Rajdeep Singh Hundal

rajdeep@u.nus.edu github.com/rajfly

Education

National University of Singapore Aug 2017 – Present
Doctor of Philosophy (Computer Science) *Current CAP: 4.83/5.0*
Master of Computing (Computer Science)
Bachelor of Engineering (Computer Engineering), Honours with Distinction

Relevant Coursework

Grades: Exclusively A– and above on all listed courses
Courses: Advanced Topics in Reinforcement Learning, Advanced Topics in Human-Computer Interaction, Advanced Computer Networks, Principles of Programming Languages and Software Engineering, Formal Specification and Design Techniques, Formal Methods for Software Engineering, Software Engineering Principles and Patterns, Software Engineering and Object-Oriented Programming, Database Systems

Research

An Empirical Study on Reinforcement Learning Frameworks | *RL, SE* Aug 2022 – Present
- Investigated the trustworthiness of state-of-the-art Reinforcement Learning frameworks
- Utilized differential testing to train, evaluate, and compare agents from different frameworks
- Found significant discrepancies between the frameworks in terms of both effectiveness and efficiency
- FSE 2024 paper submission planned

On-the-fly Image Input Repair for Deep Learning Models | *DL, SE* Aug 2022 – Present
- Investigated the effectiveness of identifying and repairing regions in the input that cause misprediction
- Utilized layer-consistency correlation to identify regions in the input which causes layer-inconsistency
- Utilized layer-consistency correlation to then repair the regions such that the layer-inconcistency is minimized
- FSE 2024 paper submission planned

Self-Checking Deep Neural Networks for Anomalies and Adversaries | *DL, SE* Sep 2021 – Aug 2022
- Investigated the trustworthiness of a Deep Neural Network's prediction during deployment
- Utilized trained Generative Adversarial Networks to transform inputs with low prediction confidence
- The new inputs were semantic-preserving and conformed to the training data distribution
- Y. Xiao et al., "Self-Checking Deep Neural Networks for Anomalies and Adversaries in Deployment", in IEEE Transactions on Dependable and Secure Computing, 2022, doi: 10.1109/TDSC.2022.3200421

Soccer Strategy Analytics Using Probabilistic Model Checkers | *ML, DL, SE* Aug 2021 – Dec 2021
- Investigated the effectiveness of using Probabilistic Model Checkers to predict soccer matches
- Utilized abstraction techniques to reduce the state space and prevent state explosion
- Prediction results were compared against popular Machine Learning and Deep Learning techniques
- Submitted as a Masters Dissertation

Research Interests

Domains: Reinforcement Learning, Software Engineering Testing and Debugging, Trustworthy AI

Experience

Project Tutor | *Formal Methods for Software Engineering* Aug 2023 – Present
Working with Prof. Dong
Tutor for the Soccer Probabilistic Model project option given to students

Research Assistant | *PLSE Lab* Sep 2021 – Aug 2022
Worked with Prof. Dong and Prof. Xiao
Project Title: Evaluating the Trustworthiness of Deep Learning Systems