# Yinghao Ma

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## EDUCATION

**Carnegie Mellon University (CMU)** 09/2020 – 05/2022

*MS: Music & Technology, School of Music. Supervised by Prof. Richard Stern*

- Overall GPA: 4.0/4.0
- Research interests: ***Music Information Retrieval, Sound Synthesis, Speech Signal Processing***
- Awards and Honors: Fellowship for graduate students that covers 50% of tuition fee
- Music Background: Recorded Chinese musical version of Beethoven's serenade for 250th anniversary of his birth during COVID to cheer others up. Released on Deep Learning course web of CMU
- Selected Courses: Speech Understanding; Convex Optimization; NLP; Introduction to Computer Music

**Peking University (PKU)** 09/2016 – 07/2020

*BS: Mathematics & Applied Mathematics (Probability Theory), School of Mathematical Sciences*

- Overall GPA: 3.4/4.0
- Awards and Honors: Outstanding graduates of School of Mathematical Science, PKU
  Excellence in the preliminary prize for S.-T.Yau College Student Mathematics Contests
- Music Background: Conductor in the orchestra of Chinese Music Institute, PKU
  Amateur Highest Performance Level of Chinese flute, China Conservatory of Music
- Selected Courses: Advanced Theory of Probability; Statistics; Intro to Stochastic Processes; Topology

## RESEARCH EXPERIENCE

**Learnable Front End for Music, Speech and Audio** 09/2021 – Present

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

- Construct 2-layers learnable frontends based on extractor from raw wave and modulation on time and frequency.
- Utilize low-pass filters and denoising auto-encoder to increase robustness by blurring the signal before max-pool.
- Review whether learnable frontends can capture more information than Mel by signals reconstruction with VAE.

**Chinese Flute Playing Technique Classification Based on FCNNs (undergraduate thesis)** 02/2020 – 05/2020

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

- Established music technique detectors based on a series of CNNs with different layers as well as FCNNs.
- Extended models with transpose convolution to support variable length inputs and pixel level classification.

**Correspondence between Speech Melody and Pitch Contour in Sichuan Folk Songs** 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 CRNNs on Chinese instruments recognition.
- Evaluated the results of our model with precision, recall rate & F-measure, compared to baseline CNN processing.
- Submitted to Conference on Sound & Music Tech (CSMT), published on Fudan Journal of Natural Sciences.

## WORK EXPERIENCE

**Teaching Assistant & Guest Lecturer of Machine Learning for Signal Processing** 08/2021 – 12/2021

- Delivered lectures on ICA; designed quizzes and assignments on NMF, SVM, EM, HMM, Compressive sensing etc.

**Cover Song Detection & Evaluation of Automatic Speech Recognition (internship)** 05/2021 – 08/2021

*Algorithm Engineer, Tencent Holdings Limited. (Beijing)*

- Examined and analyzed existed models with learnable frontends on proprietary music datasets.

**Tempo, Beat and Downbeat Detection in Chinese Pop Songs (internship)** 06/2020 – 08/2020

*Algorithm Engineer, Beijing Deepmusic Technology Co.*

- Built a pipeline for beat detection using BLSTMs, which significantly outperforms librosa and madmom libraries.
- Estimated tempo and beat of Chinese pop songs producing the beat probability for each frame with 98% accuracy.
- Developed new model based on TCNs for rhythmically instability to further improve tempo / beat detection.

## CONFERENCE PUBLICATION

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

## SELECTED ACADEMIC ACHIEVEMENT

**Introduction to Deep Learning** (A grade, Course project with β-VAE, helped write lecture notes)

**Advanced Digital Signal Processing** (1st rank of the class, proofread lecture notes' errata, listed in acknowledgements)

## LEADERSHIP

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