Audio Remixing

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EE 411 Digital Signal Processing

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1 Aim

To analyze songs of a particular music director and observe the trend in the frequency spectrum and take a new song and perform the following actions:

- Apply filter to the new song to alter its frequency spectrum to follow the trend observed in the previously analyzed songs.

- Introduce beats of reasonable frequency to the new song after passing through the filter

- By changing the pitch convert male voice to female voice and vice versa

2 Observation

The most dominant frequency of the analyzed songs lies in the range of 60Hz to 200Hz. Before 60Hz there is only a few or no sharp peaks or spikes observed but after 60 Hz, non-periodic spikes can be observed and the spike with the maximum amplitude lies in the range of 60-200 Hz. Spikes are present after around 100 Hz and the magnitude of these spikes decrease linearly till 20kHz. 20kHz being the upper limit of audio range, there is no frequency component after 20kHz as can be seen from the frequency spectrum.

The 10 songs chosen for analysis are of music director A R Rahman and consists of both tamil and hindi songs. The songs are as follows:

- Accham Accham Illai (Figure 1a)

- Enmel Vizhunthe (Figure 2a)

- Kannalane (Figure 3a)

- Kun Faya Kun (Figure 4a)

- Poralae Ponnuthai (Figure 5a)

- Agar Tum Saath Ho (Figure 1b)

- Kadhal Rojaave (Figure 2b)

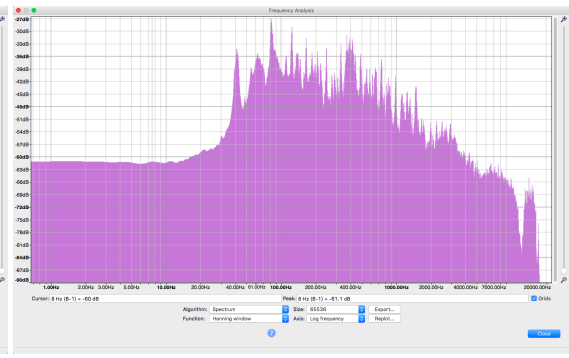- Kanodu Kanpadhelam (Figure 3b)

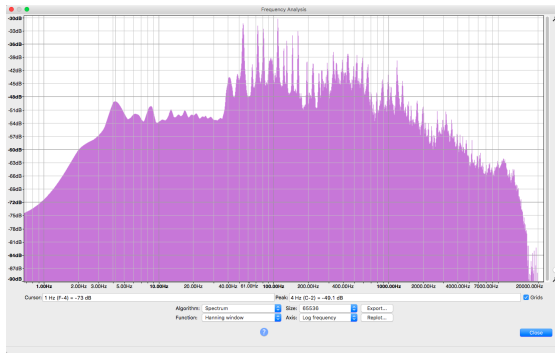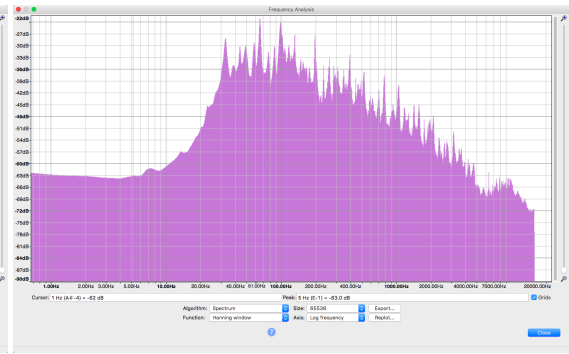- Maa Tujhe Salaam (Figure 4b)

- Vennilave (Figure 5b)
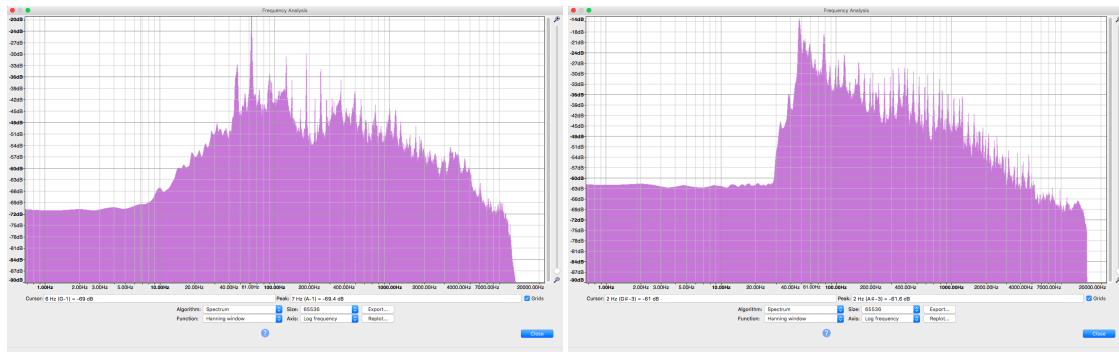
(a) Song 1
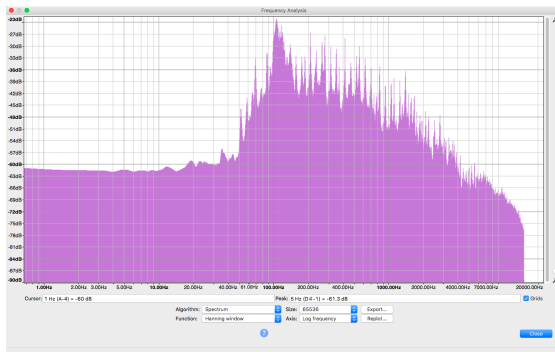

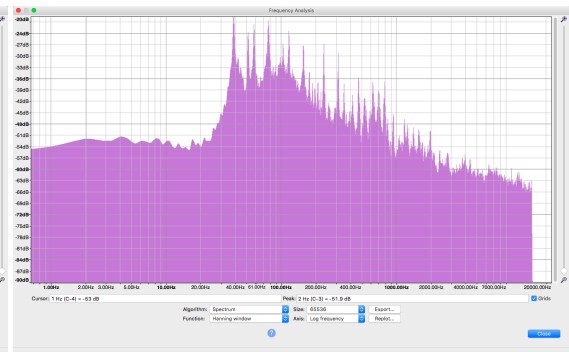(b) Song 2
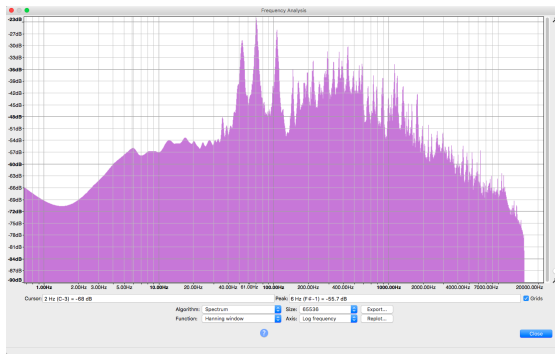
(a) Song 3

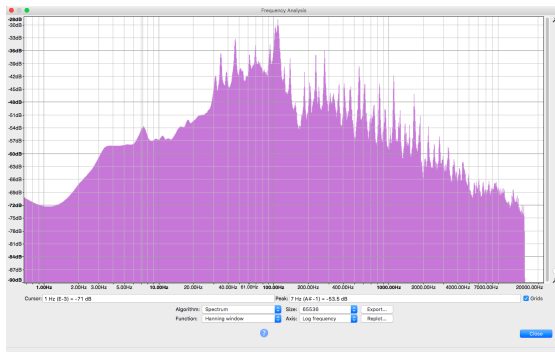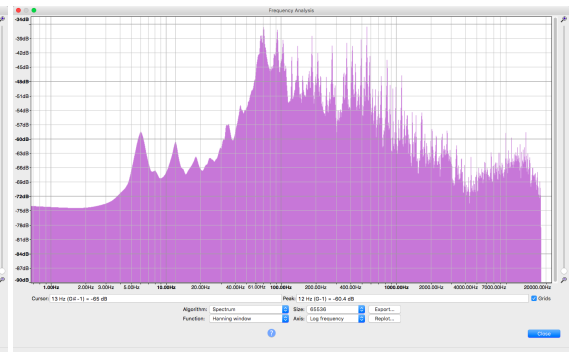

(b) Song 4

(a) Song 5

(b) Song 6

(a) Song 7

(b) Song 8

(a) Song 9

(b) Song 10

3 Implementation

3.1 Equalzation

For remixing the song Selfie from the movie Race 3 by music director Vishal Mishra has been chosen and the frequency spectrum before (Figure 7a) and after (Figure 7b) applying filter are shown below along with equalizer (Figure 6) that was applied.
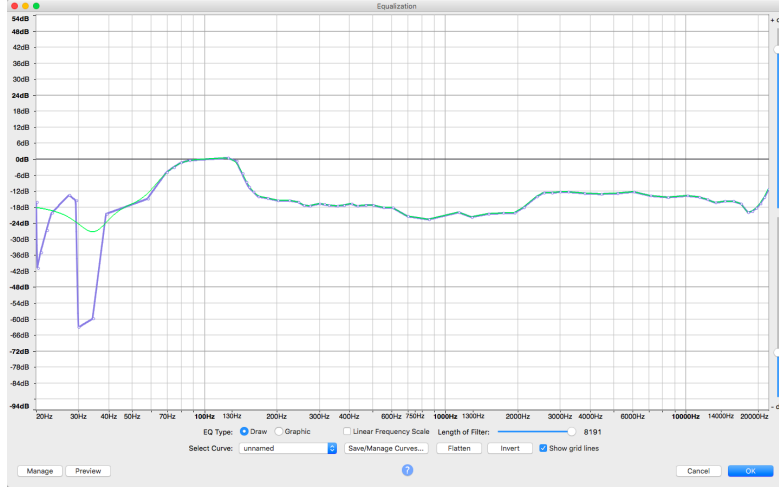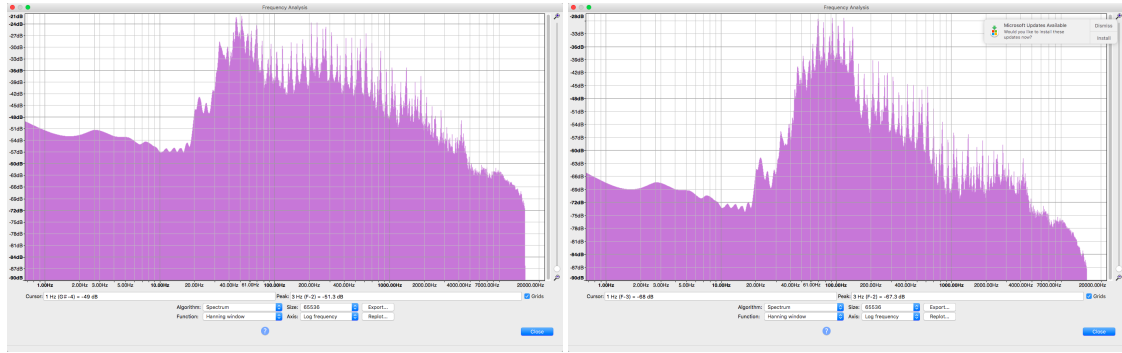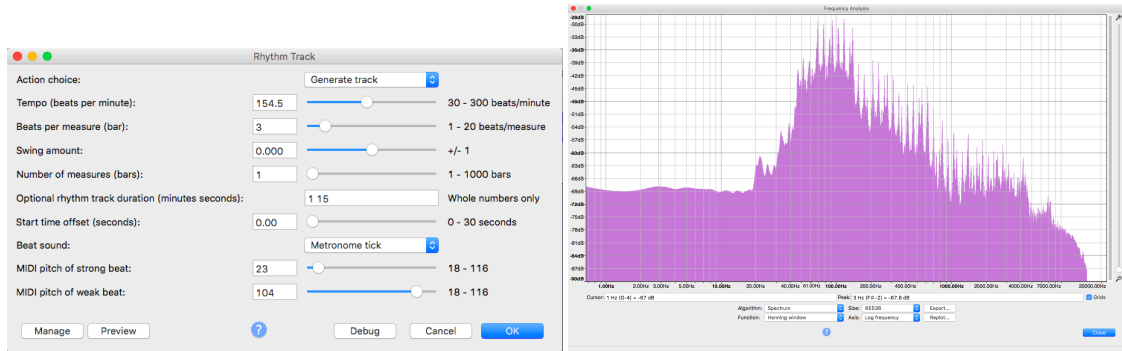

Figure 6: Equalizer

(a) Before Filter

(b) After Filter

3.2 Beats Mixing

To the filtered song a beat of 154.5 beats/minute and 3 beats/measure with an amplitude of -17.514dB was mixed to produce a new song whose frequency spectrum (Figure 8b) and screenshot of Rhythm Track window (Figure 8a) with more information on the beat applied are given below

(a) Beats Information

(b) Frequency spectrum after mixing beats

3.3 Pitch Alteration

By changing the pitch we can convert male voice to female voice and vice versa. To convert male voice to female voice the pitch must be increased whereas to convert female voice to male voice the pitch must be decreased.

The details of pitch change is shown in the figure below (Figure 9). The last 20 seconds o so of the song consists of both male and female voice so no pitch change was applied to it. The frequency spectrum of the pitch altered song is also given below (Figure 10)
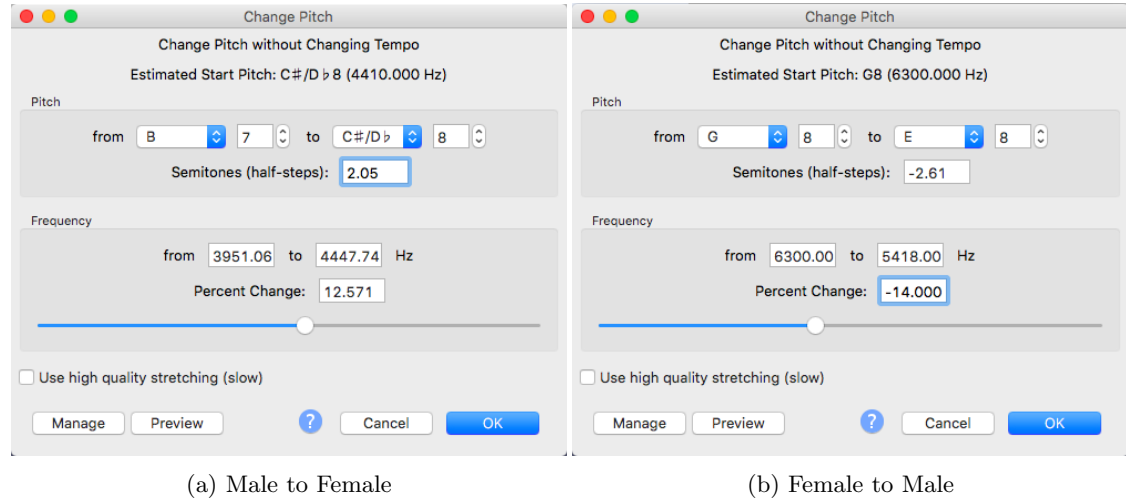

(a) Male to Female   (b) Female to Male

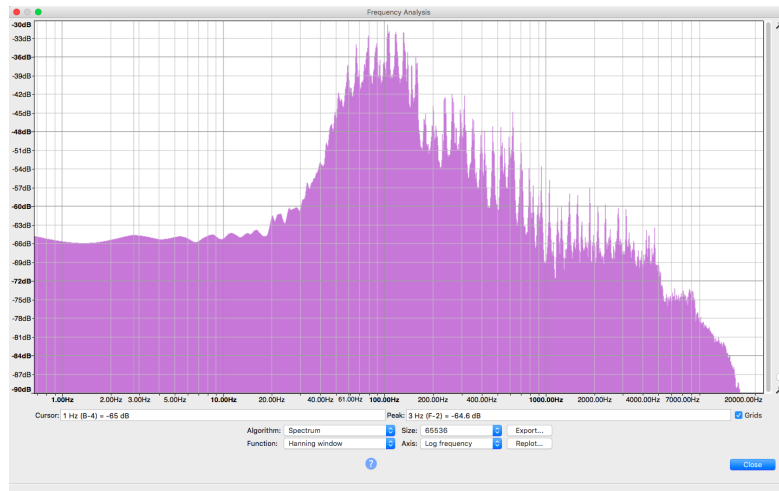Figure 9: Information on pitch alteration

Figure 10: Frequency spectrum after pitch alteration

4 Result

The frequency spectrum of 10 different songs of same music director have been analyzed and observation on the pattern noted down. A new song is taken composed by a different music director and equalization is performed on it modifying its frequency spectrum to almost match the pattern observed before in the previously analyzed songs. Beats were added to the modified song and the frequency of the resultant song has been noted. Pitch modification was done on the song obtained in the previous step to change male voice to female and vice versa and the frequency spectrum of the resultant song has been noted