

## Music Analysis and Re-synthesis

You are given one song .wav file: Mary had a little lamb in C. For this song write a program that does the following:

1. Break the song .wav file into frames and perform an analysis on each frame.
2. Identify the frequency of the first tall “spike-like” peak in each frame. Identify which note this corresponds to. Store the frequency and the note. If the tallest peak is not big enough to correspond to an actual note being played, then indicate that no note was played in that frame. In music this is a rest. OR Use the autocorrelation based method. I recommend the autocorrelation method.
3. Determine the duration of each note by seeing how many consecutive frames have the same note/frequency. Save all the note frequencies and durations to a file. This will be a kind of sheet music for the song.
4. Using the frequency/note/duration information, resynthesize the song based on the trombone note I gave you. You will also provide another sound or instrument of your own choosing so that you will do two synthesis tasks.
5. Perform these steps by writing programs that automatically do them, rather than going through each frame by yourself.
6. Write a brief report describing what you have done including how you broke the data into frames, how you found the first tall peak, how you identified the notes, etc.