Max Oliver Stapylton Norris

108 Hannover Street, Edinburgh, EH2 1DR
+44 7458321166
maxonorris@gmail.com
GitHub

Education

PhD Natural Language Processing, CDT NLP University of Edinburgh 2023-

Currently engaged in doctoral research under the mentorship of Dr. Kobi Gal at the Artificial Intelligence & Data Science Laboratory. My research primarily focuses on exploring the synergy between large language models (LLMs) and personalized learning in educational settings. The aim is to innovate and advance the field of knowledge tracing algorithms, particularly for large-scale intelligent tutoring systems, ensuring a high degree of interpretability that aligns with both algorithmic efficiency and cognitive science principles. This research involves extensive application of LLMs, advanced deep learning techniques, probabilistic modeling, and reinforcement learning (RL) methodologies.

MSc Cognitive Science, University of Edinburgh 2022–2023

I used my masters as a one year rigorous conversion course from my undergraduate. Despite having no formal training in computer science I successfully completed level 10 and 11 courses (typically for final year CS graduates) in Machine Learning and Pattern Recognition, Advanced Database Systems, Information Retrieval Systems, Computational Neuroscience, Computational Cognitive Science and Computational Cognitive Neuroscience. My thesis saw me programme a platform in Typescript (React, Node) using prompt engineering techniques that allowed teachers to automatically generate educational content for their students according to Blooms Taxonomy.
Thesis: Contenti: A pedagogically informed generative educational content creation tool.

BA Economics & Chinese, University of London (SOAS) 2019–2022

First Class Honours. My undergraduate comprised of many quantitative modules (some taken at the London School of Economics) on the economics side such as Econometrics, Linear Algebra, Introduction to Statistics and Introduction to Quantitative Methods. The other half consisted of humanities and language centered classes such as Classical and Modern Mandarin, Cantonese, Introduction to Chinese Literature, Taiwanese Legal Theory and Asian History.

National Taiwan University 2017–2021

Foundation Year - Hanyu Enrichment Scholar; intensive Mandarin classes leading to TOCFL level B2.

Research

PIXEL - Large Language Modelling with Visual Transformers 2023–2024

Explored the challenges of visual language modeling, focusing on the PIXEL model's approach of rendering text as images for processing. Investigated the impact of systematic variations in RGB channels, font type, and size on model performance. Replicated PIXEL's training on NLP tasks, with a particular emphasis on English semantic processing. Conducted experiments with different fonts, including a detailed analysis of Osaka Regular-Mono, to address character cutoff issues and enhance model accuracy. Results contribute to understanding the influence of visual elements in language modeling and propose potential improvements for non-Latin languages.

Selective State Space Models for Large Language Modelling 2023–2024

Led a research team integrating PIXEL transformer architecture with an alternative sequence model, Mamba, known for its impressive performance across various benchmarks. Guided two master's students in adapting the visual language modeling approach of PIXEL to work with Mamba's sequence

modeling framework. This project focused on a detailed analysis and strategic modifications to combine the strengths of both models. Our work offers valuable insights into the feasibility and efficiency of using diverse sequence modeling techniques in language processing tasks.

Process Augmentation of Knowledge Tracing Algorithms 2024–

Led a research initiative at the University of Edinburgh to enhance Knowledge Tracing algorithms by integrating procedural steps generated by process-supervised Language Models. This approach aimed to enrich Intelligent Tutoring Systems with more detailed question representations, potentially refining predictions of student performance in subjects such as mathematics.

Experience

Kidsloop, Junior Applied Data Scientist (Signal Processing) 2023–2024

Spearheaded research in spectral analysis of children's voice for educational technologies. Developed first-generation children's ASR system.

Revalasce Analytics LLP, Founder & Data Scientist 2023–2024

Incorporated a company ✎ with university colleague. Landed our first client in the short-term office leasing industry and built a customer churn model using data from key card swipes into their office buildings.

PricewaterhouseCoopers, Mentorship Program 2023–2024

Developed a prototype for a WFH scheduling model using a genetic algorithms to allocate desk space.

Xccelerate HK, Hong Kong Youth Technology Scholarship 2023–2024

Awarded scholarship for a 4-month intensive Data Science boot camp.

T2RL ✎, Data Analyst and Translator 2023–2024

Developed a python web scraping tool and data dashboard for tracking airline ancillary services.

World Leading Schools Association✎, UK Ambassador 2023–2024

Promoted WLSA engagement and mission pillars through workshops in UK secondary schools.

HKSF (Hong Kong Shark Foundation), Hong Kong Youth Ambassador 2023–2024

Advocated against shark finning through educational campaigns in Hong Kong schools.