

Mini-Project 05: Simple Song Detection

Please work alone for this mini project. You are free to discuss ideas with others.

Background:

For this mini project you will write a simple MATLAB function that listens to a wav file of a simple song and identifies the notes being played. The wav files¹ have some simple songs on which you can practice. The range of notes in these files is restricted to the range used in the previous mini project.

Approach

Read the song wav file into one large vector. Then break it into many smaller, equal length, *segments*. Each segment should be around 50-100 ms. This is easily done with MATLAB's `reshape` command. Enter `helpwin reshape` for more info. Play with `reshape` until you are sure it works the way you think.

Next set up a `for` loop and loop for each of the input segments. For example:

```
yy = reshape(.....);

for ii = 1:segments
    [noteNum, max] = noteDetect(yy(:,ii), fs, threshold);

    disp(sprintf('%d is note %d, max=%d', ii, noteNum, max));
end
```

Notice `noteDetect` is called for each segment and it returns the note it heard for that segment. You need to add a `silence threshold` parameter to `noteDetect`. If the power of the loudest note is below the threshold, assume the input is silence and return a `noteNum` and `max` value that means silence (`noteNum = -1` and `max = 0` work).

Grading

If you are able to show me an output that lists the note for each segment your grade will be as much as 7/10. Here is a sample of such an output:

```
notes =
Columns 1 through 27
-1 -1 -1 -1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 -1 4 4 4 4 4
Columns 28 through 56
4 4 4 4 3 -1 -1 -1 -1 -1 2 2 2 2 2 -1 -1 0 0 0 0 0 0 0 0 0 0
```

If you can make your output more compact and only show the notes that were played you will get more credit. For example:

```
notes=
Columns 1 through 13
4 4 3 2 0 0 2 1 2 2 4 2
```

In this example, note 4 was played, then note 4 again, then note 3 (which was wrong), and so on. You don't have to have perfect output, but it needs to be pretty close.

Better yet, return the note numbers and the time the notes were on. Be sure to explain what your note numbers mean and units on your time.

¹ The wave files can be found on the CD-ROM on the link below where this handout is.

Full credit will be given to those who can tie this lab to Lab 1 and resynthesize the input. That is, use the note information from this lab as input to the synthesizer for Lab 1. But when you do, place it back at twice the tempo. Your input will be a wav file as well as your output.

What is due:

1. One page memo describing what you did. Show your output for the song **AuntRhody.wav**. Mark any errors in the output. Highlight any **extras** you did.
2. Your MATLAB code.