

LIWEI (BLAIR), YANG

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EDUCATION

University of Toronto St. George | cGPA 3.92 (Dean's List)

Sept 2021 – Present

Honours Bachelor of Science | 3rd Year | Computer Science & Bioinformatics Specialist, Mathematics Minor *Toronto, Ontario, Canada*

Relevant coursework: *Computer vision, Machine learning, NLP, Software design, Statistics, Data structure, Complexity theory, Calculus, Algebra*

Status: Domestic student/ permanent resident

PROJECT EXPERIENCE

Research Student

May 2023 - Present

Vector Institute / University of Toronto

Hybrid

- Worked in Prof. Jimmy Ba's group with Michael Zhang, utilize GPT-4 to assess LLMs to understand their strengths and limitations, and provide qualitative evaluation.
- Implemented contrastive/generative process for generating model cards, ensuring they are informative and interpretable, to streamline the LLM evaluation process.
- Established an evaluation system that combines both quantitative and qualitative model feedback, offering critical insights for nuanced model refinements and advancements.

Tencent AI Arena Reinforcement learning competition | 4th Place

Jan 2022 - Jun 2023

UofT

Remote

- Led a team of five to develop a **MARL** (multi-agent reinforcement learning) model for the MOBA (multi-player online battle arena) game Honor of Kings, demonstrating strong project management and collaboration skills.
- Competed against 12 teams, primarily consisting of Master's or Ph.D. students, showcasing resilience and the ability to perform in a challenging environment.
- Implemented a **Phasic Policy Gradient (PPG)** (Cobbe 2020) deep reinforcement learning model, inspired by OpenAI's DOTA AI, and deployed advanced techniques like **distillation, MoE, LoRA, K-fac, Lookahead, and multi-head value** to enhance performance.
- Gained experience on large-scale, long-horizon model training of over **1,000 A100 hours**, utilized complex tuning skills.
- Achieved model performance above Challenger level, placing it within the **top 1st** percentile among all human players, reflecting the effectiveness and success of the developed AI model.

Research Assistant

June 2018 - Present

Beihang University

Beijing, China

- Conducted statistical analysis and visualization of experimental results, using python to help identify trends and patterns, and creating clear visual representations of the data.
- Performed preliminary peer-review on mathematical and statistical aspects of unpublished SCI articles, assessing the quality and rigor of methodologies, and providing constructive feedback for improvement.
- Applied computer vision techniques to assist research on the relationship between brain activity and perceived movie scenes, implementing customized algorithms, analyzing brain images and movie scene data, and collaborating with researchers to interpret findings.

Peer Reviewer for PLOS ONE (SCI Q1 Journal)

Apr 2022 - Present

PLOS ONE (Open Access)

Remote

- Selected as a peer reviewer for PLOS ONE, a Q1 SCI Journal known for its open-access policy.

- Reviewed multiple research articles, providing detailed feedback focused on statistical rigor and robustness to enhance the quality and academic integrity of the research.
- Contributed to the improvement and refinement of various articles through comprehensive and critical assessments delivered to the editorial team.

Robotics Championship China | National champion & co-founder

Team 7591 Aurora

Sept 2018 - Jan 2020

Beijing, China

- Co-founded the national champion FRC (FIRST Robotics Competition) robotics team 7591 Aurora, showcasing leadership and initiative in promoting STEM education and competitive robotics.
- Competed in the 2019 and 2020 off-season games, achieving the champion alliance position among 50 participating teams, demonstrating teamwork, technical skills, and problem-solving abilities.
- Took charge of programming for the automation stage of the competition, extensively utilizing computer vision techniques in Java to enhance the team's performance and contribute to the overall success.

PROJECTS

Research Project: Chaplin

University of Toronto

Jan 2024 - Apr 2024

Toronto, Canada

- Developed Chaplin, an extension of the model-based reinforcement learning algorithm Dreamer, integrating an action imitation component to enhance the world model's understanding of environment dynamics.
- Demonstrated Chaplin's superior performance in predicting future states over longer horizons compared to Dreamer, highlighting its potential to improve sample efficiency and overall performance.
- Conducted extensive experiments on the DeepMind Control Suite, improved the model's convergence speed, generalization capabilities, and reconstruction/prediction quality.

A inter and intra county mobility based COVID-19 model (Research project) | Python, R, Java

Mar 2020 – Present

- Developed a computer model to simulate and forecast the transmission of SARS-CoV-2 in Ontario, contributing to a deeper understanding of the virus's spread and informing public health strategies.
- Employed advanced techniques such as CNN, LSTM, and MCMC to estimate the prior distribution of epidemiological data, predict future population mobility, and analyze commuting flow patterns.
- Utilized Numpy and convolution extensively for dimensionality reduction, improving the efficiency and performance of the model.
- The project is set to undergo peer review and will be available as a pre-print on medRxiv later 2023, showcasing its potential impact and relevance in the field of public health and epidemiology.

Predicting the student's quiz correctness using deep attention | Python

Mar 2023 – Apr 2023

- Implemented an attention-only model to predict the correctness of a student's answer to a quiz question, focusing on a streamlined approach without the use of layer normalization, feedforward networks, etc.
- Attained a **76%** accuracy on the validation set, outperforming the baseline model by 6%; 2% lower than the SOTA models. Demonstrating the effectiveness of the attention-only approach in predicting student performance.

Sentiment analysis using minBERT | Python

Mar 2023 – Apr 2023

- Implemented a simplified version of BERT sequential classifier, fine-tuning the model to classify sentiment polarity of movie review
- Achieved **97.1%** accuracy on validation set, approximating the SOTA models.
- Utilized pre-trained LLMs for sentiment polarity classification, and utilizing natural language explanations.
- Performed in-depth analysis of the performance of LLMs in various sizes (GPT4, GPT2).

Neural machine translation with LSTM and transformer | Python

Feb 2023 – March 2023

- Implemented an encoder-decoder model using LSTM and transformer architecture, explored the differences between different architecture and attention mechanism.
- Trained the models on the Canadian bilingual parliamentary debates corpus, and achieved a BLEU score of **34.1**.

SKILLS

Technologies/Frameworks: Tensorflow, PyTorch, OpenCV, Linux, GitHub, LaTeX, Origin, Stata, Microsoft Suite

Graphic Design: Adobe Photoshop, Adobe Premiere, After Effect, Adobe Illustrator, R

Languages: Chinese, English

Programming Languages: Python, Java, C, R, LaTeX

Developer Tools: PyCharm, Eclipse, Intelli J, Visual Studio Code, Google Colab, RStudio