Eric Khiu

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Education

University of Michigan, Ann Arbor *Aug 2021 – Present*
B.S. Mathematics, Computer Science, and Data Science
- CGPA: 3.87/4.00 (as of Fall 2023); expected graduation: May 2025
- Course Highlights: Natural Language Processing, Artificial Intelligence, Machine Learning, Computer Organization, Theoretical Statistics, Probability Theory, Real Analysis, Numerical Analysis in Finance

Skills

Programming languages	Most experienced with Python, C++, and C; some experience with R
Python packages	TensorFlow, PyTorch, Numpy, Pandas, Scipy, Sklearn, Matplotlib
Languages	Fluent in English, Chinese, and Malay; Beginner in Japanese and Korean
Tools	Visual Studio Code, Git Repository, Google Colab, Ubuntu, and Adobe Premiere Pro

Research Experience

The Fields Institute for Research in Mathematical Sciences, University of Toronto *May 2023 – Present*
Research Team Lead
- Project: Predicting Performance of Neural Machine Translation (NMT) Models for Low Resource Languages (LRL)
- Model performance of the NMT models such as mBART and mT5 to predict their sp-BLEU scores.
- Analyze various factors affecting the performance using regression analysis.

Research on Teaching Mathematics in Undergraduate Settings (RTMUS) Lab *Sept 2022 – Dec 2023*
Undergraduate Research Assistant
- Project: Undergraduate Teaching and Learning in Mathematics with Open Software and Textbook (UTMOST3)
- Developed interactive textbooks that better support teaching and learning of undergraduate mathematics.
- Designed frameworks to analyze students' responses to the reading questions embedded in textbooks.

Work Experience

Computer Science and Engineering (CSE), University of Michigan *Jan 2024 – present*
Instructional Aide
- Facilitate weekly discussion sections and hold office hours for EECS 376: Foundations of Computer Science.
- Course topics: Algorithm design, computability (finite automata, Turing Machines, Turing reductions), complexity theory (P & NP, NP-hard, NP-Completeness, heuristics), cryptography (Diffie-Helman, RSA).

Math Learning Center, University of Michigan *Sept 2022 – Oct 2022*
Tutor
- Provided walk-in tutoring for Calculus I, II, Multivariable and Vector Calculus, Linear Algebra, and Probability.

Publication and Presentation

Natural Language Processing and Computational Linguistics
- **Khiu, E.**, Toossi, H., et al., including Doğruöz, A. S.. Predicting Machine Translation Performance on Low-Resource Languages: The Role of Domain Similarity. In Proceedings of the 2024 Conference of the European Chapter of the Association for Computational Linguistics (EACL 2024), Findings.
- **Khiu, E.**, Tripathi, T. (2023). Text Generator using Markov Chains: A Motivation to Recurrent Neural Network (RNN). Directed Reading Program (DRP) Presentation, University of Michigan.

Mathematics Education
- Gerami, S., **Khiu, E.**, Mesa, V., Judson, T.. Conceptions of spans in linear algebra: From textbook examples to student responses. *Educational Studies in Mathematics*.
- Mesa, V., **Khiu, E.**, Gerami, S., & Judson, T. (2023). Conceptions of spanning sets and linear independence emerging from examples and student responses to reading questions in an interactive linear algebra textbook. European Congress of Research in Mathematics Education, Budapest, Hungary.
- **Khiu, E.**, Gerami, S., Mesa, V., Judson, T. (2023, April). From Examples to Student Responses in an Interactive Linear Algebra Textbook: Conceptions of Spanning Sets. Undergraduate Research Opportunity Program (UROP) Symposium, University of Michigan. *(Received Blue Ribbon Awards for Outstanding Presentation)*

Programming Project

Domain Adaptation via Adaptive Tokenization (Python) *Nov 2023 – Dec 2023*

- Explored adaptive tokenization algorithm to improve language models' adaptability in different textual domains.
- Introduced a creative approach to integrating vector semantics with adaptive tokenization.

Pokemon TSP Problem (C++) *April 2023*

- Developed and implemented sorted, binary heap, and pairing heap priority queues using inheritance and dynamic polymorphism based on templated generic code.
- Utilized branch and bound algorithm and Prim's Algorithm to solve the Traveling Salesman Problem (TSP) for a complete weighted graph, while exploring heuristic approaches for near-optimal solutions.

Mini SQL (C++) *Mar 2023*

- Created a relational database using structural query language (SQL).
- Implemented essential functions including `CREATE, INSERT, JOIN, REMOVE, PRINT`, and `INDEX_GENERATION`, with a focus on exploring binary search trees and hash tables.

Stock Market Simulator (C++) *Feb 2023*

- Designed and implemented a real-time stock market simulator, leveraging priority queues and deque for efficient data processing and market trend analysis.
- Learned stream-based algorithms and running median calculations, enabling identification of optimal trading strategies under varying market conditions.

3D Maze Solver (C++) *Jan 2023*

- Created a program that is able to read, store, and solve a 3D maze.
- Utilized Breadth First Search (BFS w/ queue), Depth First Search (DFS w/ stack), map and coordinate list mode input and output, and handled command line arguments using `getopt_long()`.

Automated Text Classifier using Machine Learning (C++) *Nov 2022 – Dec 2022*

- Wrote a program to automatically identify the subject of students' posts on Piazza using natural language processing and machine learning techniques.
- Handled binary trees with Containers ADTs, dynamic memory, The Big Three, iterators, and the map data structure.

Computer Vision - Image Processor (C++) *Sept 2022*

- Built a content-aware image resizing program using a seam-carving algorithm by finding and removing "seams" in the image that pass through the least important pixels.
- Proficient in C-style pointers, arrays, structs, streams, IO, and Abstract Data Types in C.

Interest and Personal Project

Tutors in Action (TIA) Malaysia *July 2020-Dec 2022*

Tutor of Honor and Resource Manager

- Provided scheduled tutoring in Additional Mathematics to Malaysian Certificate of Education (SPM) candidates who are struggling with their academics due to the disruption of classes and lack of access to affordable tuition classes.
- Published online learning modules for Malaysian high school students and compiled study resources for them.

YouTube Channel: e-math Video *Apr 2020-present*

Content Creator

- Create videos on math-related topics: discuss interesting math problems in algebra, calculus, and probability; relate mathematics with real-life applications to discuss social issues such as social inequalities, gambling, and religion.
- Acquired knowledge of running a YouTube channel, including analyzing the channel's performance and coordinating YouTube collaborations and cross-promotional activities. Gained experience with video production.

Leadership Experience

M Dining *May 2023-present*

Student Manager

- Work closely with the managers to support the dining hall administration in running daily operations.
- Train new student employees and prospective student coordinators, in addition to looking after their welfare.

Student-Staff Consultative Committee (SSCC), Taylor's University *Jan 2021-Apr 2021*

Student Representative

- Represented computer science students in the ADTP program to discuss student welfare, learning experiences, and curriculum structure to support career prospects with the program directors and lecturers.