Weihan Xu

Durham, NC | weihan.xu@duke.edu | +1 734-548-7537 | https://github.com/wx83

Education

Duke University **Durham, NC**
Master of Science in Computer Science (AI/ML track) Expected May 2025
GPA: 4.0/4.0
Coursework: Deep Learning(A+), Theory and Algorithm for Machine Learning(A+), Introduction to Medical Robotics, Natural Language Processing, User Security and Privacy, AI Security and Privacy

University of Michigan-Ann Arbor **Ann Arbor, MI**
Bachelor of Science in Computer Science (with Honors) and Data Science May 2023
GPA: 3.87/4.0
Coursework: Deep Learning for Computer Vision, Machine Learning, Applied Regression Analysis, Database, Data Structures and Algorithms, Theoretical Statistics, Probability and Statistics, Linear Algebra, Intro to Computer Organization, Intro to Natural Language Processing

Publications

Published:

2023:

- **Equipping Pretrained Unconditional Music Transformers with Instrument and Genre Controls**
  Weihan Xu, Julian McAuley, Shlomo Dubnov, Hao-Wen Dong
  IEEE Big Data 1st Workshop on AI Music Generation with AI Music Competition

2024:

- **A New Dataset for Tag- and Text-Based Conditioned Symbolic Music Generation**
  Weihan Xu, Julian McAuley, Taylor Berg-Kirkpatrick, Shlomo Dubnov, Hao-Wen Dong
  The 25th International Society for Music Information Retrieval - Late Breaking Demo
- **A New Dataset, Notation Software, and Representation for Computational Schenkerian Analysis**
  Stephen Hahn, ***Weihan Xu***, Jerry Yin, Rico Zhu, Yue Jiang, Simon Mak, Cynthia Rudin
  The 25th International Society for Music Information Retrieval (ISMIR)
- **Smart Tools, Smarter Concerns: Navigating Privacy Perceptions in Academic Settings**
  Yimeng Ma, ***Weihan Xu***, Hongyi Yin, Yuxuan Zhang, Pardis Emami-Naeini
  The Twentieth Symposium on Usable Privacy and Security (SOUPS Poster)
- **SentHYMNent: An Interpretable and Sentiment-Driven Model for Algorithmic Melody Harmonization**
  Stephen Hahn, Jerry Yin, Rico Zhu, ***Weihan Xu***, Yue Jiang, Simon Mak, Cynthia Rudin
  The 30th SIGKDD Conference on Knowledge Discovery and Data Mining - Applied Data Science Track

Preprints:

2023:

- **Recurrent Neural Network on Predicting Intensive Care Transfers and Other Unforeseen Events(PICTURE) Model**
  Weihan Xu, Loc Cao, David Hanauer, Sardar Ansari, Kayvan Najarian
  Senior Honor Thesis

2025:

- **Generating Symbolic Music from Natural Language Prompts using an LLM-Enhanced Dataset**
  Weihan Xu, Julian McAuley, Taylor Berg-Kirkpatrick, Shlomo Dubnov, Hao-Wen Dong
  Submitted to ICASSP 2025
- **TeaserGen: Generating Teasers for Long Documentaries**
  Weihan Xu, Paul Pu Liang, Haven Kim, Julian McAuley, Taylor Berg-Kirkpatrick, Hao-Wen Dong
  Submitted to ICLR 2025

Research Experience

Professor Julian McAuley's Research Lab **San Diego, CA**
Project: Conditional Music Generation Jun 2023 - Present

- Developed a system that generates symbolic music aligned with user-specified genre and instrument inputs by fine-tuning a pretrained music transformer with prepended tokens
- First-authored a workshop paper accepted by 1st Workshop on AI Music Generation at IEEE Big Data 2023 and **won AI Music Innovation Award**
- Collected and constructed a large-scale dataset of nearly one million entries by extracting metadata tags from the MuseScore platform and generating captions with a large language model, resulting in a first-authored paper accepted at ISMIR-Late Breaking Demo
- Successfully built two conditional music generation systems: one that generates symbolic music based on multiple tags and another that generates music using free-form text inputs, resulting in a first-authored submission to ICASSP 2025
- Developing a text-to-symbolic music model by expanding the vocabulary of the large language model (BLOOM) and fine-tuning it with paired captions and music tokens

Project: Teaser Generation May 2024 - Present

- Constructed a dataset of over 1,000 multimodal documentary videos with an average length of 30 minutes by first annotating paired teaser and body content, then applying audio track separation on scraped raw data from YouTube, resulting in separated components for visual, speech, text, music, and sound effects
- Proposed and implemented an interval-based model and a learning-based model for generating automatic teasers under 3 minutes for long documentaries, designing new evaluation metrics to complement subjective testing, resulting in a first-authored submission to ICLR 2025

Interpretable Machine Learning Research Lab **Durham, NC**
Project: Interpretable music composition with Schenkerian analysis Dec 2023 - May 2024

- Contributed to the development of a Schenkerian Analysis dataset by annotating music depth and integrating the music data into software for computational recognition
- Proposed a novel clustering approach using a graphical neural network (GNN) that eliminates the need for predefined cluster numbers in each layer, specifically designed for music hierarchical structures
- Developed a codebase from scratch using PyTorch Geometric (PyG) and co-authored an accepted ISMIR paper
- Reimplemented a baseline model with updated libraries, obtaining results for an accepted KDD paper

Professor Sardar Ansari's Research Lab **Ann Arbor, MI**
Project: Time Series Prediction in Intensive Care Unit Nov 2021 - May 2023

- Preprocessed raw medical data to develop a Recurrent Neural Network and Transformer-based model to improve accuracy in predicting patient deterioration rates
- Explored replacing an existing XGBoost model with a deep learning approach for time series data, contributing valuable insights into model performance
- Completed an Honor Thesis under the supervision of Professor Sardar Ansari and Professor Kayvan Najarian

Projects

Diagnostic Classification in Educational Measurement **Ann Arbor, MI**
Data Science Major Capstone(Advised by Prof. Gongjun Xu) Jan 2022 - May 2022

- Proposed a new algorithm to predict psychological attributes with educational assessment data with Cognitive Diagnosis Models package in R
- Overcome computational difficulty of estimating the correlation between answering specific exam questions correctly and psychological attributes with machine learning tools (Restricted Boltzmann Machines)
- Experimented with 4 different methods of determining the correlation matrix, resulting in a research report

Accessibility tools for the blinds **Ann Arbor, MI**
Computer Science Major Capstone May 2022 - Jun 2022

- Collectively (in a group of four) built a website that allows visually impaired people to upload photos of

surroundings and describes the photos for them
- Designed various features into the website, such as giving warnings if photo includes roadblocks or other obstacles
- Constructed the code and user interface for the website with one other team member
- Tested the website and made a demo describing the function of the website

Teaching Experience

Electrical and Computer Engineering Department, Duke University **Durham, NC**
Course: Introduction to Deep Learning (Taught by Prof. Vahid Tarokh) Sep 2024 - Dec 2024

- Serve as a teaching assistant for a graduate-level deep learning course
- Hold weekly office hours to help with mathematical proof and code Implementation
- Provide assistance to nine groups, each comprising four members, in the design, implementation, and presentation of their final projects
- Design Exam Questions

Skills

Technical skills: C; C++; Python(PyTorch & Tensorflow); Java; SPSS; R; MongoDB; SQL; HTML; CSS; LaTeX

Language: English, Mandarin

Instrument: Piano(Advanced), French horn(Beginner), Violin(Beginner)