Similitude between songs with different bit rates

Camilo Arevalo

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1 Description

We know that the features of songs are measurable properties that could describe them, for this reason, in many data sets are used this to classified songs, assuming the features song are unique for each one. The problem is when we use songs that aren't an original with differents bit rates, as in the case of songs with a lossy compression format such as MP3 format, which is the format most used for the construction and testing of data sets. In a way to prove the truthfulness these data sets, below is shown comparisons between original songs from the album "Querer es poder" by Grupo Niche and the same songs reconverted from MP3 format with different bit rates.

2 Features extraction

In this case, how we aim to be as accurate as possible, the comparisons were made for bit rates 64,128,192,256 and 320 Kbps, additionally, the songs were fragmented by each BPM of these.

The features used to measure the similarity of this songs are spectral centroid, spectral roll-off point, spectral flux, compactness, spectral variability, root mean square, fraction of low energy windows, zero crossings, strongest beat, beat sum, strength of strongest beat, the 13 values of MFCC and the 10 values of LPC extracted by Jaudio.

Number	**Name song**	**BPM**
1	Homenaje al Corazón	178
2	Mi Mamá me ha Dicho	195
3	Buenaventura y Caney	189
4	Digo Yo	184
5	Enamorado de Ti	185
6	Consejo de Madre	189
7	Nicolás Santos	183
8	Corazón sin Corazón	183

Table 1: Songs in album "Querer es poder" by Grupo niche with their BPM.

3 Similitude

In this section, it's used R to measure the similitude, using a correlation of features between either song and using PCA to plot features for seeing the distance between different bit rates.

3.1 Similitude overall

Bit rate	Minimum	1st Quartile	Median	Mean	3rd Quartile	Maximum
64Kbps	0.9998533	0.9999247	0.9999722	0.9999477	0.9999758	0.9999993
128Kbps	0.9999479	0.9999902	0.9999991	0.9999903	0.9999997	1.0000000
192Kbps	0.9999197	0.9999942	0.9999999	0.9999874	1.0000000	1.0000000
256Kbps	0.9999541	0.9999961	0.9999990	0.9999929	1.0000000	1.0000000
320Kbps	0.9999899	0.9999951	0.9999998	0.9999972	1.0000000	1.0000000

Table 2: Similitude between originals songs and songs reconverted from each bit rate.

In general, as shown in a Table. 2, on average for all case, it is closer than 1, in this way, the reconverted song is similar to the original song, and while using a higher bit rate, the similarity between them will increase, as shown in the figure 1.

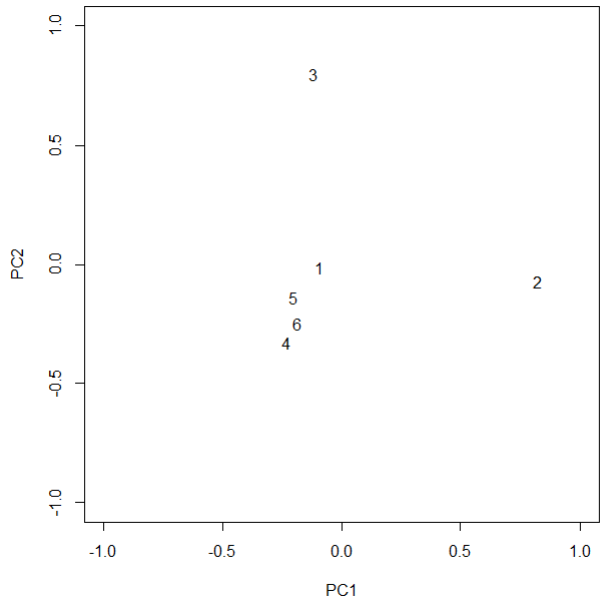
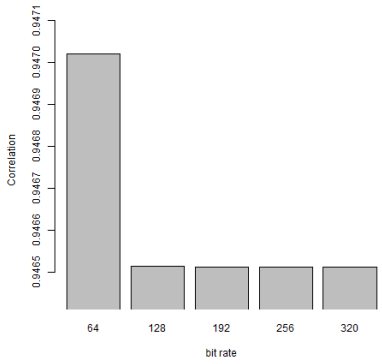


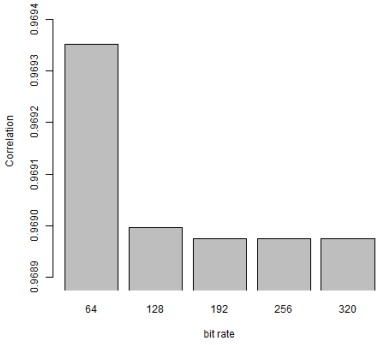
Figure 1: Distance using PCA for "Homenaje al corazón", where 1 is a original song, 2 reconverted from 64 Kbps, 3 reconverted from 128 Kbps, 4 reconverted from 192 Kbps, 5 reconverted from 256 Kbps and 6 reconverted from 320 Kbps.

3.2 Similitude for each song

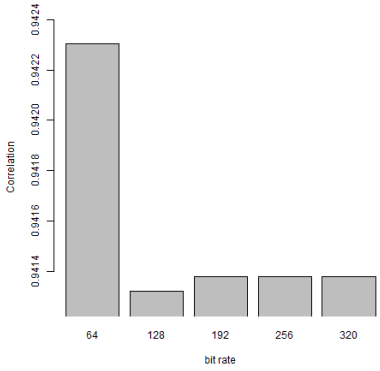
Song 1



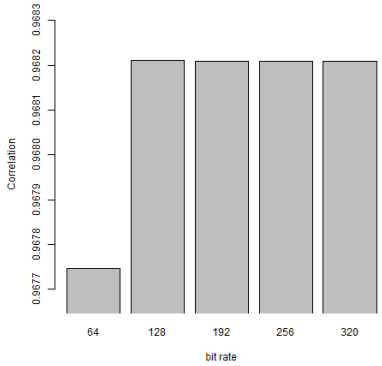
Song 2



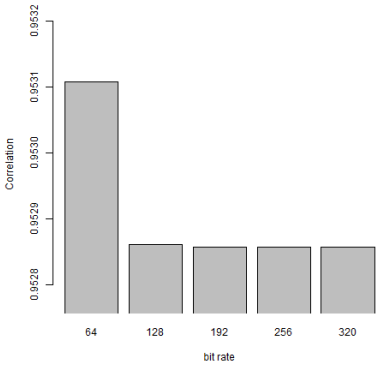
Song 3



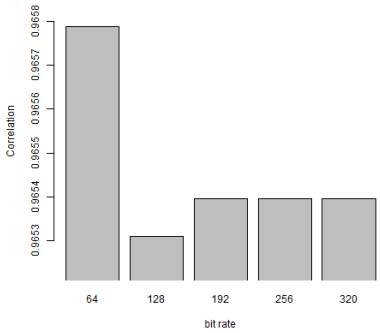
Song 4



Song 6



Song 7



Song 8

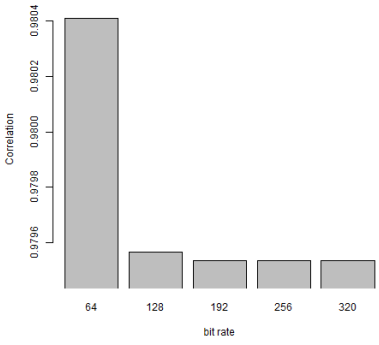


Table 3: Correlation for each song.