Abstract

Smartphones has become an important part of our everyday life. The appearance of these devices made as huge impact in our world as the spreading of PC-s in the 1990's, and if we look at the trend, we can clearly see that our phones are taking over tasks from personal computers and other devices, such as GPS, video game consoles and cameras. We use smartphones for browsing, e-mailing, navigation or for multimedia. As technology evolves, these functions are getting better and better, and smartphones have become the tools of professional photographers, video makers or musicians.

The topic of this thesis is about instrument tuning using audio signal processing techniques. My goal was developing a tuner-software on Android, which is one of the most popular smartphone operating systems, besides IOS and Windows Phone. The application includes two main functions. One is a chromatic tuner, which detects the frequency of a sound recorded by the microphone. The other is a polyphonic tuner which helps guitar players to make a quick string check.

To create this application, I had to make a literature search about the theory of musical signals. I used MATLAB for testing the most often used timedomain and frequencydomain based algorithms regarding on accuracy and speed. Based on my findings, I have chosen the algorithms best fitted to chromatic and polyphonic tuning.

Furthermore, I gathered information about the Android system and Java programming language regarding their capability of audio signal processing.

After development, I tested the software with different instruments and frequencies, and compared it with other tuner applications available in Google Play.

After testing and comparing, I found out that the chromatic module is a bit sensitive for noise, and the polyphonic tuner is not accurate enough for detecting the pitch of the *E2* string. After fixing these issues, and adding some extra features like changeable reference *A* frequency or fret offset settings for the polyphonic tuner, I could upload the software to the Google Play Store.