

# Yinghao Ma

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## EDUCATION BACKGROUND

### Carnegie Mellon University (CMU)

09.2020 – 05.2022

MS: music & technology, School of Music. Supervised by prof. Richard Stern

- Overall GPA: 3.9/4.0
- Research interests: **Music Information Retrieval, Speech Signal Processing, Sound Event Detection**
- Programming languages: Good command of Python and MATLAB
- Music Background: Record Chinese musical version of Beethoven's serenade for 250th anniversary of birth

### Peking University (PKU)

09.2016 – 07.2020

BS: Mathematics (Probability Theory), School of Mathematical Sciences, Department of Mathematics

- Overall GPA: 3.4/4.0
- Music Background: Conductor in the orchestra of Chinese Music Institute, PKU  
Amateur Highest Performance Level of Chinese flute, China Conservatory of Music
- Awards and Honors: Outstanding graduates of School of Mathematical Science, PKU  
Excellence in the preliminary prize for S.-T.Yau College Student Mathematics Contests

## RESEARCH & INTERNSHIP EXPERIENCES

### Learnable Frontend for Music, Speech and Audio

09/2021 – Now

Research Assistant, Supervised by Prof. Richard Stern, Carnegie Mellon University

- Constructing 2-layers learnable frontends based on extractor from raw wave and modulation on time and frequency
- Utilizing low-pass filters and denoising autoencoder to increase robustness by blurring the signal before maxpool
- Reviewing whether learnable frontends can capture more information than Mel by signals reconstruction with VAE

### (internship) Cover Song Detection & Evaluation of Automatic Speech Recognition

05/2021 – 08/2021

Algorithm Engineer, Tencent Holdings Limited. (Beijing)

### (internship) Tempo, Beats and Downbeats Detection in Chinese Pop Songs

06/2020 – 08/2020

Algorithm Engineer, Beijing Deepmusic Technology Co.

- Built a pipeline on (down)beat detection based on BLSTM, which significantly outperforms librosa & madmom.
- Estimated tempo and beat of Chinese pop songs with the beat probability on each frame, with 98% accuracy.
- Developed new model based on TCN for rhythmically instability to further improve tempo / beats detection.

### (undergraduate thesis) Chinese Flute Playing Technique Detection and Classification

02/2020 – 05/2020

Research Assistant, Supervised by Prof. Xiaoou Chen, Peking University

- Established music technique detectors based on a series of CNN with different layers as well as FCNN.
- Extended models with transpose convolution to support variable length inputs and pixel level classification.
- Examine and analyzed the generalization of FCNN models with large scale music techniques datasets.

### Correspondence between Speech Melody and Pitch Contour in Sichuan Folk Song

07/2019 – 09/2019

Research Assistant, Supervised by Prof. Zhiyao Duan, University of Rochester

- Analyzed the correspondence among the tone, change on fundamental frequency and the change of music notes.

### Automatic Musical Instrument Recognition and Timbre Recognition

02/2019 – 07/2019

Research Assistant, Supervised by Prof. Xiaoou Chen, Peking University

- Implemented an audio event detection model based on CRNN on Chinese instruments recognition.
- Assessed and reported the result of our model with percussion, recall rate and F-measure with the baseline of CNN.
- Submitted to Conference on Sound & Music Tech (CSMT), published on Fudan Journal of Natural Sciences

## PUBLICATION & CONFERENCE

- Yinghao Ma, et al. *A Transformer Based Pitch Sequence Autoencoder with MIDI Augmentation*, LNEE, 2020.
- Zijin Li, et al. *Chinese Instrumental Quartet Detection with CRNN*, Conference on Sound & Music Tech, 2019.

## TEACHING ASSISTANT & COURSES EXPERIENCE

### TEACHING ASSISTANT of Machine Learning for Signal Processing

- Gave lectures on ICA; design and grade quizzes and homework on NMF, SVM, EM, HMM etc.; design project topics

**Introduction to Deep Learning** (A, Course project with  $\beta$ -VAE, help with refine lecture notes)

**Advanced Digital Signal Processing** (1<sup>st</sup> rank of the class, help with refine lecture notes)

### Other Selected Courses

- Speech Recognition & Understanding; Convex Optimization; Natural Language Processing;
- Advanced Theory of Probability; Mathematical Statistics; Introduction to Stochastic Processes.
- Differential Geometry; Topology; Real Analysis; Functional Analysis; Partial Differential Equation; Abstract Algebra
- Introduction to Computer Music; Fundamental Chinese Phonetics; Enjoyment of Music; Composition; Chorus.

## EXTRACURRICULAR ACTIVITIES & LEADERSHIP

- One of Student Conductors in Chinese Music Institute, PKU. Held rehearsals of philharmonic chamber & concert.
- Holding seminar on music theory, music signal processing, stochastic processing and music information retrieval.