

Joshua Ong

☎ +447379329683 | ✉ joshuaongg21[at]gmail[dot]com | in LinkedIn | GitHub | 🌐 Personal Website

SUMMARY

Joshua is currently a PhD student at Imperial College London, supervised by Eleonora Giunchiglia, Shay B. Cohen and Wenda Li. Previously, Joshua was a visiting researcher under the supervision of Shay B. Cohen and Wenda Li. His research interests lie in Large Language Model (LLM) reasoning, with a particular focus on theorem proving and neurosymbolic approaches to enhance the faithfulness and reasoning capabilities of LLMs.

EDUCATION

Imperial College London (Imperial-X)

PhD in Electrical and Electronic Engineering (Full Scholarship)

London, United Kingdom

September 2025

- **Supervisor:** Dr. Eleonora Giunchiglia

University of Edinburgh

Bachelors of Science (Honours) Mathematics and Statistics (Second-Year Entry)

Edinburgh, Scotland

September 2021 - May 2024

- **Grade:** First Class Honours.
- **Dissertation Topic:** Detecting Redundancy in the Architecture of Boltzmann Machine (**77%**).
- **Courses:** Applied Statistics; Applied Stochastic Differential Equations; Bayesian Theory; Machine Learning in Python; Natural Language Understanding, Generation, and Machine Translation (NLU+)
- **Projects:** Spatial and Seasonal Analysis of Scottish Weather Data using Monte Carlo Permutation Test and Spatial Prediction Models (**100%**)

RESEARCH EXPERIENCE

University of Edinburgh School of Informatics

Visiting Researcher (Supervisor: Shay B. Cohen, Wenda Li)

April 2025 – Present

Edinburgh, Scotland

University of Edinburgh School of Informatics

Research Assistant (Supervisor: Shay B. Cohen)

June 2024 – April 2025

Edinburgh, Scotland

- *PiCSAR: Probabilistic Confidence Selection And Ranking for Reasoning Chains:* Developed a training-free best-of-N selection method using model probabilistic confidence as a scoring function. [1]
- *Theorem Prover as a Judge:* Leveraging autoformalisation to generate synthetic data and introducing Reinforcement Learning from Theorem Prover Feedback to improve model training and reasoning. [2]
- *CoMAT:* Leveraging symbolic representations to enhance the accuracy and reliability of LLMs in mathematical reasoning, eliminating the need for external symbolic solvers. [3]
- Developed questions and solutions, and hosted office hours for the final assignment in *Natural Language Understanding, Generation, and Machine Translation* course, with CoMAT selected as the core component.

EXPERIENCE

University of Edinburgh Information Service Group (EDINA)

Machine Learning Specialist

October 2023 – August 2024

Edinburgh, Scotland

- Researched and engineered a Retrieval-Augmented Generation (RAG) system utilising Dense Passage Retrieval for retrieval and Llama-3.1 as the generator, improving information retrieval accuracy and output precision from large-scale financial documents.
- Implemented and transitioned language models from GPT to open-source models, including Llama-3, Mistral, phi-3, among others, achieving cost reductions while elevating model performance and sustainability.
- Successfully deployed a Financial Query Answering (FinQA) model via HuggingSpace, serving both the Edinburgh University Trading and Investment Club and the University of Edinburgh Business School, and ensured going maintenance and optimisation of the model.

PUBLICATIONS

Leang, J.O.J., Zhao, Z. and Gema, A.P. and Yang, S. and Kwan, W.C. and He, X. and Li, W. and Minervini, P. and Giunchiglia, E. and Cohen, S.B.: *PiCSAR: Probabilistic Confidence Selection And Ranking for Reasoning Chains*, *arXiv:2508.21787 (Preprint)* [Link]

Leang, J.O.J., Gema, A.P., Cohen, S.B.: *CoMAT: Chain of Mathematically Annotated Thought Improves Mathematical Reasoning*, In *Proceedings of the Empirical Methods in Natural Language Processing, 2025*. [Link]

Leang, J.O.J., Hong G., Li W., Cohen, S.B.: *Theorem Prover as a Judge for Synthetic Data Generation*, 2025. In *Proceedings of the Association for Computational Linguistics, 2025*. [Link]

Gema, A.P., **Leang, J.O.J.**, Hong, G., Devoto, A., Mancino, A.C.M., Saxena, R., He, X., Zhao, Y., Du, X., Ghasemi Madani, M.R., Barale, C., McHardy, R., Harris, J., Kaddour, J., van Krieken, E. and Minervini, P.: *Are We Done with MMLU?*. In *Proceedings of the Nations of the Americas Chapter of the Association for Computational Linguistics, 2025*. [Link]

TEACHING

Teaching Assistant

Winter 2024: ELEC70144 Mathematics for Machine Learning (Graduate)

PEER REVIEW

ICLR 2025/2026 - October 2024, October 2025

EMNLP MathNLP Workshop (Programme Committee) - September 2025

ACL Rolling Review - October 2024, December 2024, February 2025, May 2025

NeSy 2025 - July 2025

TMLR - December 2024

INVITED TALK

Autoformalisation and Symbolic Reasoning for LLM Reasoning, July 2025, NEC Laboratories Europe

LLM Reasoning in the Mathematical Domain, November 2024, Natwest Data Science Seminar

SKILLS

Languages: English (Proficient), Chinese (Native), Hokkien (Native), Malay (Proficient)

Programming Languages: Python, Java, Javascript, R, Swift, SQL.

Developer Tools: Git, Ubuntu, Kubernetes, Flask, Streamlit, Gradio, VSCode.

Libraries: TensorFlow, PyTorch, Transformers, Scikit-Learn, Numpy, Pandas, Matplotlib, Seaborn.

Other Interests: Taylor Swift, Football (Real Madrid), Disney, Travelling, Swimming.