EE 541 – Computational Introduction to Deep Learning

Project Proposal

DongKyu Kim, Parima Ahmadipouranari

November 23, 2022

Project Title: Musical Chord Classification

Background summary

- We will address the problem of determining whether a musical chord is major or minor for piano and guitar.

We propose to create a model that classifies whether a given audio is a major chord or a minor chord. A major chord consists of a root note, a major third, and a perfect fifth, and a minor chord consists of a root note, a minor third, and a perfect fifth.

Dataset description

https://www.kaggle.com/datasets/deepcontractor/musical-instrument-chord-classification

The dataset is 169.67MB. It consists of 2 types of files, a major chord, and a minor chord. There are 502 .wav files of a major chord, and 357 .wav files of a minor chord. Each file is around 180 kB, and about 2 seconds long. The preprocessing that we will investigate is frequency-domain representations because we think chords are more easily represented in a frequency domain.

Objective

Our objective is to compare different models of different approaches, for example we are going to try machine learning methods on both time-series data, and frequency representations, and deep learning methods on both representations as well. We would compare the accuracies of different methods to investigate which one performs the best.

Estimated Compute Needs

We intend to use our personal workstation. We have a workstation equipped with a 8-core 3.6GHz CPU, a Geforce RTX 2060 GPU with 8GB Memory, and a 32GB RAM.

References

We propose to build on the approach used in

- N. Boulanger-Lewandowski, Y. Bengio, P. Vincent, "Audio Chord Recognition with Recurrent Neural Networks," ISMIR. 2013.
- N. Monnier, D. Ghali and S. X. Liu, "FFT and Machine Learning Application on Major Chord Recognition," 2021 Twelfth International Conference on Ubiquitous and Future Networks (ICUFN), 2021, pp. 426-429, doi: 10.1109/ICUFN49451.2021.9528762.
- T. Li, "Study on a CNN-HMM Approach for Audio-Based Musical Chord Recognition," J. Phys.: Conf. Ser., vol. 1802, no. 3, p. 032033, Mar. 2021, doi: 10.1088/1742-6596/1802/3/032033.