Jiarui Xu

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|github: https://github.com/Jiarui-Xu-Gatech | Personal Web: https://jiarui-xu-gatech.github.io/

Computer Science Master & **Music Technology** Master(**Music Information Retrieval** and **Search Algorithm** field) with **Full GPA**; Electrical Engineering professional, with a solid background in **Digital Signal Processing** foundation. Also skilled at **composing classical music**.

Experience

Next Lab Group-Zhejiang University, Hangzhou, China   *Aug 2020 - Jul 2021*
Research Intern of Software Engineering
Completed my own tonality recognition algorithm and system for music structure, chord, and melody generation algorithm. Developed Zhejiang University's **YUYIN System** -- An Asian Games certified AI composition APP Research.

Georgia Institute of Technology, Atlanta, GA   *Aug 2022- Present*
Teaching Assistant in CS6601 Artificial Intelligence, Designer&Grader for weekly assignments&projects for 200 students.

Education

Georgia Institute of Technology, Atlanta, GA   *Jan 2021- Dec 2023 (Expected)*
Master of Science in Computer Science GPA: **4.0**/4.0
Master of Science in Music Technology GPA: 3.75/4.0
Core Courses: Software Engineering/Web Developing/Data Structure/Database/Artificial Intelligence/Nature Language Process/Computer Vision/Information Retrieval/Query by Humming/Game AI/Audio Software Engineering/Machine Learning/Deep learning/HMM/Bayes Net

Xi'an Jiaotong University, Xi'an, China   *Sept 2016-Jul 2020*
Bachelor of Electronic Engineering (Honorary Graduate) GPA:3.62/4.00 | Ranking: 9/89
Core Courses: Digital Signal Processing/Linear Algebra/Mathematical Analysis/Probability Theory and Mathematical Statistics/Signal and System/Analog Electronic Technology/Fundamentals of Digital Electronics

Skills

Languages: Python: Proficient 6 years, C++: 5 years, C#: 4 years, Java: 2 year, Javascript: 2 years, Shell: 3 years
REST, HTML, CSS, Android Studio, Xcode, Tomcat, MongoDB, JUnit, JMeter, Google Cloud
SQL, MySQL, Dataflow, BigTable, BigQuery
TensorFlow, Pytorch
Matlab, Cubase, Ableton Live, Kontakt, LTspice, Unity

Projects

Computer Vision Semantic Segmentation Deep Learning   *Aug 2022 – Dec 2022*
- Utilize the Camvid dataset - a small dataset of 701 images for **self-driving perception**.
- Implement PSPNet by using ResNet backbone, but uses dilation to increase the receptive field, and aggregates context over different portions of the image with a "Pyramid Pooling Module"(PPM)
- **Transfer Learning**: Utilize the PSPNet trained on Camvid dataset, transfer it on KITTI road segmentation dataset.
- Github: https://github.com/Jiarui-Xu-Gatech/Semantic-Segmentation-Deep-Learning-Jiarui

Multi Tasks Nlp Bert Model   *Oct 2022 – Dec 2022*
- Train multi-task of Name Entity recognition(**NER**), **intent detection**, **fragment detection** 3 tasks all together using **Bert** pretrained model and plugged in downstream tasks using a linear layer and drop-out layer.
- The multi-task is parameter sharing, while the downstream task's parameters are separate.
- The result of using multitask can increase the performance to 1 percent of 2 tasks out of 3 tasks compared with a baseline that is trained alone.
- Github: https://github.com/Jiarui-Xu-Gatech/Multi-Tasks-NLP-Bert-Model

Speech Model and Reprogramming implement lyric text transcription   *Jan 2022 - Present*
- Utilize Stanford CCRMA **DAMP** DataSet; Training with TensorFlow.
- Utilize **reprogramming** to add noise appropriately, to improve **DeepSpeech** Model's transcription of lyrics.
- Github: https://github.com/Jiarui-Xu-Gatech/2022Spring7100

Unity 3D Game Design   *May 2022 – Aug 2022*
- Utilize C# and Unity to create 3D people, environment and implement all the interaction between players.
- Support artificial intelligence NPC using **Navmesh** Algorithm.
- Github: https://github.com/Jiarui-Xu-Gatech/TeamAlpha

Recommender System   *Jan 2022 – May 2022*
- Utilize **Movelens** DataSet to do Deep learning-based Recommendation.
- Compare **Transformer** Modelto a baseline **Long-Short-Term-Memory** Model
- Github: https://github.com/Jiarui-Xu-Gatech/Predicting-User-Ratings

Musical Chess Software   *Jan 2022 –May 2022*

- C++ real-time chess game software; Using **JUCE**; **GUI** Design; **Multi-threaded** collaborative operation; Multiple generators individually design sound effects for each piece. Realized synthesis object: **Comb Filter**, **ADSR**, etc.
- Support **Stockfish AI** to play chess.
- Github: https://github.com/ijc8/MUSI-6106

Real-Time Pitch and Onset Detection Applied to 2D Game   *Aug 2021 –Dec 2021*
- Real time **mono-pitch detection**, **Onset detection** algorithms in Python
- **Score algorithm** to evaluate the accuracy of rhythm and pitch
- Github: https://github.com/Jiarui-Xu-Gatech/No-thief-under-Heaven

AppStore: A Cloud and React based App Purchase Platform   *Nov 2022 –Dec 2022*
- Designed and implemented a web application for software purchase with React JS.
- Implemented features for users to create and browse software and support search software.
- Buid responsive and intuitive UI with antD, support file upload.
- Improved the authentication using token-based registration/login/logout flow with React Router v4 and Server-side user authentication with JWT.
- Launched a microservice in Go to handle register/login/logout/upload/checkout and deployed to Google Cloud(Google App Engine, GCE).
- Utilize Elastic Search(deployed to GCE) to provide search functions such that users can search softwares.
- Integrate with stripe API for checkout and view history information.

NFT Price Visualization (React, JS, AntD, Rechart, MoralistApi)   *Oct 2022 –Dec 2022*
- a NFT dashboard to search and view and analyze NFT assets.
- Leverage AntD UI Component Library to boost client side development.
- Leverage Moralis NFT API to fetch NFT relevant data(price, name, description etc.).
- Build NFT trade/price chart UI with recharts.
- Demo: https://recordit.co/IRCoD60kBq

Tinnews: a Tinder-like News Recommendation App   *Aug 2021 –Dec 2021*
- Designed the Instagram Flavor News app based on Google Component Architectural MVVM Pattern.
- Implemented the bottom bar & page navigation using JetPack navigation component.
- Utilized Mindorks's PlaceHolderView to support swipe gestures for liking/disliking the news.
- Built the Room Database with LiveData & ViewModel to support local cache and offline model.
- Integrated Retrofit and Rxjava to pull the latest news data from a RESTful endpoint(newsapi.org).

A Personalized Twitch Resources Recommendation Engine   *Jan 2022 –Feb 2022*
- Designed and built a full-stack web application for users to search twitch resources(stream/video/clip) and get recommendations.
- Built a web page with rich + user friendly experience using React and Ant Design.
- Implemented RESTful APIs using Java servlets, retrieved real Twitch resources using Twitch API and store data in MySQL.
- Support login/logout and favorite collection.
- Explored multiple recommendation algorithms and extracted game information from Twitch resources to implement a Content-based algorithm.
- Deployed the service to AWS EC2 for better stability.

Music Signal Synthesis and Processing System   *Apr 2021*
- Control: Serial Modularization System, interactions between inputs, oscillators, synth engine, effects, and filters by chaining, parallel processing, and the combination of the former.
- Synth: Utilities for generating and modifying sounds. (Audio Envelop Algorithm)

Chipmaking and Signal Systems Developing based on Analog electronics and Digital electronics   *June –July 2019*
- The design included a solar panel, lithium batteries, LED lights, a Bluetooth module and a Microcontroller Unit (MCU).
- With the help of software like Altium Designer, I designed an original BISS0001 human induction infrared sensor chip and an MCU.

Completed a 15-minute classical orchestral work - piano concerto   *Aug 2020*
- The link of the concerto is: https://music.163.com/#/song?id=1317442300

Studio Albums Making   *Jul 2021*
- Recording songs in recording studio, vocal shifting, mixing, processing master and integrating albums on my own.
- Publish the album online: https://music.163.com/#/album?id=91852925

Publications

Paper

J. Xu, 'Application of Blind Source Separation in Sound Source Separation', in *Proceedings of AEIC's 2nd International Conference on Computer Information Science and Application Technology*, *Guangzhou, China, Aug. 30 – Sep. 1, 2019* (EI, CPCI); published on *Journal of Physics: Conference Series (JPCS)*, ISSN: 1742-6588,EI:20200107981104

Developed an algorithm for sound source separation using ICA, IVA and the inverse matrix, and conducted simulations with MATLAB.

Patent

Chen, Q. & Xu, J.(2021).*'A MIDI music evaluation and polishing method based on harmony analysis*' China. Patent Number 202110825341.2. China Intellectual Property Office.

Developed an efficient algorithm for Key recognition which is twice faster than other deep learning based algorithm.