Mrinank Sharma

mrinank@robots.ox.ac.uk • mrinanksharma.github.io

Education

University of Oxford — **Magdalen College**
PhD Candidate, CDT in Autonomous Intelligent Machines and Systems — *2019–Present*

My interests within machine learning are broad, but I firmly believe that good uncertainty estimation is essential for optimal, robust decision making. I'm interested in developing algorithms and techniques which enable inference algorithms to be applied to a number of real world scenarios, whether this be by respecting the constraints within the problem context (e.g., privacy requirements for sensitive data), or improving the data efficiency of particular algorithms.

University of Cambridge — **Pembroke College**
MEng (Hons) Information and Computer Engineering — *2015–2019*

Specialisation in Machine Learning. I ranked **top of my cohort** in my final two years, achieving a distinction in my final year and a first class with distinction in my third year. I consistently ranked within the top ten students of the cohort throughout the duration of my degree.

Final Year Project: *Differential Privacy and Approximate Bayesian Inference*. Supervisor: Dr. Richard Turner. **Distinction**.

Salient Courses: • *Probabilistic Machine Learning* • *Statistical Signal Analysis* • *Deep Learning and Structured Data* • *Practical Optimisation* • *Advanced Information Theory and Coding* • *Inference* • *Computational Neuroscience* • *Learning From Data* (EdX CS1156x) • *An Optimisation-based Approach to Control*

Recognition: • *Charles Lamb Prize* (2019) • *Ronald Wynn Prize for Engineering* (2019, 2018) • *IET Undergraduate Grant* (2018) • *Kilby Prize for the Best Undergraduate Performance* (2018) • *Winifred Georgina Holgate Pollard Memorial Prize* (2018, 2017) • *Foundress Scholarship* (2018, 2017) • *Foundress Prize* (2017, 2016) • *College Scholarship* (2016) • *Reece Foundation Arkwright Undergraduate Scholarship (2015)*

Activites: • *Pembroke College AFC III XI (Captain 2018)* • *Pembroke College Badminton I Team (II Captain 2017)* • *Pembroke College Table Tennis II Team* • *Pembroke Engineering Fresher Representative* • *Socials Officer, Cambridge University Engineering Society* (2017)

Calday Grange Grammar School (CGGS) — **West Kirby**
A-Level: 7 A* including Mathematics, Further Mathematics, Physics and Chemistry. — *2008–2015*
GCSES: 11 A* including English Literature, English Language, Mathematics, Physics, Chemistry & Biology.

Recognition: • *Overington Memorial Prize* (2016) • *Sergeant, CGGS Combined Cadet Force RAF Section* (2014) • *Arkwright Sixth Form Scholarship* (2013) • *Netcraft Computing Prize* (2013) • *Best Game KS4: Codebreaker Competition* (2012)

I **co-authored a GCSE English Revision Guide** which has **sold internationally**.

Technical Experience

Computational and Biological Learning Lab — **Dept. of Engineering, University of Cambridge**
Research Assistant — *June 2019–September 2019*

Research Assistant, working under Dr Richard Turner, extending my fourth year project. Developed the Differentially-Private Paritioned Variational Inference algorithm which enables private, Bayesian

learning in the federated learning context. This work lead to a workshop paper (Privacy in Machine Learning Workshop) at NeurIPS.

- **LendOne** — **Cambridge**
  Director — *January 2017–October 2018*
  LendOne was a start-up in the sharing economy space, seeking to facilitate peer-to-peer lending and borrowing of commodity items in communities through a mobile application. Involved in product and app design decisions. Additionally, gained technical experience with mobile application development as well as back-end server development.

- **Cambridge Consultants** — **Cambridge**
  Data Scientist — *July 2018–September 2018*
  As an intern in the *Algorithms and Analytics* group at Cambridge Consultants, I worked on developing an end-to-end system to detect stress levels from an array of biological sensors. For this project, I investigated academic literature to determine appropriate *biomarkers* (features that can be used to determine stress levels effectively) and implemented algorithms to perform extraction of these features. A number of machine learning algorithms were then applied to the feature data-set using `scikit-learn` with `Apache Spark`.

- **California Institute of Technology** — **Pasadena, California**
  Summer Undergraduate Research Fellow — *June 2017–September 2017*
  I worked for ten weeks in the *DNA and Natural Algorithms Group* under Professor Erik Winfree researching techniques to improve the reliability of dynamic DNA nanotechnology. I was required to assimilate a body of technical literature in a short period of time and found that patience and perseverance are crucial for this task. An open source software package, `Multistrand`, was used to simulate techniques which were thought to improve the robustness of DNA Seesaw Circuits by slowing down the rate of unwanted biological reactions (*leak*). Throughout this project, I contributed to `Multistrand` and developed a case study to provide a starting point for other researchers who wish to investigate leak reactions.

- **Cambridge University Eco Racing (CUER)** — **Cambridge**
  Embedded Software Engineer — *June 2016–June 2017*
  Working full time for ten weeks as part of the Summer Design Team, I designed and produced an *Electronic Driver Controls* system for *Evolution*, CUER's solar powered car. This involved producing a set of technical requirements for the project, developing a system approach and implementing the chosen approach. The *ARM Mbed* platform was used extensively for this body of work. As a key team member at the *European Solar Challenge 2016*, I made technical modifications in a high pressure and safety critical environment without which the vehicle would have been unable to participate in the competition. I remained involved with CUER throughout the next academic year, leading a team of three which designed an updated steering wheel.

Publications

- **M. Sharma***, M. Hutchinson*, S. Swaroop, A. Honkela and R. Turner, "Differentially Private Federated Variational Inference", *NeurIPS Workshop on Privacy in Machine Learning*, 2019.

Technical and Personal Skills

- Experienced with Python, TeX, Git. Additionally, I am familiar with a Unix operating environment.
- Full UK Driving License.
- GRE (October 2018): $170/170$ Quantitative Reasoning, $167/170$ Verbal Reasoning, $6/6$ Analytical

Writing.

Non Technical Experience

- **Pembroke College May Ball Committee** **Cambridge**
  President (18/19), Treasurer (17/18) *November 2017–Present*

  As President of Pembroke May Ball 2019, I led a committee of seventeen members to organise a high quality event whilst also focusing on the wider societal impact the event. We were ranked the most sustainable Cambridge May Ball in 2019 and for the first time in Pembroke May Ball history, all workers were paid the real living wage. Additionally, discounted tickets were made available to students in receipt of a Cambridge bursary and the event raised 3500 GBP for charity.

  As Treasurer for Pembroke June Event 2018, I was ultimately responsible for allocating a budget exceeding 100,000 GBP. On discovering the inadequacies of our external ticketing provider, I designed and implemented an alternative ticketing system in less than a week with an additional committee member. The June Event was well received by the guests of the event, who were particularly impressed by the quantity of food and entertainment that was provided at the event.

- **Pembroke College Junior Parlour Committee** **Cambridge**
  Treasurer *November 2016–November 2017*

  As the elected Treasurer for a student body of over 450 undergraduates, I was responsible for the allocation of a budget exceeding over 20,000 GBP to fund student run societies within the college. I introduced a system to increase the ease by which claims can be made as well as improved the allocation process by ensuring that all relevant information, such as the current assets of each society, is included in each application, mitigating the risk of a misuse of funds.

- **MyTutor** **Remote**
  Online Tutor *July 2016–October 2017*

  I have over 50 hours of experience of tutoring A-Level Mathematics and Physics through an online website. I have received excellent reviews for my lessons and garnered significant experience in communicating challenging technical concepts.