

CSC 120: Comprehensive Lab

Building a Chromatic Tuner

February 20, 2012

1 Introduction

In this lab you will be creating a chromatic tuner, which is a device that tells a user what musical note is closest to the one being played into the tuner's microphone. In order to accomplish this on Android, you must utilize its onboard microphone and directly analyze the incoming audio data. Aiding you in this task is a function called the Fast Fourier Transform (FFT). The FFT is a special case of the more general Fourier transform in that the FFT only applies to discrete data. The FFT has various applications, but the one for which it will be used here is to decompose an audio waveform into its constituent frequencies. A full discussion of the Fourier transform is beyond the scope of this lab and this course, but some examples of it in action will be given. Please note that these examples are meant to illustrate concepts rather than be perfectly accurate in their results. Figure 1 demonstrates the result of a continuous Fourier transform applied upon a sine wave. Figure 2 on the other hand illustrates the expected results of a discrete Fourier transform

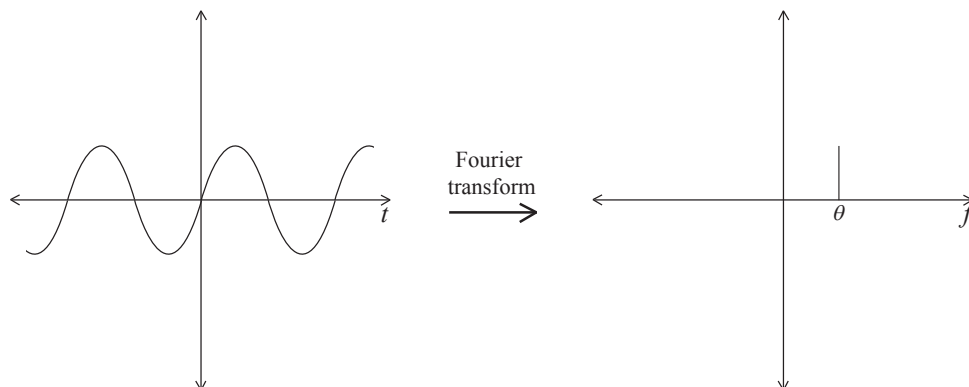


Figure 1: The Fourier transform of a sine wave with frequency θ in the time domain results in a single peak in the frequency domain at θ .

applied upon a discretized sine wave. As you can see, there is no well-defined

2 Objective

The purpose of this lab is to provide a comprehensive test of the abilities and knowledge that you have gained thus far. As a result, the solution to the problem necessitates the use of classes,

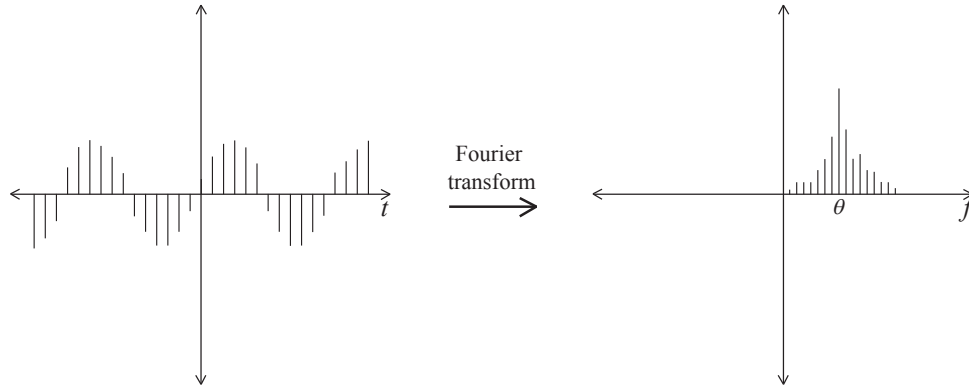


Figure 2: The Fourier transform of discrete samples approximating a sine wave with dominant frequency θ in the time domain results in a rough distribution in the frequency domain peaked at (or near) θ .

methods, loops, arrays, APIs, and debugging tools. In addition, the problem itself will require you to critically think of ways to effectively solve it.

3 Activity

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4 Conclusion

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5 Deliverables

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