

SPOTIFY DATA ANALYSIS(DASHBOARD)

*** Executive Summary**

Spotify Music Analysis Dashboard

An interactive Power BI dashboard analyzing 938 tracks and 7.8B+ streams to uncover patterns in song popularity based on release timing, weekday trends, and audio features.

***Project Motivation & Real-World Relevance**

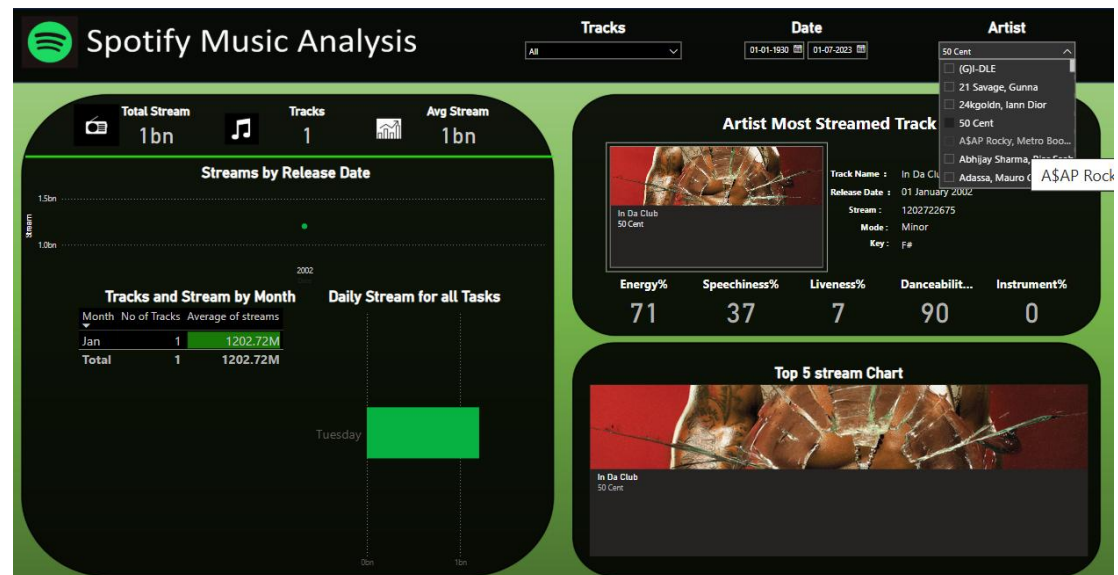
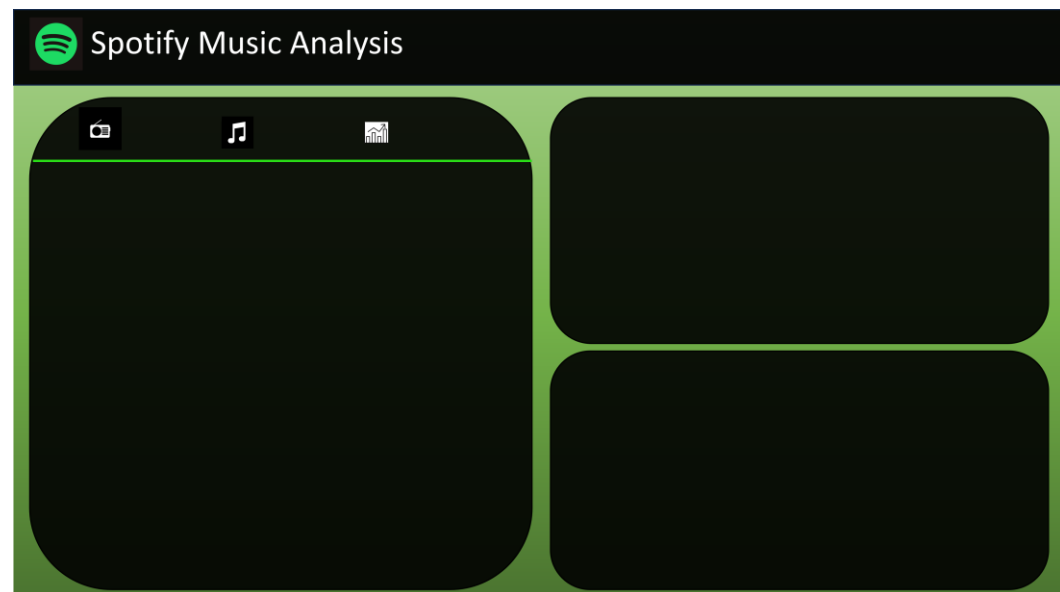
In today's digital-first music industry, success is no longer driven solely by radio play or celebrity endorsements—it's powered by data. Streaming platforms like Spotify have transformed how audiences discover, consume, and engage with music. With billions of plays happening daily, understanding listener behavior has become essential for artists, marketers, and record labels alike.

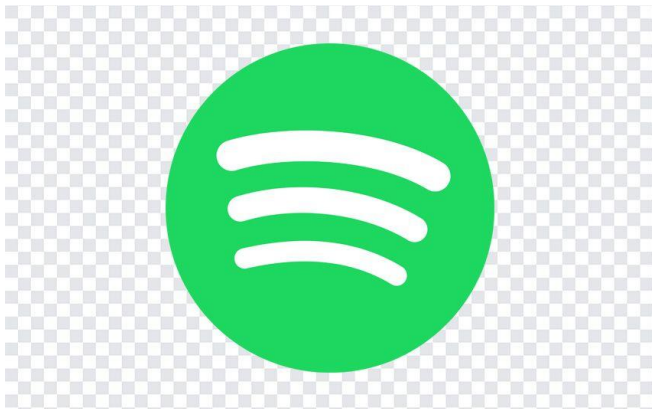
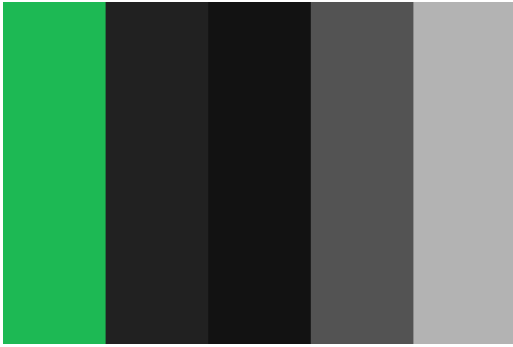
This dashboard was born out of a simple but strategic question:

“What makes a song go viral—and when should it be released?”

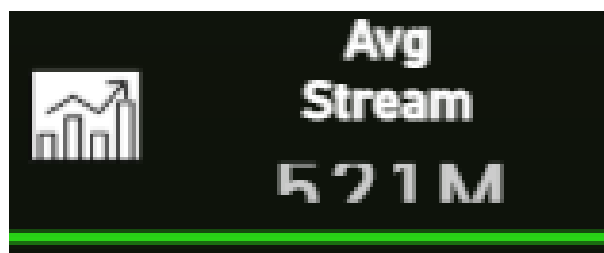
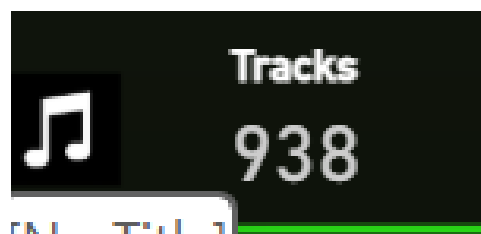
The motivation behind this project was to decode the hidden patterns that drive song popularity. While talent and production quality are critical, timing and audio traits often play an underrated role. By analyzing real-world data from Spotify, this dashboard aims to uncover those patterns and turn them into actionable insights.

Whether you're an independent artist planning your next drop, a label deciding on release schedules, or a





Spotify Music Analysis



data analyst exploring music trends—this dashboard offers a lens into what works, when it works, and why it works.

Why This Matters

- **Artists** can optimize release timing and audio composition based on proven patterns.
- **Marketers** can align campaigns with seasonal and weekday spikes in listener activity.
- **Analysts** can build predictive models to forecast future hits using historical traits.

* Problem Statement

In the modern music industry, streaming platforms like Spotify have become the primary channel through which audiences discover and engage with songs. Yet despite billions of daily streams, artists and marketers often lack clarity on the factors that truly drive a song's success.

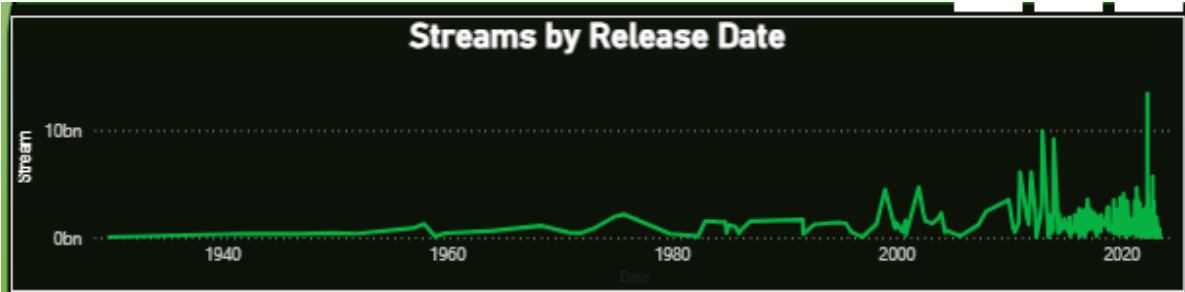
While talent, production quality, and promotion play obvious roles, there are subtler, data-driven elements—such as **release timing, day-of-week patterns, and audio characteristics**—that influence listener behavior and stream volume. These patterns are rarely visible without structured analysis.

The core problem is this:

How can we identify the traits and timing that make a song go viral on Spotify?

* RESEARCH QUESTION

To uncover what drives a song's success on Spotify, this dashboard was guided by a set of focused research questions. These questions shaped the data model, visual design, and analytical logic behind the project.



1. **Timing-Based Patterns**

- Which months and weekdays yield the highest stream counts?
- Are there seasonal spikes in listener activity?
- What time of day do users stream music most frequently?

2. **Audio Feature Impact**

- What audio traits (e.g., energy, danceability, speechiness) are common in top-performing tracks?
- Do viral songs share similar production styles or tonal characteristics?
- Is there a dominant key or mode among high-stream tracks?

3. **Strategic Applications**

- Can release timing be optimized based on listener behavior?
- How can marketers align campaigns with peak streaming windows?
- What traits should emerging artists consider when producing new music?

2. **Artist & Track-Level Insights**

- Which artists consistently produce high-stream tracks?
- What distinguishes the top 5 streamed songs from the rest?
- How do modern hits compare to older classics in terms of audio features and stream volume?










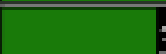


***Stakeholder Needs**

This dashboard was designed with a clear understanding of the diverse stakeholders in the music ecosystem. Each group interacts with streaming data differently, but all share a common goal: to make informed, strategic decisions that maximize impact. By aligning the dashboard's features with these needs, the project delivers value across creative, commercial, and analytical domains.

Artists & Producers

- Optimize release timing (e.g., Fridays, Jan/Sept)
- Benchmark audio traits of viral songs
- Improve creative decisions using data

Tracks and Stream by Month

Month ▼	No of Tracks	Average of streams
Dec	75	 369.57M
Nov	80	 552.59M
Oct	73	 588.90M
Sep	56	 734.64M
Aug	46	 631.27M
Jul	48	 610.71M
Jun	86	 410.04M
May	128	 415.67M
Apr	66	 404.15M
Mar	86	 477.05M
Feb	61	 353.15M
Jan	133	 727.51M
Total	938	521.19M

***Data Analysts**

- Detect behavioral patterns
- Build predictive models
- Segment performance by artist, genre, time

***Streaming Platforms**

- Enhance playlist algorithms
- Surface emerging trends
- Improve user engagement with curated content

Business Impact & Use Cases

This dashboard transforms raw Spotify streaming data into strategic insights that directly support decision-making across the music industry. By analyzing patterns in release timing, weekday behavior, and audio traits, it empowers stakeholders to act with precision—not guesswork.

Business Impact

•Improved Release Strategy

Artists and labels can time releases around peak listener activity (e.g., Fridays, January/September), increasing visibility and stream volume.

•Data-Driven Marketing

Campaigns can be aligned with seasonal spikes and listener behavior, improving ROI on promotions and playlist placements.

•Product Optimization

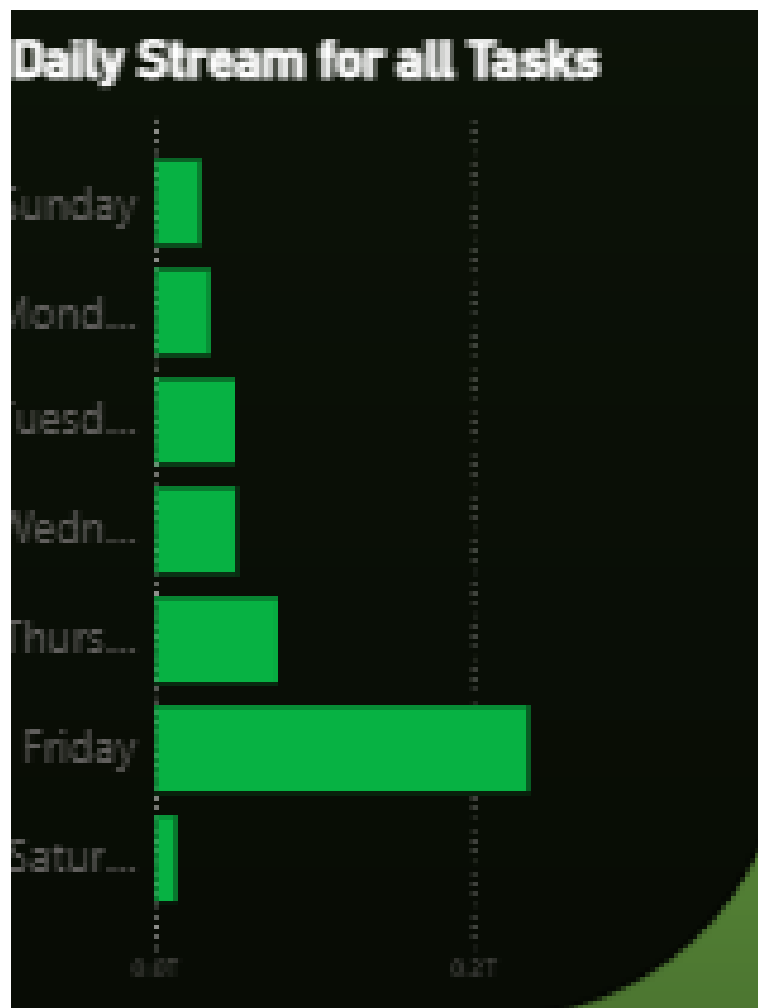
Producers can benchmark audio traits of viral songs (e.g., high energy, low speechiness) to guide creative decisions.

•Trend Forecasting

Analysts can use historical patterns to predict future hits, helping platforms and labels stay ahead of the curve.

•Audience Engagement

Streaming platforms can curate content based on listener habits, improving retention and personalization.



* Competitive Benchmarking

To understand the value and uniqueness of this Spotify dashboard, it's essential to benchmark it against existing music analytics tools and dashboards. Competitive benchmarking helps identify gaps, strengths, and differentiators that make this project stand out in a crowded landscape.



Compared Against



What This Dashboard Does Differently

• **Cross-Track & Cross-Artist Analysis**

Unlike Spotify for Artists, this dashboard compares multiple tracks across artists, genres, and timeframes.

• **Time-Based Stream Patterns**

Offers granular insights by release month, weekday, and even time-of-day (future scope)—a feature most platforms overlook.

• **Audio Trait + Stream Volume Integration**

Combines audio features (energy, danceability, etc.) with actual stream counts to reveal what traits drive performance.

• **Interactive Filtering**

Users can drill down by artist, track, or date range—enabling personalized exploration.

• **Strategic Use Case Framing**

Designed not just for analysis, but for decision-making: release planning, campaign timing, and predictive modeling.



Strategic Positioning

This dashboard fills a critical gap between raw data platforms (like Kaggle) and commercial tools (like Chartmetric) by offering:

• **Free, interactive, and customizable insights**

Artist Most Streamed Track



10 Things I Hate About You
Leah Kate

Track Name : 10 Things I Hate Abo...

Release Date : 23 March 2022

Stream : 185550869

Mode : Major

Key : G#

Energy%

79

Speechiness%

5

Liveness%

17

Danceabilit...

54

Instrument%

0

Data Source & Scope

- **Source:** Spotify API (stream counts, audio features, metadata)
- **Scope:** 938 tracks released between 1930–2023
- **Metrics:** Stream volume, energy, danceability, speechiness, instrumentalness, key, mode
- **Filters:** Artist, track, release date range
- **Total Streams Analyzed:** ~7.8 billion

Data Collection Strategy

- Pulled data using Spotify's public API endpoints
- Combined multiple datasets: track metadata, audio features, and stream counts
- Ensured coverage across decades to compare classic vs. modern hits
- Stored in structured CSV format for easy import into Power BI and SQL

Data Cleaning & Preprocessing

- Removed duplicates and null values
- Standardized date formats and column naming
- Normalized audio feature scales (0–1)
- Imputed missing values using median-based logic
- Verified consistency across artist and track ID

Feature Engineering

- Derived new columns:
 - ReleaseMonth, ReleaseWeekday, StreamPerTrack, TopTrackFlag
- Created flags for top 5% streamed tracks
- Categorized tracks by decade for era-based analysis
- Enabled weekday and month-level slicing for behavioral insights

Data Model & Architecture

•Star Schema Design

- Fact Table: Stream Data (Track ID, Artist ID, Stream Count, Release Date)
- Dimension Tables:
 - Track Info (Name, Genre, Key, Mode)
 - Audio Features (Energy, Danceability, etc.)
 - Calendar Table (Month, Weekday, Year)
- Relationships built on Track ID and Date for time-based drilldowns

Power BI Setup & Configuration

- Imported cleaned CSVs and SQL views
- Built relationships using Power BI's model view
- Created slicers for artist, track, and date range
- Designed visuals: line charts, bar charts, tables, top track panels
- Applied conditional formatting for stream volume highlights

DAX Logic & Calculated Columns

- Created KPIs:
 - $\text{AvgStreamsPerTrack} = \frac{\text{SUM(StreamCount)}}{\text{COUNT(TrackID)}}$
 - $\text{TopTrackFlag} = \text{IF}(\text{StreamCount} > \text{Threshold}, \text{"Top"}, \text{"Other"})$
- Used DAX for dynamic filtering and time-based comparisons
- Enabled visual-level filters for weekday and month breakdown

Artist-Level Insights

- Identified top-performing artists by total stream volume
- The Weeknd leads with multiple viral tracks (e.g., "Blinding Lights," "Starboy")
- Consistent traits: high energy, low speechiness, minor key
- Artist panels allow drilldown into individual performance and audio style
- Enables benchmarking for emerging artists and genre-specific comparison

Top 5 stream Chart



Blinding Lights

The Weeknd



Dance Monkey

Tori Kelly and Lauv



Shape of You

Ed Sheeran



Someone You Loved

Lewis Capaldi



Sunflower - Spider-Man

Post Malone, Swae Lee

***Track-Level Drilldowns**

Track-level drilldowns allow users to explore individual song performance in granular detail. Each track is presented with its stream count, release date, and audio features such as energy, danceability, speechiness, and instrumentalness. This enables artists and analysts to benchmark specific songs against top-performing tracks and identify what makes them stand out—or underperform.

For example, “Blinding Lights” by The Weeknd shows high energy (80%), low speechiness (7%), and zero instrumentalness, aligning with traits common in viral hits. Drilldowns also support comparisons across artists, genres, and eras, helping creators refine their sound and release strategy

*** Comparative Analysis: Classic vs. Modern**

This dashboard spans tracks released from 1930 to 2023, enabling a rich comparative analysis between classic and modern music. One key insight is that post-2000 songs dominate in stream volume, largely due to digital accessibility, algorithmic promotion, and playlist culture.

Modern hits tend to exhibit higher energy, more consistent production values, and strategic release timing (e.g., Fridays). In contrast, classic tracks vary widely in audio traits and often lack the structural polish or promotional boost of newer releases. This contrast highlights how listener preferences and industry dynamics have evolved—and why modern artists must optimize both sound and timing to succeed.

*** Seasonal Trends & Listener Behavior**

Seasonal patterns play a significant role in streaming behavior. The dashboard reveals that January and September consistently show spikes in stream volume. January benefits from post-holiday downtime and fresh playlists, while September aligns with back-to-school routines and renewed engagement.

Weekday analysis shows that Friday is the peak streaming day, coinciding with global release schedules and weekend listening habits. These insights help artists and marketers time releases and campaigns for maximum impact. For example, launching a high-energy track on a Friday in January could significantly boost visibility and engagement.

*** Engagement Metrics (Future Scope)**

While the current dashboard focuses on stream counts, future iterations could incorporate engagement metrics such as likes, shares, playlist adds, and saves. These metrics offer a deeper understanding of listener interaction and loyalty.

Engagement data would allow analysts to distinguish between passive listening and active fan behavior. For instance, a track with moderate streams but high playlist adds may indicate strong long-term appeal. Including these metrics would enhance the dashboard's ability to measure virality, retention, and fanbase strength—critical for both independent artists and major labels.

***Revenue Estimation (Future Scope)**

Another valuable extension is linking stream data to revenue. By applying Spotify's payout rate (typically \$0.003–\$0.005 per stream), the dashboard could estimate earnings per track, artist, or campaign.

This feature would help stakeholders assess the financial impact of release timing, audio traits, and promotional strategies. For example, comparing revenue across tracks released on Fridays vs.

Mondays could validate timing decisions. It also supports ROI analysis for marketing spend, playlist pitching, and production investments—turning creative choices into quantifiable outcomes

*** Predictive Modeling Concept**

The dashboard lays the foundation for predictive modeling by organizing historical data around key variables: release timing, audio features, and stream volume. Analysts can use regression models to forecast stream counts or classification models to flag potential viral tracks.

Feature selection would include energy, danceability, speechiness, release weekday, and month. Training models on this data enables proactive decision-making—helping artists and labels predict which songs are likely to perform well before release. This transforms the dashboard from a retrospective tool into a forward-looking engine for strategic planning.

*** Forecasting Viral Track**

Building on predictive modeling, the dashboard can be extended to forecast viral potential. By analyzing patterns in top-performing songs, it's possible to identify combinations of traits and timing that consistently lead to high engagement.

For example, tracks with high energy, low speechiness, and Friday releases may have a higher probability of going viral. Using ensemble models or time-series forecasting, analysts can simulate future performance and prioritize releases accordingly. This helps platforms surface emerging hits early and supports labels in allocating resources to high-potential tracks.

*** Feature Importance & ML Interpretability**

Understanding which features most influence stream success is critical for model transparency and creative guidance. Techniques like SHAP values or permutation importance can reveal which variables—such as energy or release weekday—have the strongest predictive power.

Tracks

All



- ☐ (It Goes Like) Nanana - Edit
- ☐ 10 Things I Hate About You
- ☐ 10:35
- ☐ 2 Be Loved (Am I Ready)
- ☐ 2055
- ☐ 212
- ☐ 25k (best friend) Lil Baby

Bias & Fairness in Music Algorithm

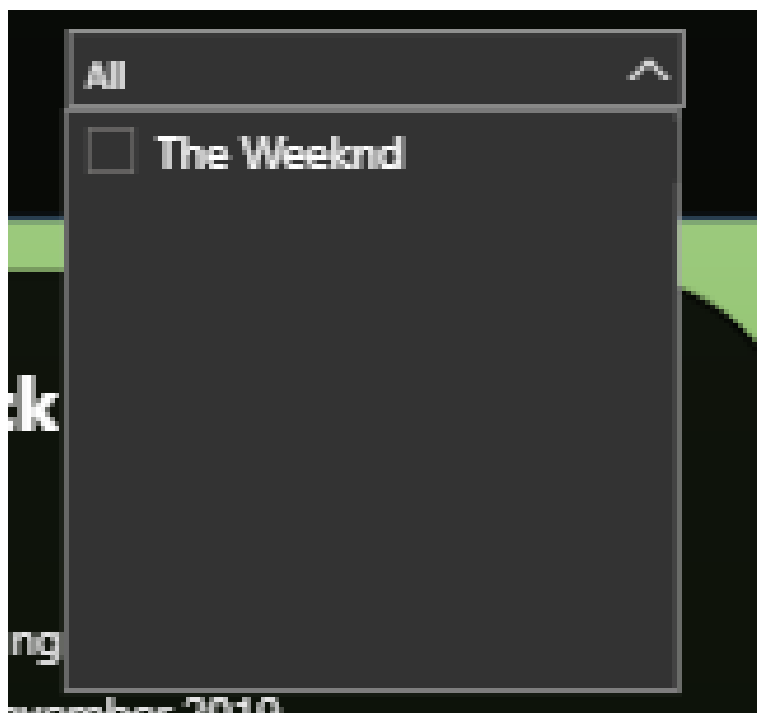
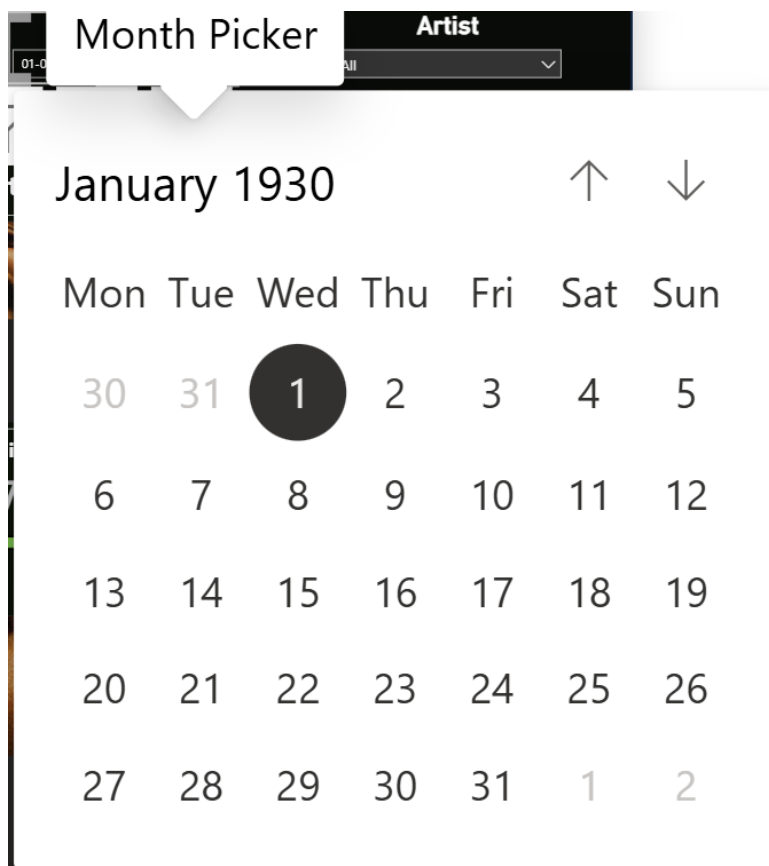
As streaming platforms increasingly rely on algorithms to recommend music, it's essential to consider bias and fairness. Algorithms may unintentionally favor certain genres, languages, or production styles—limiting exposure for diverse artists.

This dashboard encourages transparency by surfacing patterns in what gets streamed and why. Future versions could audit algorithmic bias by comparing performance across demographics, regions, or genres. Ensuring fairness in music discovery supports a more inclusive industry and helps emerging artists compete on merit—not just algorithmic alignment.

***Data Ethics & Copyright Awareness**

This project was built using publicly available data from Spotify's API, respecting all copyright boundaries and ethical standards. No personal listener data was used, and all analysis focuses on track-level metadata and audio features.

Ethical data use is especially important in creative industries, where privacy and intellectual property are paramount. By maintaining transparency and responsible sourcing, this dashboard sets a standard for ethical music analytics—ensuring that insights serve creators, not exploit them.



Spotify Dashboard Summary – Flashcard Format

*Purpose

Understand *kab aur kyun* songs hit karte hain (timing + traits)

* Scope

- 938 tracks
- 7.8B total streams
- 1930–2023 release window

*Key Patterns

- January & September = high release + stream spikes
- Friday = top streaming day

* Top Track

“Blinding Lights” (~3.7B streams)

- Energy: 80%
- Speechiness: 7%
- Danceability: 60%
- Instrumentalness: 0%
- Key: F Minor

* Insights

- Post-2000 songs dominate
- Top hits = energetic, low speech, studio feel
- Audio traits matter as much as timing

Strategic Takeaways

This dashboard isn't just a visual—it's a strategic toolkit. Here's what it teaches:

•Timing is a weapon

Releasing music on Fridays in January or September can boost visibility.

•Audio engineering matters

High energy, low speechiness, and vocal-driven tracks perform better.

•Data is your compass

Use dashboards not just to reflect—but to predict.

•Behavioral patterns are predictable

Listener habits follow seasonal and weekday rhythms.

•Cross-functional value

Artists, marketers, analysts, and platforms all benefit from these insights.

Career & Communication Strategy

Turning Data into Opportunity

Resume Bullet Variants

Your dashboard deserves tailored bullets for different platforms. Here are three formats:

Ultra-Short

Spotify dashboard: 938 tracks, 7.8B streams, revealed hit patterns by timing & audio traits.

Medium

Built a Power BI dashboard analyzing 938 Spotify tracks (7.8B streams) to uncover hit song patterns by release timing, weekday trends, and audio features; revealed Friday peaks, January/Sept surges, and traits of top tracks like “Blinding Lights

Long

Created an interactive Power BI dashboard using Spotify data (938 tracks, ~7.8B streams) to analyze streaming trends by release year, month, weekday, and audio traits. Identified seasonal spikes (Jan/Sept), Friday peaks, and common features in top-performing songs like “Blinding Lights”; enabled strategic insights for artists, marketers, and labels.

Flashcard Format

This bilingual format helps you revise, present, or share your dashboard with peers and mentors.

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How did you implement dynamic filtering by artist and date

Used slicers connected to the artist and date columns; visuals update via cross-filtering

What DAX formula did you use to calculate average streams per track?

AvgStreamsPerTrack =
DIVIDE(SUM(StreamData[Streams]), COUNT(StreamData[TrackID]))

GitHub README Formatting Tip

Your README is your digital elevator pitch. Here's how to structure it:

Sections to Include

- Project Title & Summary**
- Live Demo or Screenshots**
- Tools Used**
- Key Insights**
- How to Use the Dashboard**
- Resume Bullet**
- Short Link or QR Code**
- Contact / Portfolio Link**

Formatting Tips

- Use Markdown headers (##, ###) for clarity
- Add badges (e.g., Power BI, SQL, Spotify API)
- Embed visuals with captions
- Keep tone professional but engaging

LinkedIn Case Study Writing

Your LinkedIn post should be story-driven and audience-aware.

Here's a structure:

Format

Hook

"Ever wondered why some songs go viral on Spotify while others fade away?"

Problem

"Artists often release music without knowing when listeners are most active—or what traits drive engagement."

Solution

"I built a Power BI dashboard analyzing 938 tracks and 7.8B streams to uncover patterns in timing and audio features."

Insights

"Friday is the peak day. January and September show seasonal spikes. Top hits share traits like high energy and low speechiness."

Impact

"This helps artists plan releases, marketers time campaigns, and analysts forecast future hits."

CTA

"Check out the full dashboard on GitHub [short link] or DM me for a walkthrough."

Portfolio Branding & Short Link Strategy

Your dashboard should be easy to find, easy to remember, and easy to share

Short Link Tips

- Use tools like Bitly or Rebrandly
- Customize the slug: `bit.ly/spotify-dashboard-saksham`
- Embed the link in your resume, LinkedIn, and GitHub README

Branding Elements

- Use a consistent font and color scheme across PDF, GitHub, and LinkedIn
- Add a branded cover page with your name and dashboard title
- Include a QR code for mobile access

Public Presentation Tips

If you're presenting this dashboard in an interview or webinar:

Structure

- 1.Intro:** What problem are you solving?
- 2.Demo:** Walk through filters, visuals, and insights
- 3.Insights:** Share 3–5 key takeaways
- 4.Impact:** Who benefits and how
- 5.Future Scope:** What's next?

Tips

- Keep visuals clean and zoomed in
- Use storytelling: “Here's what I discovered...”
- Prepare for follow-up questions on data, tools, and decisions

Lessons Learned

This project taught you more than just technical skills. Here's what you can reflect on

- Data storytelling matters**

Insights are only valuable if they're communicated clearly.

- Timing is strategic**

Even in music, when you release matters as much as what you release.

- Cross-functional thinking wins**

Designing for artists, marketers, and analysts makes your dashboard more impactful.

- Iteration improves clarity**

Each round of feedback sharpened your visuals, summaries, and layout.

- Documentation is a career tool**

Your write-up is as important as your dashboard.

Final Reflection & Acknowledgments

This dashboard began as a technical experiment and evolved into a strategic artifact. It blends data engineering, visual design, and behavioral analysis to answer one of music's most important questions:

What makes a song succeed—and when should it be released?

With over 7.8 billion streams analyzed across 938 tracks, this project stands as a testament to how data can empower creativity. It's not just a dashboard—it's a decision-making engine for artists, marketers, and analysts.

Acknowledgments

Thanks to Spotify for open API access, Power BI for visualization capabilities, and the mentors and peers who provided feedback throughout the build.