football Half-field Offense*** — Jul'23 - Dec'23
- Implemented **Monte-Carlo Tree Search (MCTS)** for potting balls in minimal attempts ($< 10$) for noisy billiards
- Executed MDP Planning to devise an optimal half-field football offense strategy using value and policy iteration

***Generative AI & Stock Trading System*** — Jul'23 - Dec'23
- Enhanced the **CGAN** model to generate diverse images of a given individual by utilizing a **Siamese Discriminator**
- Set up an **LSTM-based** high-frequency stock trading system (**MSE Loss: 0.3%**) using multi-stock inputs

***Real-Time Rapid Multi-Face Detection*** — Jan'23 - May'23
- Facilitated multi-face detection using **Haar features-based AdaBoost** Cascade Classifier integrated with a webcam

***Biomedical Image Segmentation*** — Aug'22 - Dec'22
- Coded **U-Net** and applied **watershed segmentation** for nuclei semantic segmentation, achieving MSE Loss of 8%

## Skills

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| **Programming Languages:** | Python (Proficient), MATLAB, C++, Java, HTML, Embedded C |
| **Libraries:** | PyTorch, TensorFlow, Keras, PyTorch-Geometric, HuggingFace, OpenCV, NLTK, Scikit-Learn, SciPy, Pandas, Gymnasium, SymPy |