Jacob T. Emmerson

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EDUCATION

University of Pittsburgh, Pittsburgh Campus (08/2021 - 05/2024)
School of Computing and Information

- B.Sc. Computer Science; *summa cum laude*
  Overall GPA: 3.90/4.00
  Major GPA: 3.91/4.00
- Applied Statistics Minor

Graduate Coursework: Foundations of A.I., Advanced Topics in A.I.

EXPERIENCE

Research Assistant (05/2024 - Current)
University of Pittsburgh, PI: Adriana Kovashka

- Formulated and tested hypotheses on culture-induced language shifts between western and eastern countries using multilingual text embeddings (XLM-R, mBERT).
- Evaluated the caption rewriting ability of large-language using in-context learning to combat domain biases.
- Developed experiments to test the adaptability of multilingual vision language models (mCLIP, PaLI-X) in low-resource domains on retrieval tasks.

Machine Learning Developer (08/2022 - Current)
Signature Diagnostics

- Increased model accuracy 2-5% using Bayesian ensemble approaches for non-invasive prenatal disease classification.
- Developed genetic ratios to create features resistant to batch-effects; resulted in lower computational complexity for finding related genes.
- Calculated the cellular compositions of newborns diagnosed with NEC through methylation-based deconvolution.

PAPERS & PUBLICATIONS

Emmerson, J., & Hinson, C. (2024). *Adjusting transit networks for undeserved communities using evolutionary algorithms* (Unpublished). https://github.com/chris-hinson/cs3710-proj

PROJECTS

Genetic Algorithm for Equitable Neighborhood Service (03/2024)
Python

- Encodes localized information (grocery stores, retail stores, distances) obtained from Google Map's API using a multi-layered perceptron.
- Optimizes a weighted transit network using evolutionary algorithms and the encoded states at each bus stop.

Quantum Hadamard Edge Detector (04/2023)
Qiskit

- An edge detection algorithm for image analysis utilizing quantum gates implemented for comparison against classical alternatives; developed and tested remotely using IBM's Quantum Computers.
- https://github.com/jacobemmerson/QHED

Textual Entailment Model for Question Answering (12/2023)
Python

- An RTE-based model for answering multiple-choice questions about a given set of text; trained and evaluated on the publicly available MC500 dataset.
- https://github.com/jacobemmerson/CS1671/tree/main/MCTest

ORGANIZATIONS

Rainbow Alliance, Board Member (11/2021 - 04/2022)

Student Government, Judicial Committee (04/2022 - 12/2022)

SKILLS & INTERESTS

Interests: Fair and explainable A.I., A.I. for social good, natural language processing (NLP), reasoning in vision language models, machine commonsense

Programming Languages: Python, R, C/C++, Java, MATLAB

Technical Skills: Machine learning, deep learning, transformer models, large language models, generative models, reinforcement learning, data science, PyTorch, scikit-learn, Anaconda, Linux

Soft Skills: Collaboration, problem solving, team organization, project management, research, literature review