

Varun Babbar

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Citizenship: Indian • **Location:** London, United Kingdom

Research Interests

Human-Machine Collaboration, Explainable / Interpretable AI, Statistical Inference, Deep Learning

Current Position

September 2022 **ML Scientist at JP Morgan Chase and Co**

– Present

Working on projects in the following areas:

- Code completion
- Network compression
- Automated code quality analytics

Recently set up a reading group on human-centered AI for my team, with monthly paper discussions and frequent knowledge sharing.

Education

2018 – 2022 **University of Cambridge** – Cambridge, UK

BA + MEng in Information and Computer Engineering

MEng Supervisors: [Dr Adrian Weller](#), [Umang Bhatt](#)

MEng Thesis: *Set Valued Predictions for Human-AI Teams*

MEng Grade: 78.8% - Honours with Distinction, Rank 14/261

BA Grade: 79.4% - 1st Class Honours, Rank 18/289

2016 – 2018 **Singapore International School** – Mumbai, India

IB Diploma

Grades:

- 45/45 Points (World Topper)
- 5/5 in AP Mechanics, Chemistry, Calculus AB
- 800/800 in SAT Subject Tests in Physics, Chemistry, Maths II
- 35.25/36 in ACT

Relevant coursework

- *Probability and Statistics*: Probabilistic Ranking, Bayesian Inference, Gaussian Processes, Latent Dirichlet Allocation, High-dimensional MCMC, Information theory, Statistical Signal Processing
- *Optimization Methods*: Bayesian Optimization, Simulated Annealing, Particle Swarm Optimization, Linear Programming
- *Machine Learning*: Image Compression (BA Project), Computational Neuroscience, MEng Thesis

Honors and Scholarships

- 2022 IIB Project Prize (*University of Cambridge*)
For a top ranked MEng Project in the Department.
- 2021, 2022 Foundation Scholarship (*Queens' College, University of Cambridge*)
Awarded twice for obtaining a first class in my BA and MEng exams respectively
- 2022 The James & Jean Bennett Prize (*Queens' College, University of Cambridge*)
For outstanding distinction in my MEng degree
- 2022 Ruth Hendry Year Prize (*Queens' College, University of Cambridge*)
For outstanding distinction in my MEng degree
- 2020 Hawks' Trust Prize (*University of Cambridge*)
For sporting and academic achievements
- 2017, 2018 Merit Scholarship in School
Topped the school in all subjects.
- 2018 Full Scholarship from Hong Kong University
On the basis of my IB results.

Publications and Workshops

- 2022 **Conformal Prediction for Resource Prioritisation in Predicting Rare and Dangerous Outcomes**
Varun Babbar, Umang Bhatt, Miri Zilka, Adrian Weller
NeurIPS Workshop on Human in the Loop Learning 2022.
- 2022 **On the Utility of Prediction Sets in Human-AI Teams**
Varun Babbar, Umang Bhatt, Adrian Weller.
International Joint Conference on Artificial Intelligence (IJCAI) 2022 (Long Oral)
- 2021 **Style Transfer Preprocessing for Federated Learning**
Antonios Georgiadis*, **Varun Babbar***, Fran Silavong, Sean Moran
SPIE Medical Imaging 2022

2020 **Training a Task-Specific Image Reconstruction Loss**
Aamir Mustafa*, **Aliaksei Mikhailiuk***, Dan Andrei Iliescu, Varun Babbar, Rafal Mantiuk
2022 IEEE CVF Winter Conference on Applications of Computer Vision (WACV).

Research experience

August 2022 – September 2022 **Research Assistant**
Supervisors: Dr Adrian Weller, Umang Bhatt
Applied risk control methods to a problem where we want to identify radicalised individuals and allocate resources for intervention and monitoring. Top 15% of accepted papers at the NeurIPS Human-in-the-Loop Learning Workshop.

September 2021 – June 2022 **MEng Project: Set Valued Predictions for Human-AI Teams**
Supervisors: Dr Adrian Weller, Umang Bhatt
Link to [thesis](#) (contains abstract).

June 2021 – September 2021 **JP Morgan Chase and Co**
Supervisor: Antonios Georgiadis
Proposed a CyclGAN augmented federated learning model for resolving heterogeneity in client datasets. The resulting system showed promising performance on a segmentation task, leading to a **pending patent** and a paper (see above).

June 2020 – September 2020 **Research Assistant: University of Cambridge - Dept of Computer Science**
Supervisor: Dr Rafal Mantiuk.
Experimented with different loss functions for image-to-image translation tasks in order to answer the question - which loss function provides the most perceptually pleasing images? Co-author of a paper accepted at WACV '22.

June 2019 – September 2019 **Research Assistant: University of Cambridge - Dept of Physics**
Supervisors: Dr Sarah Bohndiek, Emma Brown.
Wrote scripts in Matlab and Python that can perform image processing operations on tumour images. Link to research [report](#)

Some Projects

January 2022 **Hack Cambridge**
Built an app that determines your carbon footprint by taking a photo of your receipt and performing a semantic search for identified keywords. Winner of the Huawei Challenge. ([see Devpost](#))

- December 2021 **Analysis of Optimization Algorithms**
Implemented Simulated Annealing and Particle Swarm Optimization for a high dimensional, constrained function as part of a coursework project. Extended this by tweaking algorithm hyperparameters using Bayesian optimization - I scored 90% in this module.
- May 2021 **Image Compression**
My 3rd year Image Processing project. Extended this by developing a decompressor that combines efficient hyperparameter tuning and deep learning based denoising. Obtained a 1st class mark + placed 2nd in the competition. ([see Github](#))
- March 2020 **Vanilla CNN**
Built a modern CNN from scratch, using only matrix multiplications. ([see Github](#))
- Jan 2020 – April 2020 **Synthetic Medical Image Generator**
Trained a GAN for generating synthetic MRI images from their corresponding segmentations.
- October 2019 **Hack Brunel**
Built an app that finds the optimal cycling route based on user risk preferences, crime levels, and traffic. Winner of the McAfee Security Challenge. ([see Devpost](#))
- November 2019 **Integrated Design Project**
Designed and wrote the navigation algorithm for a robot that can detect mines in a minefield, pick them up, and drop them to a safe zone. Came 2nd in the final competition out of 14 teams.
- November 2018 **Oxford Hack**
Built an app that makes storytelling an interactive experience by outputting relevant images and playing appropriate background sounds as a story is narrated. Winner of the AWS Challenge. ([see Devpost](#))

Miscellaneous

- 2022 Reviewer at TheWebConf2023

Technical skills

Programming languages

Proficient in: Python, MATLAB

Basic Knowledge: Java, Javascript, HTML

Software

LaTeX, Git, Shell

Languages

English, Hindi, French

Other interests

Racquet Sports, Juggling, Basketball, Climbing, Chess, Rubiks Cubes