MyMusicTutor

Android app to help musicians evaluate their performance

HO Pan Pan, LEE Chun Sing, LO Ka Yee, NG Chi Fung

Supervised by

Professor Andrew HORNER

Introduction

It was found that there are not many interactive music apps on the Google Play market that allow users to record their performance and receive feedbacks based on their performance. In view of that, our group developed *MyMusicTutor*, hoping it will act as an invisible teacher so that musicians can improve on their weaknesses.

MyMusicTutor consists of three modes:

Record Mode

Users can record anything they like and play back the recordings.

Practice Mode

Users can play along a pre-stored track in the app. A performance review will be given if the user pauses the recording or completes a song. The performance review will highlight errors made by the user.

Test Mode

This mode is similar to Practice Mode except users must complete the track from the beginning to the end without pausing. Apart from a performance review, a test report will also be presented to the user, giving a grade based on the quality of the performance.

Users can even share their test reports to Facebook through the app too!

Figure 1: Main Menu of MyMusicTutor

Principle

MyMusicTutor was written in Java using the *Android Software Development Kit* (SDK) by Google. The general principle of the app is shown below:

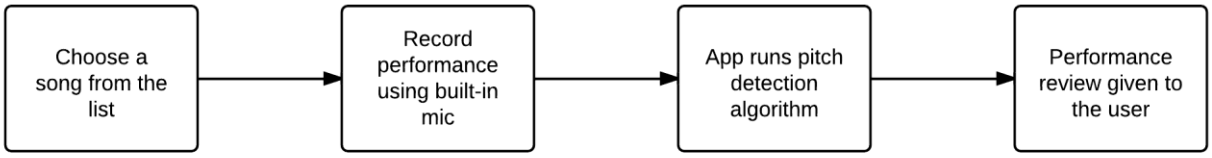

Figure 2: Flowchart showing the working principle of MyMusicTutor

The pitch detection algorithm we implemented into this app was the *Fast Fourier Transform* (FFT). It works by transforming an input waveform from time-domain to frequency-domain. The frequency spectra we obtained can be used to determine a pitch. As shown in the figure below, an apparent peak will appear at the fundamental frequency (which corresponds to the pitch) of a note.

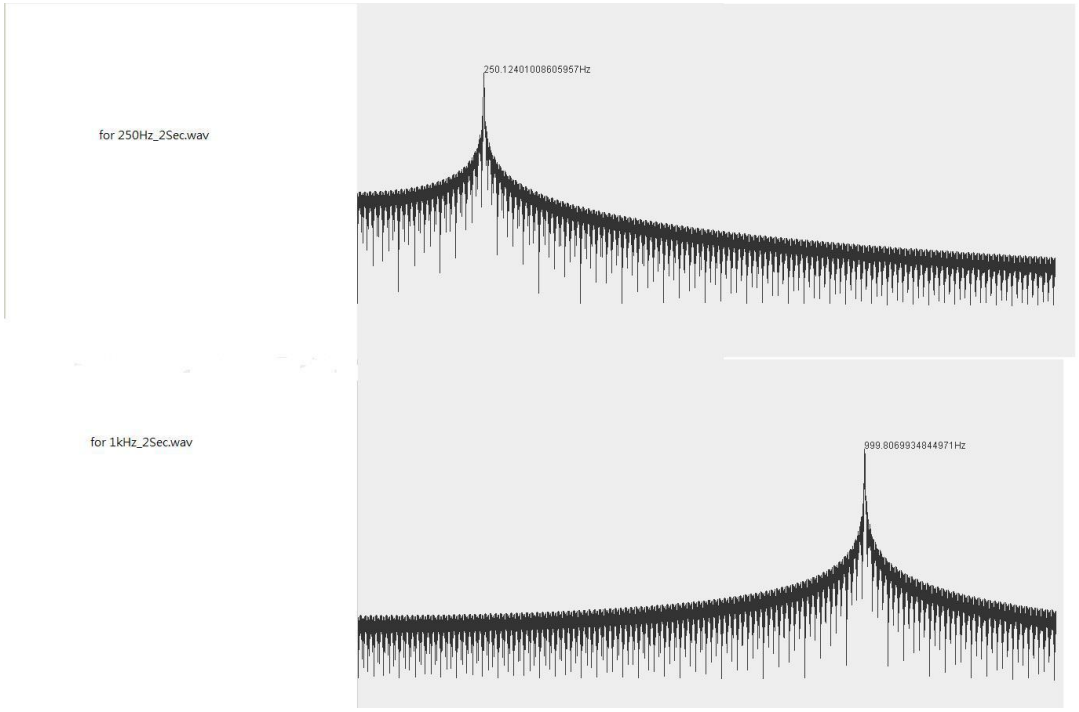

Figure 3: Frequency spectrum of a 250Hz sine wave (above) and a 1kHz sine wave (below)

In summary, the correctness of a note will be determined by two factors:

- **Rhythm / Timing**
  The timing of a note may be too early or too late, and the error is conspicuous.
- **Intonation / Pitch**
  The pitch of a note may be too high or too low, suggesting tuning or intonation errors.

Testing

As pitch detection algorithms for more complex music are still currently under research, we were only able to test our app against simple monophonic songs, meaning music with one melody and no accompaniment.

We have recorded two simple nursery tunes, *Twinkle Twinkle Little Star,* and *London Bridge Is Falling Down* on piano as the *Standard Tracks*, which we defined as the expected performance of a piece of music according to the scores. All performance recorded by users will be compared to the *Standard Tracks*.

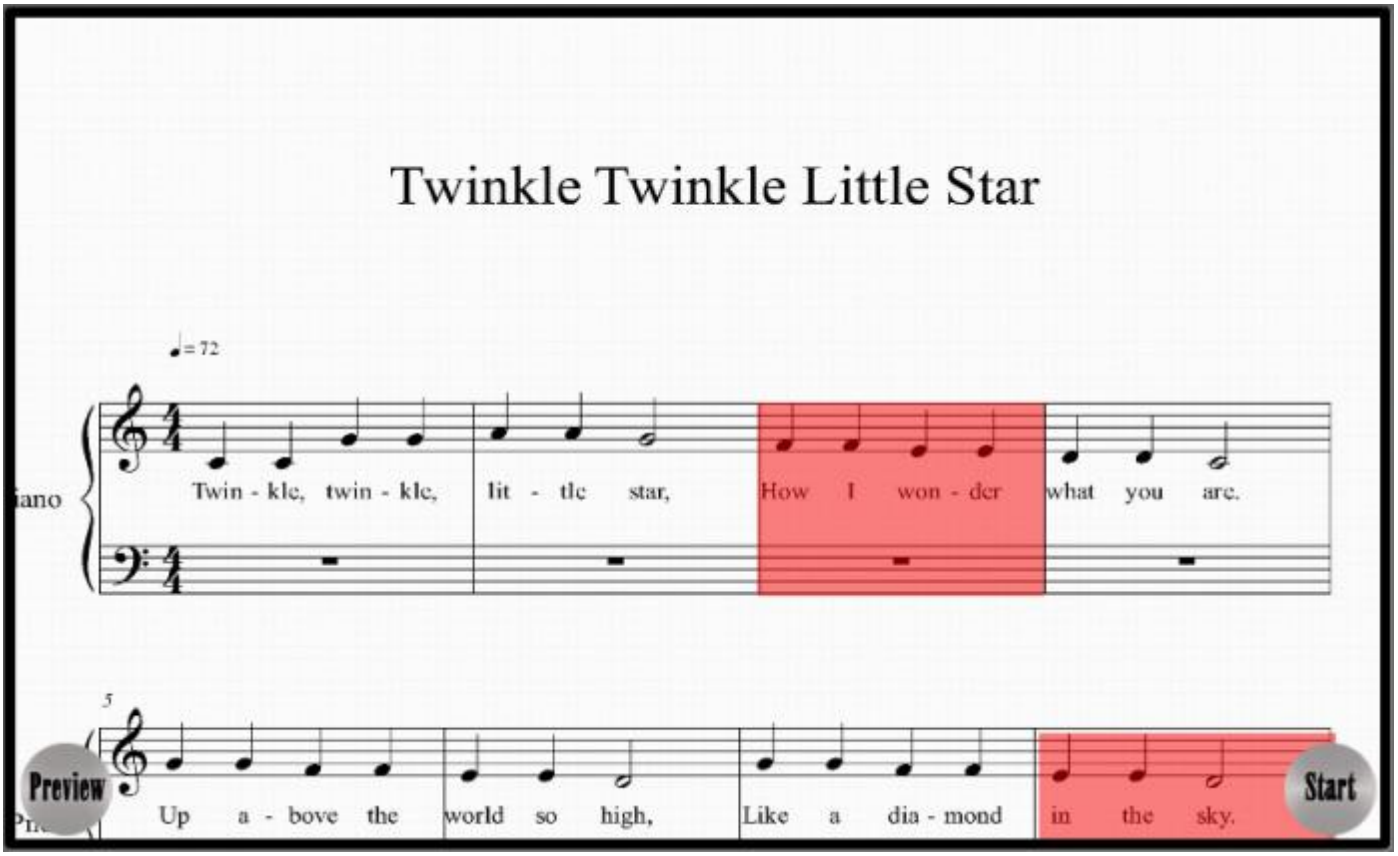

Figure 4: A sample performance review by MyMusicTutor

Conclusions

In this project we have developed a unique Android app that helps musicians pinpoint their mistakes during practice. We hope that *MyMusicTutor* can be deployed as a music teaching tool for children in the future.