prob1

September 5, 2019

1 EECS16A: Homework 1

1.1 Problem 2: Filtering Out The Troll

```
[1]: import warnings
     import wave as wv

     import matplotlib.pyplot as plt
     import numpy as np
     import scipy
     import scipy.io.wavfile
     from IPython.display import Audio
     from scipy import io
     from scipy.io.wavfile import read

     # For this to work make sure to download m1.wav and m2.wav to the same location␣
      ↪as this jupyter notebook
     warnings.filterwarnings("ignore")
     sound_file_1 = "m1.wav"
     sound_file_2 = "m2.wav"
```

Let's listen to the recording of the first microphone (it can take some time to load the sound file). Run the cell below, then press the play button to listen.

```
[2]: Audio(url="m1.wav", autoplay=False)
```

```
[2]: <IPython.lib.display.Audio object>
```

And this is the recording of the second microphone (it can take some time to load the sound file). Run the cell below, then press the play button to listen.

```
[3]: Audio(url="m2.wav", autoplay=False)
```

```
[3]: <IPython.lib.display.Audio object>
```

We read the first recording to the variable `corrupt1` and the second recording to `corrupt2`. Treat `corrupt1` and `corrupt2` as the two sound recordings picked up by microphone 1 and microphone 2 respectively.

```
[4]: rate1, corrupt1 = scipy.io.wavfile.read("m1.wav")
     rate2, corrupt2 = scipy.io.wavfile.read("m2.wav")
```

Enter the weights of the two recordings to get the clean speech.

Note: The square root of a number a can be written as `np.sqrt(a)` in IPython.

```
[5]: # enter the weights u (recording 1) and v (recording 2)
     u = np.sqrt(2) / (1 + np.sqrt(3))
     v = np.sqrt(6) / (1 + np.sqrt(3))
```

Weighted combination of the two recordings:

```
[6]: a = u * corrupt1 + v * corrupt2
```

Let's listen to the resulting sound file (make sure your speaker's volume is not very high, the sound may be loud if things go wrong).

```
[7]: Audio(data=a, rate=rate1)
```

```
[7]: <IPython.lib.display.Audio object>
```