Ahan Gupta

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Education

- **National University of Singapore** — Singapore
  Bachelor of Computing - Honours in Computer Science — *Aug 2017 - Dec 2021*
  Computer Science Courses: *Design And Analysis Of Algorithms, Computer Architecture, Operating Systems, Networking, Compilers, Databases, Software Engineering, Parallel and Concurrent Programming, Machine learning, Optimisation Algorithms*
  Mathematics Courses: *Probability, Statistics, Algebra I, Real Analysis, Discrete Mathematics*

Research Experience

- **National University of Singapore** — Singapore
  High Performance Deep Learning (under A/P Yang You) — *Dec 2020 - Present*
  - Working on accelerating the training of distributed deep neural networks through high performance load balancing techniques in heterogeneous shared clusters.
- **National University of Singapore** — Singapore
  Distributed Systems Verification (under A/P Li Jialin) — *Aug 2020 - Present*
  - Working on automating the formal verification of large scale distributed systems
  - Developing a Novel approach to distributed systems verification by expanding pre-existing push-button verification approaches.
- **Purdue University** — West Lafayette, IN
  Automatic Program Repair (under A/P Lin Tan) — *March 2020 - Aug 2020*
  - Worked to increase the generalizability of deep learning models for automatic program repair through variable abstraction.
  - Proposed novel reconstruction algorithms to formulate assembled pieces of code from codified templates. Proposed novel metrics to obtain probabilities of variables in scope as candidates for codified templates through textual similarity metrics. Proposed novel metrics to impose probability distributions on candidate concrete patches.
  - Successfully generated correct templates and increased current model prediction accuracy by **23%** according to the quixbugs benchmark. Reduced model training time by **57%**
- **National University of Singapore** — Singapore
  Reinforcement Learning (under A/P Jonathan Scarlett) — *Jan 2019 - Dec 2019*
  - Worked on designing and analysing novel algorithms to balance exploitation against exploration under Huber's contamination model for Stochastic Multi-Armed bandits (MAB) - a reinforcement problem that involves guiding agents to allocate choices in an optimal manner across a pre-defined time horizon
  - Used the median as a robust statistical estimate to develop a novel algorithm that minimizes cumulative regret across a time horizon in a MAB setting
  - Used new statistical anomaly detection and removal techniques to develop a novel algorithm that minimizes cumulative regret across a time horizon by identifying and removing adversarial generated points in a MAB setting.
  - Proved the run time and correctness of all conceived algorithms by applying advanced statistical techniques and bounds to the specific conceived of algorithms

Experience

- **Google** — Singapore
  Software Engineer (Intern) — *May 2020 - Aug 2020*
  - Designed Asynchronous Web APIs via OpenAPI for authorisation microservice as well as database schemas for authorisation microservice for the MojaLoop Project. Implemented all APIs in HapiJS and TypeScript
  - Built Infrastructural groundwork to enable integration testing with databases.
  - All code merged into production. In subsequent builds, third party payment applications (e.g. Venmo, UPI) will be interoperable to the larger MojaLoop network in a secure manner
- **Ninja-Van** — Singapore
  Software Engineer (Intern) — *May 2018 - Aug 2018*
  - Developed a full stack Chrome application using JavaScript and WebUSB to route print requests to a Label Printer, with a **150-180%** speedup.
  - Developed a system to visualise Kafka and internal system metrics with Slack alerts using Grafana, InfluxDB and Prometheus
  - Integrated Highly Structured Message logic into a WhatsApp microservice replacing a pay-per-messaging service model, saving ∼**12$** annually

Honors and Awards

- **Honours List of Student Tutors**: In recognition of a high level of commitment to, and achievement of good teaching ('19)
- **Scholar's Program Honour Role**: Honour Role for university scholars for outstanding academic performance ('19)
- **Top Teaching Assistant**: Top one out of fifty teaching assistants for exemplary teaching abilities ('18)

Technical Skills

- **Programming**: Python, C, C++, Java, JavaScript, TypeScript, Scala, SQL
- **Deep Learning**: Pytorch
- **Frameworks**: Docker, Kubernetes, Kafka

Extra Curricular Activities

- **TURING PROGRAM**: Matriculated into a highly selective internal research program, *∼10/200 students*, within the Computer Science cohort for students who show outstanding academic capability for conducting research (Aug '20)
- **UNIVERSITY SCHOLARS PROGRAM**: Matriculated into a highly selective scholars program, *3% acceptance rate*, within NUS for students who show outstanding academic capability (Aug '17)

Teaching

- **Introduction to Programming Senior TA**: Conduct Weekly Tutorial Sessions for 8 students; mark and make assignments. In charge of 8 undergraduate TAs; mentoring them on how to teach and ensuring teaching standards and quality are met. Overall teaching score: 4.8/5.0, Department Average: 4.2/5.0 (Aug - Dec '19)
- **Introduction to Programming TA**: Conduct weekly tutorial sessions for 8 students majoring Computer Science on how to think computationally. Prepare and grade challenging assignments for undergraduate students. Overall teaching score: 4.8/5.0, Department Average: 4.2/5.0 (Aug - Dec '19)