

2019-05-15

Exercise Sheet 6

This week, we will be working in the field of music information retrieval (MIR). Particularly, we will aim at finding clusters of similar tracks based on their acoustic features.

Exercise 1 (Song Features)

[1 Point]

For the representation of songs, we will rely on high-level descriptors as provided by the Spotify API¹. Get to know the features the API provides as we will be dealing with those in the next exercise.

Exercise 2 (Music Playlist Clustering)

[6 Points]

In this exercise, you will work with an extended version of the [Spotify playlist dataset](#), which you can find on OLAT. This version will provide you with information about the average acoustic features of each playlist contained in the dataset (i.e., we averaged the acoustic features of all tracks contained in the playlist).

- a) 1.5 Points We aim to find clusters of similar playlists and hence, will make use of two well-known clustering algorithms: k-Means and DBSCAN. Please apply both clustering methods to find a sensible set of playlist clusters.
- b) 1.5 Points Look into how the DBSCAN and k-Means algorithms actually work.
- c) 1.5 Points In this scenario, we are dealing with a 7-dimensional space that naturally is hard to visualize. Please apply Principal Component Analyses (PCA) on the data to find a lower 2-dimensional representation of the data and visualize the playlist cluster assignments.
- d) 1.5 Points How does PCA work and how can we interpret its results?

Exercise 3 (Reading)

[3 Points]

To get a more complete picture on how such acoustic features can be utilized for describing user preferences (so-called *user modeling*), please read the following paper:

Eva Zangerle and Martin Pichl. Content-based User Models: Modeling the Many Faces of Musical Preference. In *Proceedings of the 19th International Society for Music Information Retrieval Conference 2018 (ISMIR 2018)*, pages 709–716, 2018. URL http://ismir2018.ircam.fr/doc/pdfs/128_Paper.pdf

and answer the following questions:

- a) 1 Point What are the main findings of this paper?

¹Audio Features Object as provided by the GET /v1/audio-features/{id} API.

- b) 1 Point What are Gaussian Mixture Models and how do these manage to capture user preferences in the presented scenario?
- c) 1 Point How was the evaluation performed?

Important: Submit your solution to OLAT and mark your solved exercises with the provided checkboxes. The deadline ends at 23:59 on the day before the discussion.