

# **DWBI Final Project Report**

## **Exploring Musical Trends – A Spotify Dataset Analysis**

### **Team Members**

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### **Dataset Link**

- <https://www.kaggle.com/datasets/zaheenhamidani/ultimate-spotify-tracks-db/data>

### **Objective**

The primary objective of our project was to conduct a comprehensive analysis of the Ultimate Spotify Tracks dataset, available on Kaggle, with a focus on unraveling intricate patterns and insights related to various musical features. Our goal was to provide a detailed examination of not only the overall landscape of artists and songs but also to delve into specific musical attributes, such as modes, keys, danceability, liveness, energy, and loudness. By scrutinizing these attributes, we sought to unravel patterns and correlations that shed light on the diverse and dynamic nature of the music present in the dataset.

Furthermore, our objective extended to the detailed analysis of specific songs, drilling down into key elements such as tempo, valence, liveness, and speechiness. This level of granularity allowed us to discern nuances in the musical composition, providing users with a nuanced understanding of how these individual features contribute to the overall listening experience.

In essence, our project aimed to offer a holistic view of the musical landscape, blending macro-level insights into overall trends with micro-level examinations of individual songs. This dual approach aimed to cater to both those seeking a broad understanding of the dataset and enthusiasts interested in the intricate details that define the essence of each track. Through this analysis, we aspired to provide a valuable resource for music enthusiasts, researchers, and industry professionals, enabling them to explore and appreciate the multifaceted dimensions of the Ultimate Spotify Tracks dataset.

### **Methodology**

#### ***Data Exploration and Understanding:***

- Conducted a thorough exploration of the Ultimate Spotify Tracks dataset to understand its structure and content.
- Identified key variables, such as genre, artist name, track details, and various musical attributes, to form the basis for our analysis.

#### ***Dashboard Design and Conceptualization:***

- Outlined the primary objectives of the project, focusing on macro and micro-level insights.

- Conceptualized two dashboards - General Overview and Song Spotlight - to cater to different user needs, providing both high-level trends and in-depth song analysis.

#### ***Visualizations and Interactivity:***

- Selected appropriate visualizations for each insight, considering factors such as trendlines, bar charts, and scatter plots to effectively convey information. Implemented interactivity features, such as sliders for song selection and embedded links using Web Objects, to enhance user engagement and create a dynamic exploration experience.

#### ***Using API (Web Objects) to Embed Songs into the Dashboard:***

- Using Tableau's Web Objects we first embedded a Spotify song into the Dashboard
- To make it dynamic, where the user could interact with the visualization and the Spotify song would get updated automatically, was achieved using dynamic actions to select songs and listen to previews directly within the dashboard interface.
- The combination of Web Objects and actions enhances the user experience by providing a seamless and interactive connection between data analysis and the auditory exploration of music.

#### ***User-Centric Approach:***

- Maintained a focus on the end-user experience, simplifying complex information to create an intuitive and user-friendly dashboard.

### **Challenges Faced**

***Embedding Links:*** Embedding links for song playback posed a significant challenge during the project. This process proved to be intricate, requiring careful attention to detail. Ensuring accurate links and maintaining consistency across a large dataset demanded meticulous effort.

***Resolution:*** To address this challenge, we implemented a systematic approach, double-checking each link's accuracy and completeness. Utilizing action filters and embedding links through Tableau's functionalities, we were able to overcome these challenges.

***Dashboard Lagging Issues:*** The second challenge we encountered involved dashboard performance issues, particularly when dealing with multiple embedded links. As we added more interactive elements, the responsiveness of the dashboard decreased, leading to lags and delays.

***Resolution:*** To mitigate this challenge, we optimized the performance of the dashboard by reviewing and refining the actions and filters applied. We prioritized critical interactions, avoiding unnecessary computations and improving the overall user experience.

***Information Overload on the Dashboard:*** The third challenge revolved around the complexity of fitting multiple visualizations onto the dashboard without compromising clarity. Balancing the amount of information displayed without overwhelming the user proved to be a delicate task.

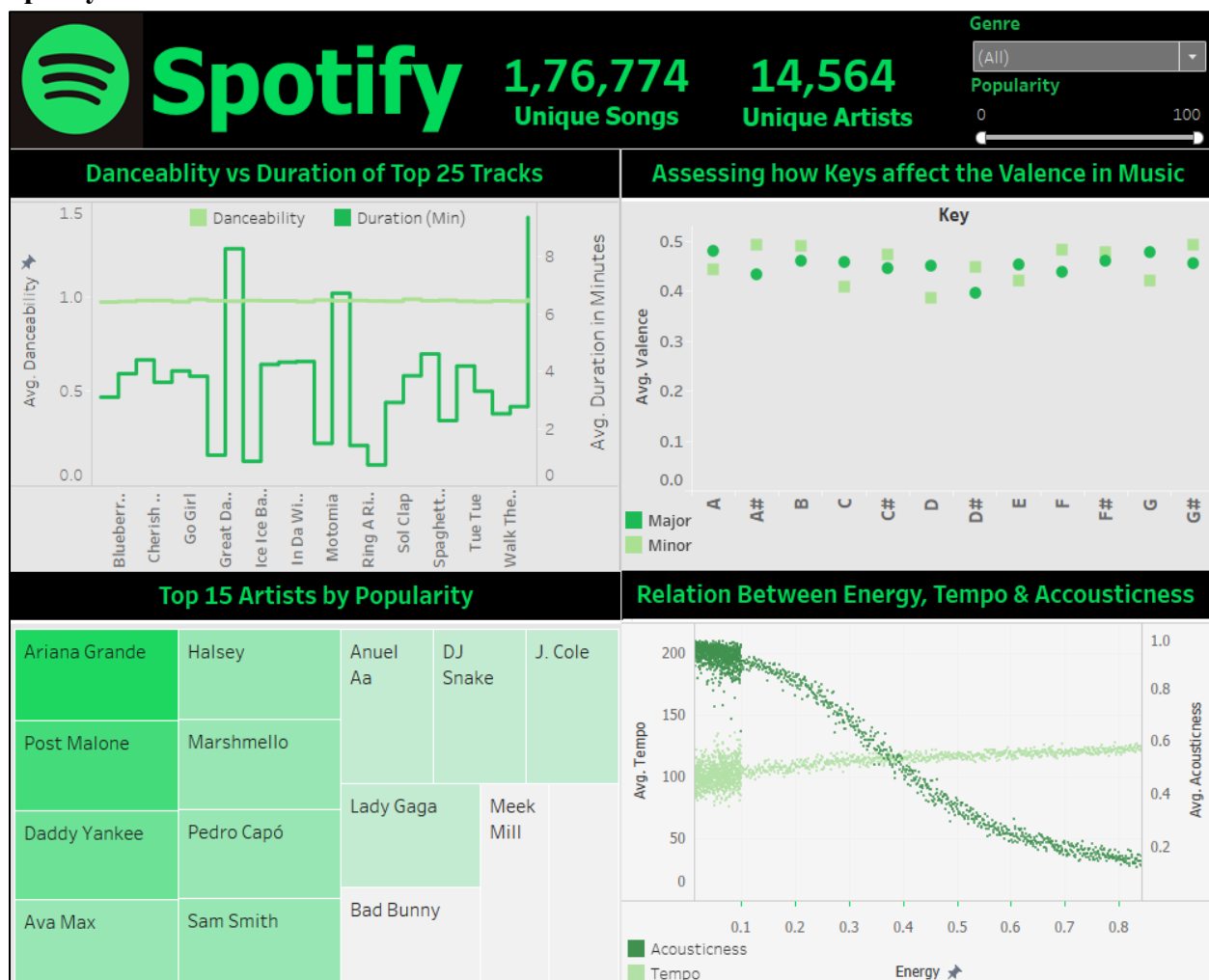
***Resolution:*** We addressed this challenge by categorizing visualizations, prioritizing key insights, and providing tooltips for additional context. By streamlining the information presented, we aimed to enhance the user's ability to interpret the data without feeling overwhelmed.

- Balancing functionality with performance is crucial. While embedding links and interactive features can enhance the user experience, strategic design choices are necessary to avoid performance issues.
  - Continuous testing and refinement are essential. Identifying and addressing issues early in the development process helps prevent major setbacks and ensures a smoother user experience.
  - Focusing on the end-user experience is paramount. Simplifying complex information and providing intuitive interactions contribute to a more effective and user-friendly dashboard.
- These lessons learned, along with the resolutions implemented, allowed us to deliver a final project that not only overcame challenges but also provided an engaging and insightful experience for users exploring the Ultimate Spotify Tracks dataset.

## Result of the Project

The final project resulted in two comprehensive dashboards that provide insights into the Ultimate Spotify Tracks dataset.

### Spotify's Pulse: A General Overview of Music Trends:



The first dashboard, Spotify's Pulse : A General Overview, includes four key visualizations:

- Danceability vs. Duration Trendline Chart: Displaying the relationship between danceability and duration for the top 25 tracks. The trendline reveals that most top songs fall within the 3-4 minute duration range.
- Key vs. Valence Horizontal Bar Chart: Illustrating how different keys affect the valence of music. This visualization provides a unique perspective on the emotional quality of songs in different keys.
- Top 15 Artists by Popularity: Highlighting the most popular artists, with a focus on Ariana Grande, Post Malone, and Daddy Yankee.
- Energy, Tempo, and Acousticness Relationship: Demonstrating the correlation between energy, tempo, and acousticness in songs. It reveals trends such as increased energy corresponding to higher tempo and decreased acousticness.

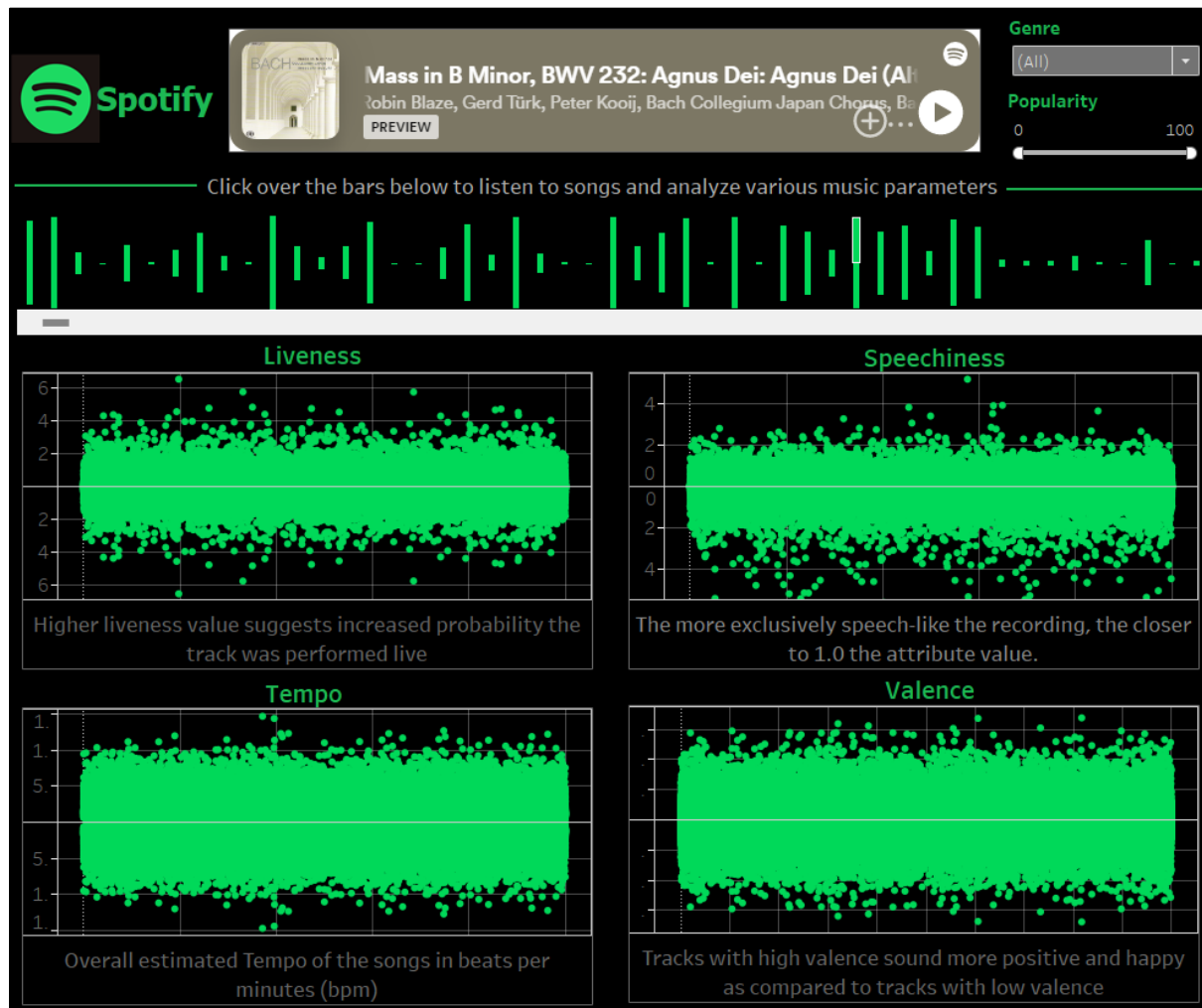
***Key Insights from the Dashboard:***

- It can be deduced from the dashboard that for all the top songs in every genre, for more the duration of the song, lower is the danceability.
- Valence refers to the perceived musical positiveness or negativeness conveyed by a piece. It is often associated with emotions, with high valence indicating a positive or happy mood, and low valence suggesting a negative or sad mood

From our assessment of how keys affect the valence parameter of music:

- Major keys are often associated with brighter and more positive emotions, contributing to higher valence. For example, the key of C major is generally perceived as bright and happy.
- Minor keys, on the other hand, tend to evoke a sadder or more serious emotional tone, contributing to lower valence. For instance, the key of D minor is often associated with a melancholic feel.
- However, it is important to note that the emotional impact of a musical piece is influenced by various factors, including tempo, rhythm, instrumentation, and the overall musical context.
- The top artists from every genre kept on varying and thus no particular artist emerged as a constant top performer in the visualization.
- For all Genres combined, it was observed that that acousticness has an inverse relationship with energy and was decreasing with an increase in energy of the song
- On the contrary, Tempo is observed to have a direct relationship with energy
- The drop-down for Genre and the slider for Popularity filters the data and updates the visualizations to provide very specific information and key insights to any music enthusiast.

## Song Spotlight: Deep Dive into Musical Details with Interactive Analysis:



The second dashboard is designed for a detailed analysis of specific songs based on characteristics such as Liveness, Tempo, Valence, and Speechiness. Users can use a slider chart to select songs within a certain range, and the dashboard provides embedded links for listening to the chosen song, enhancing the overall user experience.

### Key Visualizations:

- **Spotify Web Object:** Embedded within the dashboard is a Spotify Web Object, allowing users to seamlessly listen to the song being analyzed. This integration enhances the interactive experience, enabling users to hear the sonic features in action and connect their analysis to the actual listening experience.
- **Click-and-Analyze Bars:** Interactive bars beneath the waveform empower users to pinpoint specific song sections and analyze their corresponding audio features. This enables a granular exploration of the music, revealing how different parts contribute to the overall listening experience.

### ***Key Insights from the Dashboard:***

- By analyzing the waveform and feature values, users gain insights into the song's composition. For instance, a high Liveness value suggests live instrumentation, while high Danceability and Energy could indicate a club-ready track.
- Valence and Danceability offer a window into the song's emotional tone. A low Valence with high Danceability hints a melancholic dance music, while high Valence and Energy points towards an upbeat anthem.
- The dashboard's ability to analyze across genres opens doors to fascinating comparisons. Users can discover how tempo, acoustics, and other features vary across musical styles, revealing genre-specific sonic fingerprints.
- This tool goes beyond passive listening, encouraging active engagement with music. Users can identify patterns in their own listening habits, discovering their preferred emotional landscapes or sonic textures.

### **Conclusion**

In conclusion, the Dashboards have successfully achieved its primary objective of conducting a comprehensive analysis of the Ultimate Spotify Tracks dataset, offering a multifaceted exploration of musical features and patterns. Through the meticulously designed Spotify's Pulse and Song Spotlight dashboards, users can navigate both macro and micro-level insights, providing a holistic understanding of the dataset. The challenges faced during the project, from embedding links to addressing dashboard lag, were overcome through systematic approaches, leading to valuable lessons in dashboard design and optimization. The integration of Web Objects and interactive features has elevated the user experience, allowing enthusiasts, researchers, and industry professionals to delve into the intricate world of music with ease. This project stands as a testament to the power of data visualization in unraveling the nuances of music, offering a rich resource for exploration and appreciation in the realm of music analytics.