JASRAJ SINGH

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EDUCATION

University College London, England **Sep 2023 – Nov 2024**
M.Sc. in Machine Learning

- **Grade**: 84.55% – First Class (Honours)
- **Thesis Title** – On the Effects of DropEdge on Over-squashing in Deep GNNs
  Supervisors – Prof. Laura Toni and Prof. Brooks Paige

Nanyang Technological University, Singapore **Aug 2019 – May 2023**
B.Sc. in Mathematical and Computer Sciences

- **Grade**: 4.58/5.00 – First Class (Honours)
- **Thesis Title** – Training-Free Neural Active Learning with Initialization-Robustness Guarantees
  Supervisors – Prof. Bryan Kian Hsiang Low and Prof. Ping Tong

Venkateshwar International School, India **Mar 2015 – May 2019**
All India Senior School Certificate

- **Grade**: 96.4%

MANUSCRIPTS

Jasraj Singh, Keyue Jiang, Brooks Paige, Laura Toni. Effects of Random Edge-Dropping on Over-Squashing in Graph Neural Networks. *Under review*, `https://openreview.net/forum?id=ZZwP9zljas`.

Jasraj Singh, Fang Liu, Hong Xu, Bee Chin Ng, Wei Zhang. LingML: Linguistic-Informed Machine Learning for Enhanced Fake News Detection. *Under review*, `https://arxiv.org/abs/2405.04165`.

Apivich Hemachandra, Zhongxiang Dai, **Jasraj Singh**, See-Kiong Ng, Bryan Kian Hsiang Low. Training-Free Neural Active Learning with Initialization-Robustness Guarantees. In *Proceedings of the 40th International Conference on Machine Learning*, PMLR 202:12931-12971.

RESEARCH EXPERIENCE

Learning and Signal Processing Lab, UCL, UK **Mar 2023 – Oct 2024**
Supervised by Prof. Laura Toni and Prof. Brooks Paige

- Theoretically characterized the negative impact of DropEdge, DropNode, DropAgg, and DropGNN on over-squashing, suggesting their unsuitability for long-range tasks
- Empirically demonstrated the detrimental effects of random edge-dropping on test-time performance with heterophilic datasets: Squirrel, Chameleon and TwitchDE

Visual Cognitive Neuroscience Lab, NTU, Singapore **May 2023 – Oct 2023**
Supervised by Prof. Xu Hong and Prof. Liu Fang

- Developed LingML, a novel approach integrating linguistics into machine learning for fake news detection, achieving 80.9% accuracy solely using linguistic features
- Conducted an experimental study with a COVID-19 fake news dataset, demonstrating improvement in 11 transformers-based LLMs upon incorporation of linguistic features

MapleCG Lab, NUS, Singapore **Jun 2022 – May 2023**
Supervised by Prof. Bryan Kian Hsian Low

- Introduced a training-free active learning (AL) criterion, *Expected Variance with Gaussian Processes* (EV-GP), for neural networks in the NTK regime
- Proposed several AL algorithms using the EV-GP criterion, and benchmarked them against BADGE, MLMOC and K-Means++ algorithms on (E)MNIST, SVHN, CIFAR-100 and various UCI datasets

EMPLOYMENT EXPERIENCE

Indeed Inc., Singapore **May 2022 – Aug 2022**
Product Science Intern

- Statistically analysed user behaviour in the two groups of an A/B test to recommend next steps
- Modelled the top 20 international markets to identify a minimal criterion for screening resumes

Shopee Pte. Ltd., Singapore **Jan 2022 – May 2022**
Research Engineering Intern

- Engineered features resulting in 11.79% increase in total orders and 12.48% in orders per user in Brazil
- Reproduced Lin et al., 2017, and Kendall et al., 2017, for multi-task learning with data imbalance, leading to a 0.3% gain in CTR and 2% in CR in Malaysia
- Discovered unexpected ranking behaviour and identified the responsible feature through an ablation study

Navtech Pte. Ltd., Singapore **Jul 2020 – Aug 2020**
Full Stack Data Science Intern

- Built a recommendation system to be deployed as a B2B service to jewellery retailers
- Employed Neural Collaborative Filtering (NCF) to learn user-user and item-item similarities
- Proposed a solution to the cold start problem by engaging with the user before recommending to them

TEACHING EXPERIENCE

Division of Mathematics, NTU, Singapore **Jan 2023 – Apr 2023**
Teaching Assistant – MH3500, Statistics

Division of Mathematics, NTU, Singapore **Aug 2022 – Nov 2022**
Teaching Assistant – MH2500, Probability and Introduction to Statistics

Center for Computational Brain Research, IIT Madras, India **Sep 2021 – Nov 2021**
Head Tutor – Machine Learning for Neuroscience Workshop

VOLUNTEERING EXPERIENCE

- **Reviewer** – International Conference on Learning Representations (ICLR) **2024**

HONORS & AWARDS

- **1st Prize in Integration Bee** – NTU, Singapore **2023**
- **3rd Prize in IET-Cup Hackathon** – NTU, Singapore **2022**
- **1st Prize in Integration Bee** – NTU, Singapore **2022**
- **1st Prize in Electronic Trading Challenge** – Jane Street Capital **2021**
- **3rd Prize in International Mathematics Competition** – UCL, England **2021**
- **President Research Scholar** – NTU, Singapore **2021**
- **JEE Advance Scholarship** – FIITJEE, India **2019 – 2023**
- **KVPY Scholarship** – DST, Government of India **2019**
- **KVPY Scholarship** – DST, Government of India **2018**
- **NTS Scholarship** – NCERT, Government of India **2017**
- **JSTS Scholarship** – DoE, Government of NCT of Delhi **2016**

EXTRA CURRICULAR

- **Inter-Hall Games (NTU)** – Represented Hall 13, NTU **2020**
- **Inter-School Games (NTU)** – 1st Prize representing School of Mathematical Sciences, NTU **2019**
- **Youth National Basketball Championship (BFI)** – Represented NCT of Delhi, India **2017**
- **Youth National Basketball Championship (BFI)** – Represented NCT of Delhi, India **2016**
- **Sub Junior National Basketball Championship (BFI)** – Represented NCT of Delhi, India **2014**

CERTIFICATIONS

- **Applied Social Network Analysis in Python** – University of Michigan **2021**
- **Deep Learning Specialization** – DeepLearning.AI **2021**
- **AI Engineering Specialization** – IBM **2020**
- **Algorithms: Design and Analysis** – Stanford University **2020**

TECHNICAL SKILLS

- **Programming Languages** – Python, SQL, R, MATLAB
- **Frameworks and Tools** – PyTorch, Tensorflow, Hadoop (HDFS, YARN), Spark, Airflow