EE432: Digital Signal Processing Fall 2008

Project 4: Adobe Audition

Assigned: Tues 9/16/08 Due: Mon 9/22/08

This project is intended to give you introduction to the professional audio editing and analysis software called "Adobe Audition." It can be used for recording, playing, and analyzing audio files, both in the time and frequency domains.

I. Using Audition to Record

1. Start Adobe Audition.

2. Press the red Record button, then choose the sample rate, number of channels (mono or stereo), and resolution (8 or 16 bits integers, or 32-bit floating point). Usually, voice is sampled at 8000 samples/sec, CD-quality music is 44,100 samples/sec, and DVD-quality audio is 192,000 samples/sec. You should use 8000 samples/sec, stereo, and 8-bits.

3. Record yourself saying "Should we chase?".

4. Record yourself saying "Are we there yet?"

5. Based on your sound settings, the recording level may be very low. To boost the power, you can select *Effects→Amplitude→Amplify/Fade* and increase the amplification, or select *Effects→Amplitude→Normalize* and normalize to 100%. Save your recordings as .wav files, with the name: Chase_<your last name>.wav and Yet_<your last name>.wav. Do not put the brackets in the file name…that is just where you insert your last name.

6. Play the recording. Audition displays the waveform in real-time as it is being played. Try to note where each individual sound starts as the words are spoken. For example, "Should we chase?" is actually a combination of 6 sounds:

"Sh" + "ould" + "we" + "ch" + "a" + "se".

Check this against where you thought the words started in the plot you turned in for Project # 2.

II. Using Audition to Copy Audio Files from a CD

The overall goal here is to extract ~20 seconds from your favorite song for educational use only. Many CD music files are copyrighted, but short clips can be used in the classroom. We will be saving these clips as .wav files, so we can analyze them later in MATLAB.

1. Put your CD in the CD drive. In Audition, select *File→Extract Audio From CD*, choose your favorite track, and select *OK*. It may take a while to load the entire song. The entire waveform for this song will appear in the Edit View window. Notice that along the bottom of the plot of the waveform, the time axis is annotated.

2. Hit the Play button, and listen to your song. While you're listening, investigate the frequency content…select *Analyze→Show Frequency Analysis.* Recall that the highest frequency that is possible in a digital recording is ½ the sample frequency. Is the frequency axis on this display accurate? Change some of the settings on the frequency display and note the differences. What happens if the FFT size is too large?

3. Now strip off a short segment of the song using *Edit→Trim*, then highlight the ~20 seconds of the song that you think best represents the entire song (e.g., the chorus, perhaps) and then *Edit->Copy* to edit this short segment for editing. When you have selected the desired ~20 seconds, normalize these values (*Effects→Amplitude→Normalize*) and save this clip as a Windows PCM (.wav) file using the name of the song in the file name. Pass this to the professor for future Use

4. Try some of the special effects that you can insert in the music by operating on this short clip, by using the *Effects* menu. To insert most of these effects, you will need to stop (not pause) the recording. Investigate:

   - Delay Effects--try the Echo Chamber, for example
   - Filters--try the Graphic Equalizer. Also try to create a scientific filter –low pass, high pass and band pass filters…note that you can set the cutoff frequencies. Check out their preset frequency filters.
   - Time/Pitch--try the Doppler Shifter, for example.

Note: you can also use Adobe Audition to extract the audio from video files.

III. Other Audio Signals

1. Download any five of the sound clip .wav files from the course website at: http://www.usna.edu/EE/ee432/SoundClips.

2. Listen to each file while viewing the frequency analysis window. Can you see any specific frequencies that stand out?

For this lab, only turn in your three .wav files, but send me an email that you have completed the rest of the steps.