DSP: Lab 4
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Exercise 1.

1. Mmm… It's difficult to answer this. I mean, I guess you picked this words because they contain vowel sounds and they are mostly isolated. But, Why do they use the /h/ and /d/ phonems? I don't know! English tradition?

2. According to the scatterplot generated by vowelf1f2.py and the results on the spyder shell: F1 = 270Hz and F2 = -1259Hz

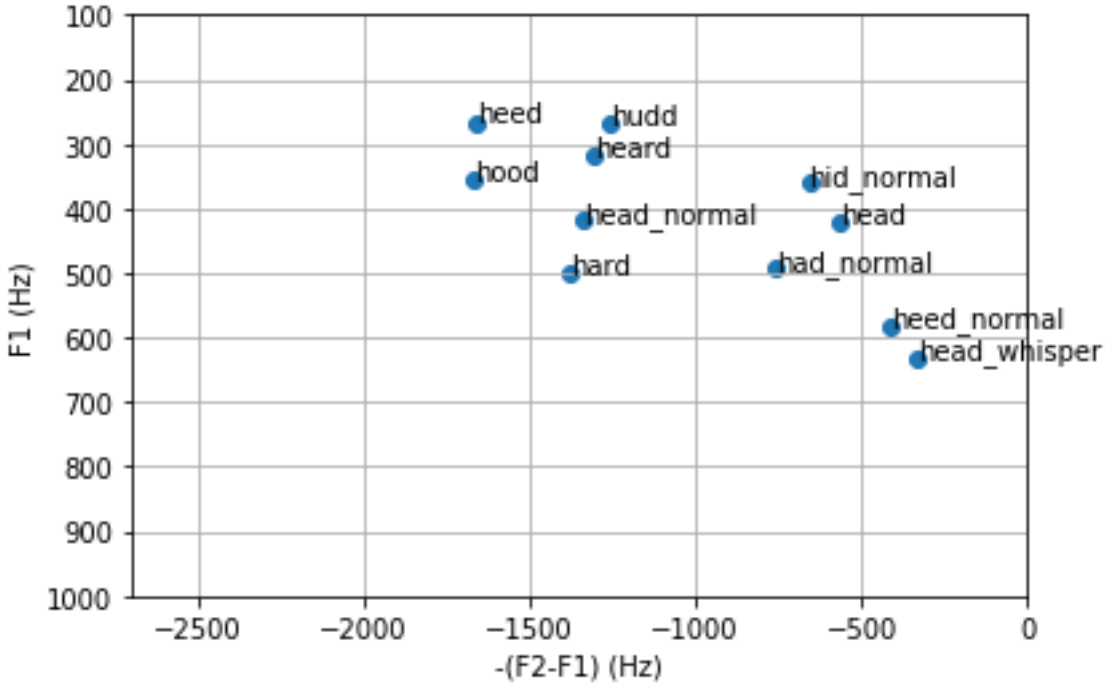
3. F1 = 355Hz & F2 = 1308.

4. Yes, they look correct. If we take F1 as a reference the freq vs Magnitude chart shows its peaks addressing (aproximately) the numbers expressed in Spyder's shell. For F2 the points in the scatterplots they are allocated in the scatterplots in such way that the difference – (F2 – F1) meets the results in Spyder's shell.

5. Hid occupies the same regions. But the calculated HAD would be an outlier within his cluster in figure 1.b.
6. In vowelf1f2scatter.py peakutils is imported but never used. In vowelspectrum.py peakutils.indexes is executed. It gathers the indexes where the array of frequencies that represetn the spectrum of a particular vowel will produce a local maximum in the plot.
7. No online documentation available. But, fortunately, we can inspect the source code, according to it:
   - Thres: Normalizes the threshold. Only the peaks with amplitud higher than the threshold will be detected.
   - Min_dist: Minimun distance between each detected peak. The peak with higher amplitude is preferred to satisfy this constraint.
8. I used the "Varible Explorer" window to calculate freq_res = 107.3841.

Exercise 2.

1. Honestly I don't know what to do here. The text refers to Figure 2 & Figure b but none of them exists! In addition I tried to find the mentioned paper, but I couldn't find similar graphs in any of them.
2. It's a technique known as *vowel normalization.* The value in Hz of formant frequencies depends on each speaker's morphology. This calculations (along with many others, there's more than one technique) pretend to reduce the impact of speakers in the plot.
3. I added a few sounds, normal an whispered. They're represented in the plot below. All new sounds appear in different places respect the originals. They don't show any recognizable pattern. But I'm afraid that I'm a bad subject to compare with the original baseline. I'm Spanish and the given sounds represent English vowels. We only have 5 vowels where English use many! It's very difficult to address the given sounds.


100
200
300
400
500
600
700
800
900
1000
F1 (Hz)
heed
hudd
heard
hood
hid_normal
head_normal
head
hard
had_normal
heed_normal
head_whisper
−2500
−2000
−1500
−1000
−500
0
-(F2-F1) (Hz)