# Data Visualization - Milestone 2

### 1. Project Goal

Through our visualization, we aim to provide a new perspective on Spotify top charts data, focusing on metrics that qualitatively describe a song rather than its mere performance in the top charts. Using a dataset of the most popular songs since 2016, our goal is to present the specific characteristics of each song in an interactive manner. Such a presentation would also allow users to intuitively make comparisons between individual songs as well as search/filter for songs containing desired characteristics.

Concretely, the presented characteristics are as follows:

**Danceability**, **Energy**, **Instrumentalness**, **Key**, **Liveness**, **Loudness**, **Speechiness**, **Tempo**, **Valence**

For each of the above, an appropriate visualization tool will be used to represent its value, such as custom "sound wave" bar charts and a dancing crowd that adapts its speed to the tempo of the song.

### 2. Design Elements

Given the music-oriented nature of our dataset, we opted for a themed visualization and interaction/control mechanism. Upon loading the page, a user will be presented with a view as shown below:
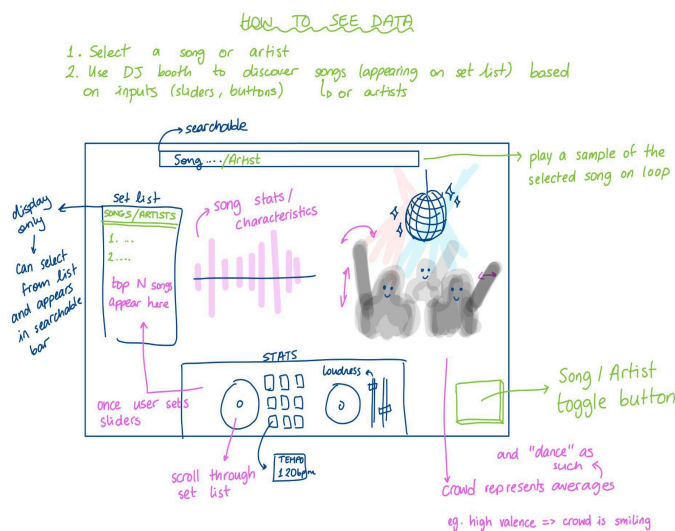


From top to bottom, the page consists of a **search bar**, where users can query the database for songs and artists, a "**set list**" containing all relevant songs within a searched category, followed by a visualization of the currently selected song's characteristics in the form of a **bar chart** and a **dancing crowd**. At the bottom of the page is a **DJ turntable**, which is used to apply filters to the song database, with each element of the turntable controlling a different characteristic. Finally, a **button** allowing the toggling between song and artist queries is placed at the bottom right of the page, which modifies the functionality of the turntable filtering.

The elements described serve as independent pieces to be implemented, and we expect the following functionality from each:

**Search bar:** Allows users to query for songs/artists. Performs pattern matching on strings and supports incremental search, allowing for dynamic, live updating of results as the user types.

**Set list:** Serves as a display for search results when applying filters on song characteristics using the DJ turntable. Should dynamically update whenever a filter is modified on the turntable.

The toggle button swaps the content of the set list between a list of songs that match the chosen characteristics and a list of artists that have songs which qualify for said characteristics.

**Bar chart:** When searching for a song/artist or modifying properties on the DJ booth, depending on the song/artist toggle button, the most popular item is shown with their statistics (section 1). This is represented as a bar chart, stylistically modified to look like a sound wave. As the goal is to show the ensemble of properties, the graph will be visually proportioned, and axis values will be omitted. The smallest length of the bar will also be big enough to encapsulate the label, so the bar isn't obstructed. The processing of data will be facilitated with D3.js. In this visualization, transitions will be important, and highlighting bars with the cursor to see their specific values will also be possible (interaction lecture).

**Dancing crowd:** Based on the parameters provided by either the song, artist, or the values selected by the user in the DJ booth, the stickmen representing the "crowd" will begin to dance with different possible animations. The tempo of the dancing will be set to the current parameter's tempo value. The "danceability" factor will determine how much their limbs move, whether it is a small head nod or an explosive arm/leg movement. The energy will also determine the style of dance that the stickmen will perform, with three envisioned animations: a slow dance, involving a bit of head and body rocking, a "normal" dance with a bit more limb motion, and then a flat out dance at higher energy with every limb of the stickman involved. Liveness will affect how many stickmen are in the dancing crowd, while finally valence affects the "mood" of the stickmen - visualized through smiley or sad faces stuck onto their heads. The stickmen in the crowd appear as customized SVGs, and are animated in real time using Anime.js.
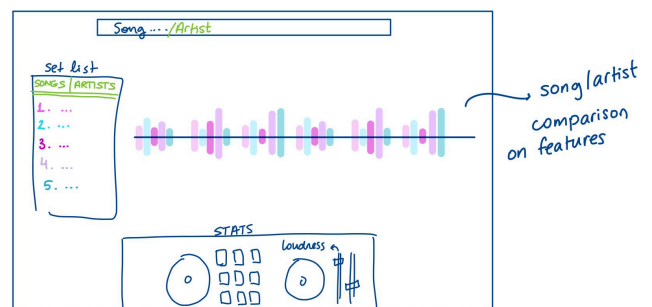
**Toggle button:** Simple button which toggles the information displayed in the set list between songs and artists.

### 3. Challenging ideas

**Map:** Overall view of all the data over a map of the world based on each song's country of origin. The visible data will be able to change based on filtering parameters (interaction lecture).

**Song samples:** The user can choose to play a snippet of a selected song, or any of the songs presented in the set list. If selecting an artist, play their most popular song. This can be done using the Spotify Web API.

**Song comparison:** Instead of looking at the statistics for a single song, users can compare multiple songs at the same time to observe differences. This can be achieved by presenting each chosen song's bar chart side by side in the main display area.



### 4. Prototype website:

https://com-480-data-visualization.github.io/project-2024-cmsgang/