WILLIAM (BILL) XIA

CURRENT   401-834-5064   **PERMANENT**
90 Bromfield Rd   wxia01@tufts.edu   3935 Diamond Hill Rd
Somerville, MA 02144   https://www.linkedin.com/in/william-xia-ab40b2218/   Cumberland, RI 02864

EDUCATION

Tufts University, School of Engineering, Medford MA   August 2021 – Present
    Major: Computer Science
    Minors: Mathematics, English
    GPA: 3.75 / 4
    Clubs: Tufts Computer Science Exchange ● Parnassus (Tufts Creative Writing Club) ● Tufts Mountain Club

RESEARCH EXPERIENCE

Senior Honors Thesis: LLM-guided RL Agents for Solving Puzzle Video Games   September 2024 – Present
Advisor: Professor Vasanth Sarathy, Tufts University
- Read relevant literature and self-studied reinforcement learning (RL).
  - Familiarized myself with current state-of-the-art RL methods and large language model (LLM)-RL hybrid technologies.
  - Watched 10 lectures from David Silver's Google DeepMind RL Course on YouTube.
- Implemented a modular MiniGrid environment for developing problem-solving-based puzzles.
- Implemented a series of RL baseline agents to solve puzzles built within the aforementioned environment.
- Designing an algorithm that uses an LLM as an adaptive policy to enhance the performance of trained RL agents when tested in unfamiliar puzzle environments.
- Writing a thesis paper compiling my methods and results, which must be a minimum of 30 pages long.
  - This manuscript will be published by Tufts University in May 2025.

National Institutes of Health, Bethesda MD - Summer Research Intern   May – August 2024
    June – August 2023

Dr. Dina Demner-Fushman's Natural Language Processing Lab, National Library of Medicine
- Designed and built a suite of large language model-based tools to perform text simplification on biomedical abstracts.
  - Mastered Python machine learning libraries like Hugging Face and PyTorch.
  - Gained a deep understanding of natural language processing (NLP) concepts such as word embeddings and transformers.
- Annotated a natural language dataset consisting of over 4,000 sentence pairs.
- Read relevant scientific papers on NLP and biomedical text simplification.
- Presented progress reports at weekly lab meetings and provided insights to other's projects
- Attended weekly NIH intern journal club meetings, presenting and discussing influential NLP papers.
- Presented my work at the NIH Summer Intern Poster Day.
- Mentored a new intern who joined the lab during my second summer at NIH.
- Wrote a scientific manuscript as the first author and co-authored an additional scientific manuscript.

Tufts University, Medford MA - Research Assistant   May – December 2022
Professor Robert Jacob's Human-Computer Interaction Lab
- Completed Good Clinical Practice (GCP) training in preparation for conducting clinical trials.
- Performed data collection during clinical trials in which participants' brain waves were collected by an EEG device as they played chess.
- Used Python and MATLAB to preprocess game and brainwave data for a machine learning model.
- Performed exploratory data analysis to identify key variables to be assessed by machine learning models.
- Presented progress reports at weekly lab meetings and provided insight at weekly brainstorming meetings.
- Co-authored a scientific manuscript.

Tufts University, Medford MA - Research Volunteer   June 2022
Professor Justin Hollander's Urban Attitudes Lab
- Performed data analysis on WebGazer.js eye tracking data using Python's MatPlotLib and Pandas Libraries.
  - Discovered an error in the experimental configuration and implemented a solution for the issue.
- Presented progress reports at weekly check-in meetings.

Brown University, Providence RI - High School Student Researcher   July – August 2018
Professor Chun Guen Lee's Pathobiology Lab
- Read relevant literature and experimental protocols.
- Learned lab safety skills, how to take detailed research notes, and how to document experimental results.
- Accurately followed lab protocols while conducting experiments.

MANUSCRIPTS / PUBLICATIONS

- **William Xia**, Ishita Unde, Brian Ondov, Dina Demner-Fushman. "Identifying and simplifying non-consumer terminology in biomedical abstracts". Pending (December 2024) submission to the *Proceedings of the 63rd Annual Meeting of the Association for Computational Linguistics*.

- Brian Ondov, **William Xia**, Dina Demner-Fushman. "Lessons from the inaugural plain language adaption of biomedical abstracts track at TREC 2024". Pending (December 2024) submission to *Journal of Biomedical Informatics*.

- Matthew Russell, Samuel Youkeles, **William Xia**, Kenny Zheng, Aman Shah, Robert J.K. Jacob. "Decoding chess puzzle play and standard cognitive tasks for BCI: A low-cost EEG study". Submitted on October 28, 2024 to *Frontiers in Neuroscience* (under review).

PRESENTATIONS

- Brian Ondov (Co-presenter), **William Xia** (Co-presenter), Ishita Unde, Hoa Dang, Dina Demner-Fushman. "PLABA @ TREC 2024". Text Retrieval Conference (TREC) 2024. November 20, 2024.

- **William Xia** (Presenter), Brian Ondov, Dina Demner-Fushman. "Identifying and Simplifying Non-consumer Terminology in Biomedical Abstracts". National Library of Medicine Summer Internship Program Poster Day. August 2, 2024.

- **William Xia** (Presenter), Brian Ondov, Dina Demner-Fushman. "Identifying and Simplifying Non-consumer Terminology in Biomedical Abstracts". National Institutes of Health Summer Internship Program Poster Day. August 1, 2024.

- **William Xia** (Co-presenter), Amelia Hawks (Co-presenter), Sarah Rose Odutola (Co-presenter). "Rewilding of Laboratory Mice Enhances Granulopoiesis". National Institutes of Health Summer Intern Journal Club: *The Last of Us: The Threat of Emerging Fungal Pathogens*. July 11, 2024.

- **William Xia** (Presenter), Brian Ondov, Dina Demner-Fushman. "Identifying and Defining Non-consumer Medical Terminology". National Institutes of Health Summer Internship Program Poster Day. August 9, 2023.

- **William Xia** (Presenter), Brian Ondov, Dina Demner-Fushman. "Identifying and Defining Non-consumer Medical Terminology". National Library of Medicine Summer Internship Program Poster Day. August 8, 2023.

- **William Xia** (Co-presenter), Ike Keku (Co-presenter), Jerry He (Co-presenter). "Improving Language Understanding by Generative Pre-Training". National Institutes of Health Summer Intern Journal Club: *Exploding Gradients: The Rise of Large Language Models in AI*. July 19 2023.

PROJECTS

Senior Capstone Project: Recommender System for ASL Learning Platform   September 2024 – Present
Role: Machine Learning Engineer, Programmer
- Developing an AI-driven course recommendation system for ASLdeafined, an online American Sign Language (ASL) education program.

Neural Network: Custom Model   May 2024
Role: Programmer
- Programmed a neural network from scratch using Python and the NumPy library.
- Trained and evaluated the performance of the neural network using the *Iris* flower data set.
    - Optimized the neural network's performance by tuning hyperparameters with a validation set.

Language Model: Statistical Complex Term Identifier   March – May 2024
Role: Programmer
- Developed a Categorical-Dirichlet statistical language model to identify complex biomedical terms in academic texts.
- Deepened my understanding of statistical machine learning and natural language processing.

Language Model: Sentiment Analyzer   June 2023
Role: Programmer
- Programmed two sentiment analysis models from scratch using Python and the NumPy library.
    - One model used logistic regression to classify text; the other was a Naïve Bayes classifier.

Web Application: BitCalc   December 2022
Role: Programmer
- Designed and built a programming calculator web app using HTML, JavaScript, and the React framework.
    - Functionalities included basic arithmetic, bitwise operations, and base changing.
- Maintained version control using GitHub.

Digital Game: Catacombs   February – May 2022
Roles: Project Manager, Programmer
- Led a team of three classmates to create a video game using Unity and C#.
- Coordinated weekly team meetings and maintained a project timeline to keep the team organized.
- Designed and programmed the enemy AI system.

OTHER WORK EXPERIENCE

Tufts University, Medford MA - Programming Languages Teaching Assistant   September 2023 – Present
- Led semiweekly recitation classes for up to fifteen students at a time.
- Assisted students in office hours by answering questions and helping with debugging.
- Regularly answered student questions on the course *Piazza* forum.
- Graded students' assignments at teaching assistant grading meetings.

Ruffalo Noel Levitz - Telefund Student Fundraiser   January – May 2022
- Fundraise for Tuft's various colleges and programs through engaging phone calls with alumni and parents.
- Handled confidential and sensitive information in a professional, appropriate manner.

Cumberland Public Library, Cumberland RI - Teen Volunteer   June 2019 – December 2020
- Reshelved books and designed posters for library public events.

Moses Brown RISE Summer Camp, Providence, RI - Counselor in Training   June – August 2018
- Assisted full counselors with camp activities and supervised campers ages 3-13 years old.

AWARDS & HONORS

- Dean's List, Tufts University, Fall 2021 – Spring 2024
- Intramural Research Training Award, National Institutes of Health, 2023 – 2024

COMPLETED ONLINE COURSES & CERTIFICATES

- **Reinforcement Learning Course.** Taught by David Silver. Published by Google DeepMind on YouTube. Completed October 2024.
- **Natural Language Processing Specialization.** Taught by Łukasz Kaiser and Younes Bensouda Mourri. Published by DeepLearning.AI on Coursera. Completed June 2023.
- **Python Data Structures.** Taught by Charles Russell Severance. Published by University of Michigan. Completed and certified May 2022.
- **Programming for Everybody (Getting Started with Python).** Taught by Charles Russell Severance. Published by University of Michigan. Completed and certified May 2022.

SKILLS

Programming Languages: Python, Java, C++, JavaScript/HTML, C, C#, Linux/Unix, SQL, PHP, R, MATLAB
Spoken Languages: English, Mandarin

HOBBIES

Creative Writing / Storytelling
- Currently writing a fantasy novel titled, *A Merchant's Feud*.
- Served as Dungeon Master for various *Dungeons & Dragons* groups since 2019.

Violin
- 16 years of experience.
- Member of Tufts University's Klezmer Ensemble.

LINKS

LinkedIn: https://www.linkedin.com/in/william-xia-ab40b2218/
GitHub: https://github.com/onionLad