Spotify

Music Trends & Popularity Analysis

Welcome

Transforming 12,000+ tracks of Spotify data into actionable business intelligence insights. Analyzing music trends from 2015-2020 to understand what drives song popularity and streaming success.

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Introduction

About Us

Business Description

The music streaming industry is one of the most data-driven digital sectors, where competition is strongly influenced by the ability to understand listener preferences and predict content performance.

This Business Intelligence project aims to analyze Spotify music data to identify the key factors that drive song popularity using dimensional modeling, dashboards, and insight generation.

Our Company

Spotify relies extensively on data analytics to optimize recommendations, curate playlists, and support both artists and business partners.

The objective is to transform raw music data into actionable insights that explain popularity trends and support strategic decision-making related to content curation, playlist design, and artist promotion.

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Dimensional Modeling
Dashboard Development
Insight Generation
Recommendations

Our Team

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Agenda

Analysis Workflow

#	Phase	Tasks	Deliverables
1	Data preparation	Clean and transform 12,000+ tracks	Star schema model with fact and dimension tables
2	Dimensional Modeling	Design FactTracks and 4 dimension tables	Optimized data structure for analysis
3	Dashboard Development	Create Executive, Deep Dive, Artist dashboards	Interactive Power BI dashboards
4	Insight Generation	Analyze audio features vs popularity	10 key findings with business interpretation
5	Recommendations	Develop data-driven strategies	7 actionable business recommendations

Data preparation

Project Metrics & Impact

12k+

Tracks Analyzed

Comprehensive dataset coverage

6Y

Time Period

2015-2020 music trends

8

Key Findings

Data-driven insights identified

6

Recommendations

Actionable strategies developed

Data preparation

Project Metrics & Impact

1. Data Import

- Loaded Spotify dataset using pandas library.
- Configured with semicolon delimiter and latin1 encoding.
- Dataset contains 20 columns including track attributes and metadata.

```
df = pd.read_csv("Spotify.csv", sep=';', encoding="latin1")
```

Data preparation

Project Metrics & Impact

2. Data Formatting

- Rounded all numerical columns to 3 decimal places.
- Ensured consistency across all metrics.
- Improved readability for analysis.

```
float_cols = df.select_dtypes(include='float').columns
df[float_cols] = df[float_cols].round(3)
```

Data preparation

Project Metrics & Impact

3. Missing Data Handling

- Identified 36 missing values in release_date column.
- Removed all rows with null values using dropna().
- Verified complete data cleanliness.

```
print(df.isna().sum())
df_clean = df.dropna()
```

Data preparation

Project Metrics & Impact

4. Data Export

- Spotify_data.csv – Intermediate version
- Spotify_data BI.csv – Final cleaned version
- Ready for BI tools and visualization.

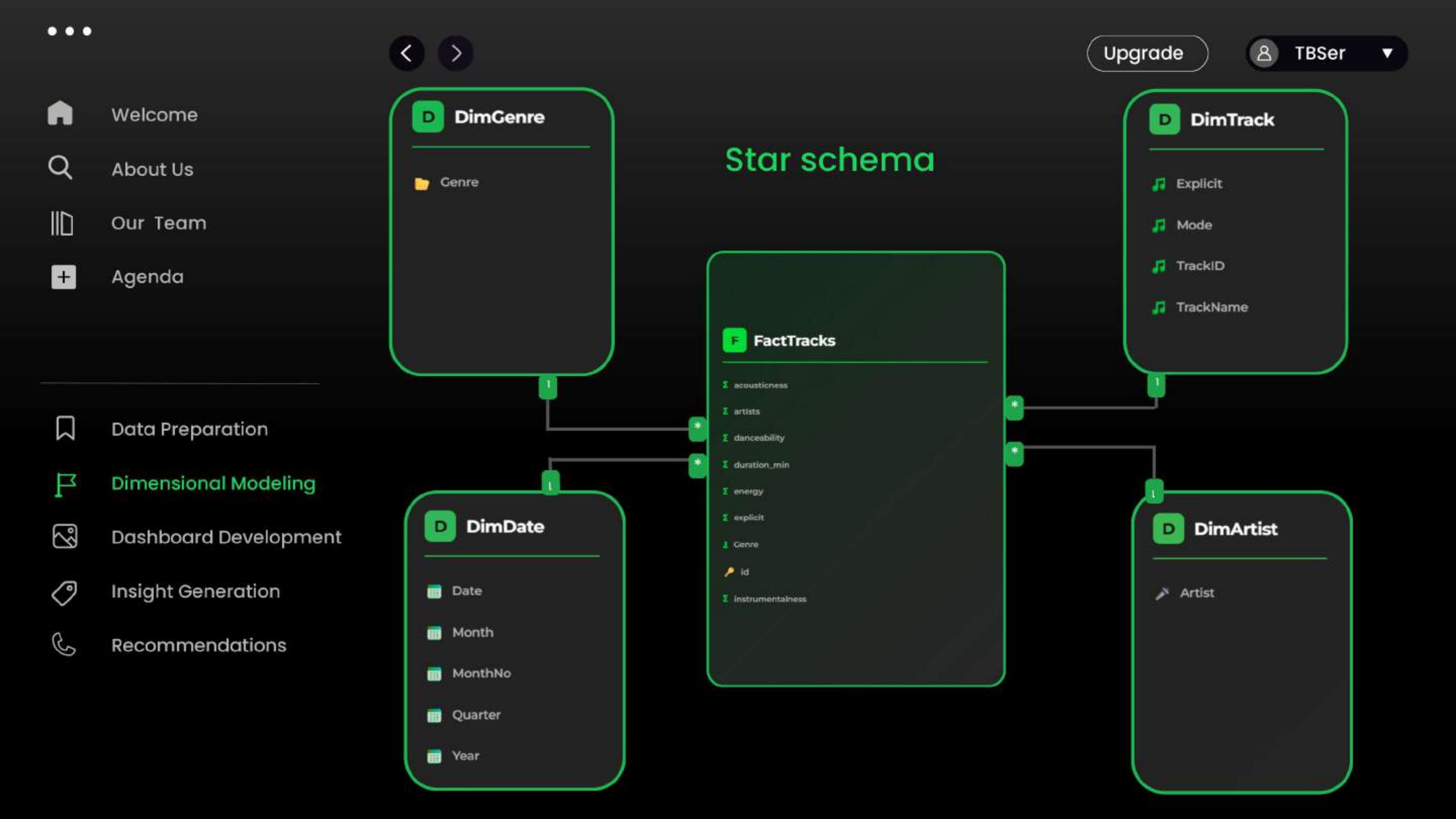
```
df_clean.to_csv('Spotify_data BI.csv', index=False)
```

Dimensional Modeling

A **star schema** dimensional model was implemented. The central fact table, **FactTracks**, stores quantitative measures such as popularity and audio feature values. It is connected to four dimension tables:

- **DimGenre**: genre classification
- **DimArtist**: artist information
- **DimTrack**: track-level metadata
- **DimDate**: time hierarchy (year, quarter, month)

This modeling approach improves query performance, enables flexible slicing and filtering, and aligns with BI best practices.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Star schema
DimGenre
Genre
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FactTracks
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artists
danceability
duration_min
energy
explicit
Genre
id
instrumentalness
DimDate
Date
Month
MonthNo
Quarter
Year
DimArtist
Artist

Dashboard Development

Visual Insights from Our Analysis

Dashboard Highlights

- Executive Summary Dashboard - Overview of tracks, artists, and trends
- Deep Dive Dashboard - Audio features and genre analysis
- Artist Drill-Through Dashboard - Individual performance metrics
- Interactive visualizations with year-over-year comparisons
- Real-time filtering by genre, artist, and time period

Transforming Data into Actionable Insights

A comprehensive Power BI solution featuring three specialized dashboards, powered by custom DAX measures and interactive visualizations to explore 12,000+ tracks from 6,000 artists.

DAX Measures & Calculations

Performance Metrics
- Average Popularity
- Popularity Year-over-Year (YoY)
- Popularity Month-over-Month (MoM)

Audio Feature Metrics
- Average Energy
- Average Danceability
- Average Valence

Content Metrics
- Explicit Content Percentage
- Average Track Duration
- Total Tracks Count
- Number of Artists

Business Value
These measures enable dynamic analysis across time periods, genres, and artists, forming the foundation for actionable insights.

Technical Implementation: All measures are dynamically calculated and respond to filters and slicers, allowing users to explore data from multiple perspectives without pre-aggregation.

Three-Tier Dashboard Architecture

Visual Insights from Our Analysis

Dashboard Highlights

Executive Summary Dashboard - Overview of tracks, artists, and trends

Deep Dive Dashboard - Audio features and genre analysis

Artist Drill-Through Dashboard - Individual performance metrics

Interactive visualizations with year-over-year comparisons

Real-time filtering by genre, artist, and time period

Executive Summary Dashboard

Key Visualizations:

- Strategic Overview Layer
- Total tracks & artist count
- Average track duration

- Genre distribution analysis
- Popularity trend lines
- High-level KPIs for decision-makers

Deep Dive Dashboard

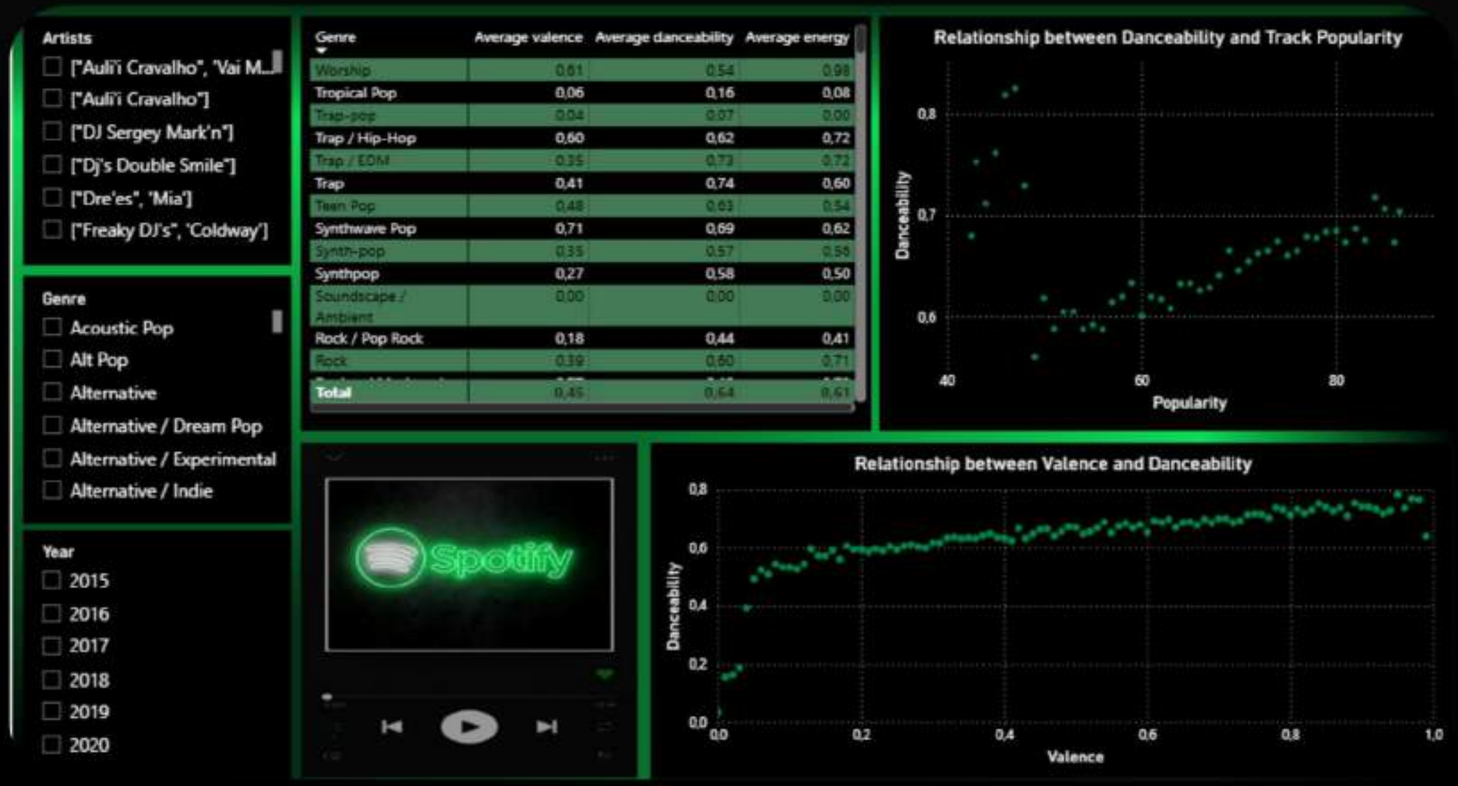
Correlation Analysis

Danceability vs Popularity:

Scatter plot reveals tracks with danceability between 0.6-0.8 achieve higher popularity scores (60-80 range). Sweet spot identified for streaming success.

Valence vs Danceability:

Positive correlation shown - more danceable tracks tend to have higher valence (musical positiveness), indicating upbeat songs resonate better.



Artist-Level Drill-Through Dashboard

Granular Artist Performance Analysis

Drill-Through Functionality:

Users click any artist name in Executive Summary or Deep Dive dashboards to navigate instantly to this detailed view, with all filter contexts preserved for seamless analysis.

Key Insights Generated

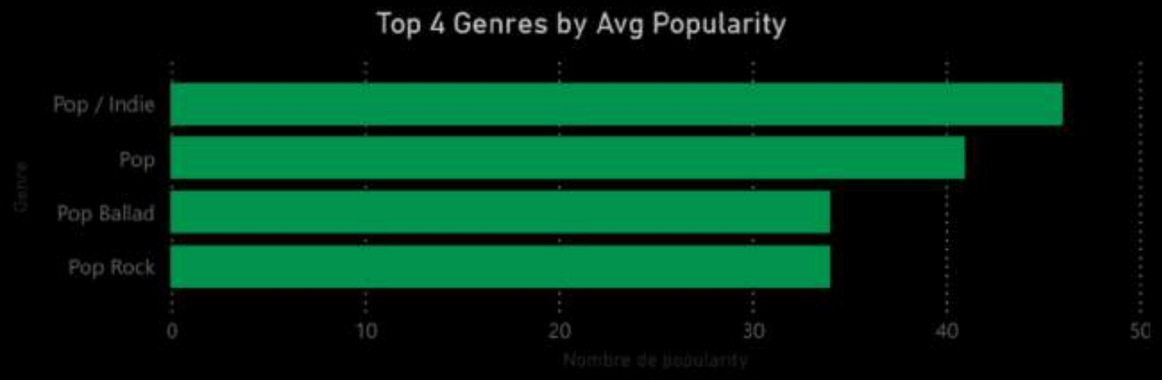
Popularity Trending Upward

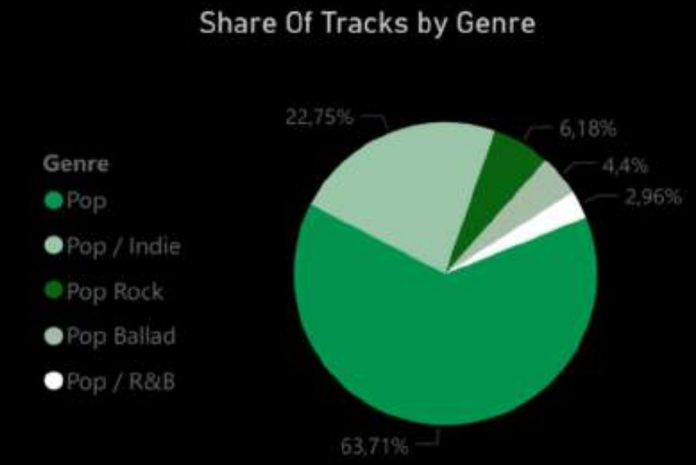
Average popularity increased from ~60 to ~75 (2015-2020), reflecting improved algorithms and production standards.

Key Insights Generated

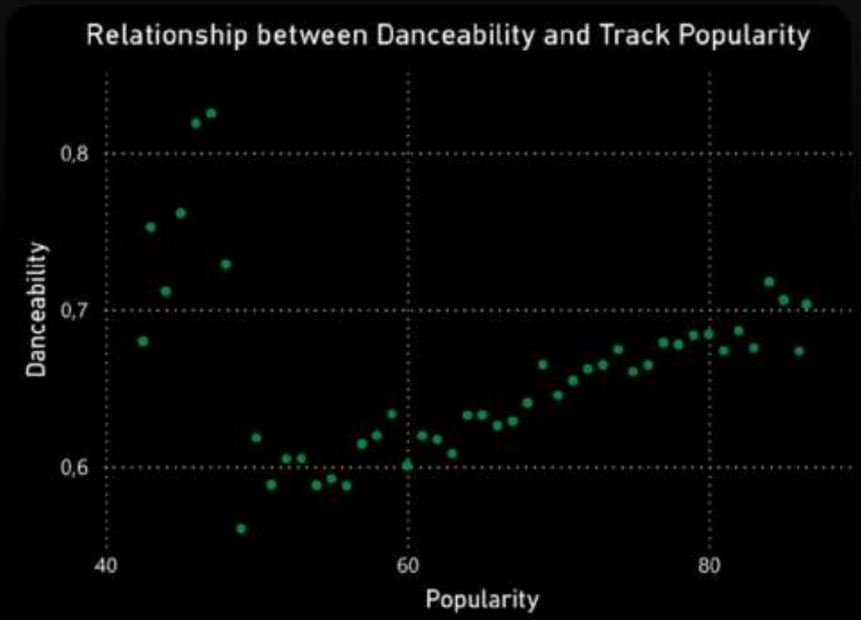
Pop Genres Dominate

Pop-related genres account for 63.7% of tracks with highest average popularity scores.





Key Insights Generated



Danceability Drives Success

Strong positive correlation between danceability (0.6-0.8) and popularity (40-80).

Key Insights Generated

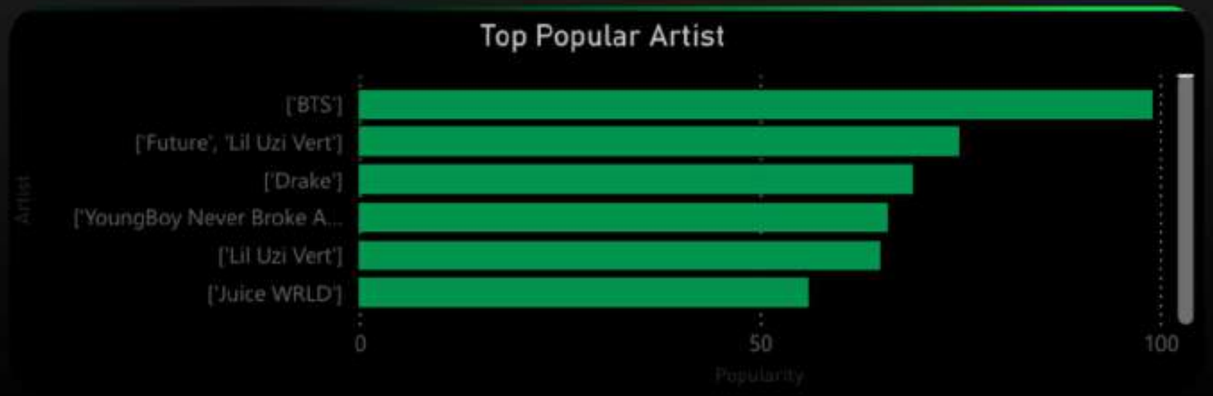
Genre-Specific Audio Profiles

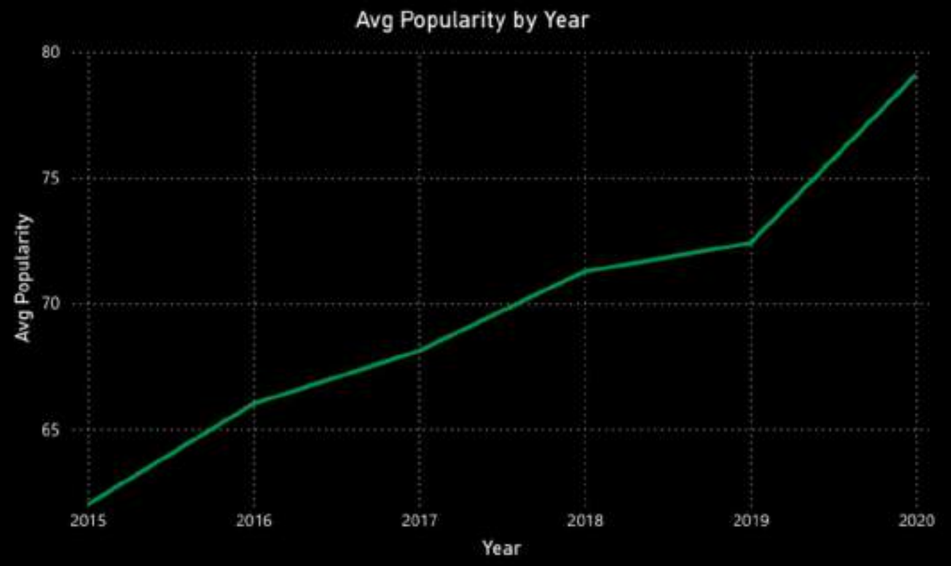
Audio features vary significantly across genres, revealing distinct musical characteristics:

Worship (0.98 energy) vs Tropical Pop (0.08 energy).

Genre	Average valence	Average danceability	Average energy
Worship	0,61	0,54	0,98
Tropical Pop	0,06	0,16	0,08
Trap-pop	0,04	0,07	0,00
Trap / Hip-Hop	0,60	0,62	0,72
Trap / EDM	0,35	0,73	0,72
Trap	0,41	0,74	0,60
Teen Pop	0,48	0,63	0,54
Synthwave Pop	0,71	0,69	0,62
Synth-pop	0,35	0,57	0,56
Synthpop	0,27	0,58	0,50
Soundscape / Ambient	0,00	0,00	0,00
Rock / Pop Rock	0,18	0,44	0,41
Rock	0,39	0,60	0,71
Total	0,45	0,64	0,61

Key Insights Generated





Top Artists Drive Engagement

BTS maintains 70.77 average popularity with consistent performance. Artist brand strength is crucial.

Key Insights Generated

6K	12K	3,46
Number of Artists	Total Tracks	Avg Track Duration (min)

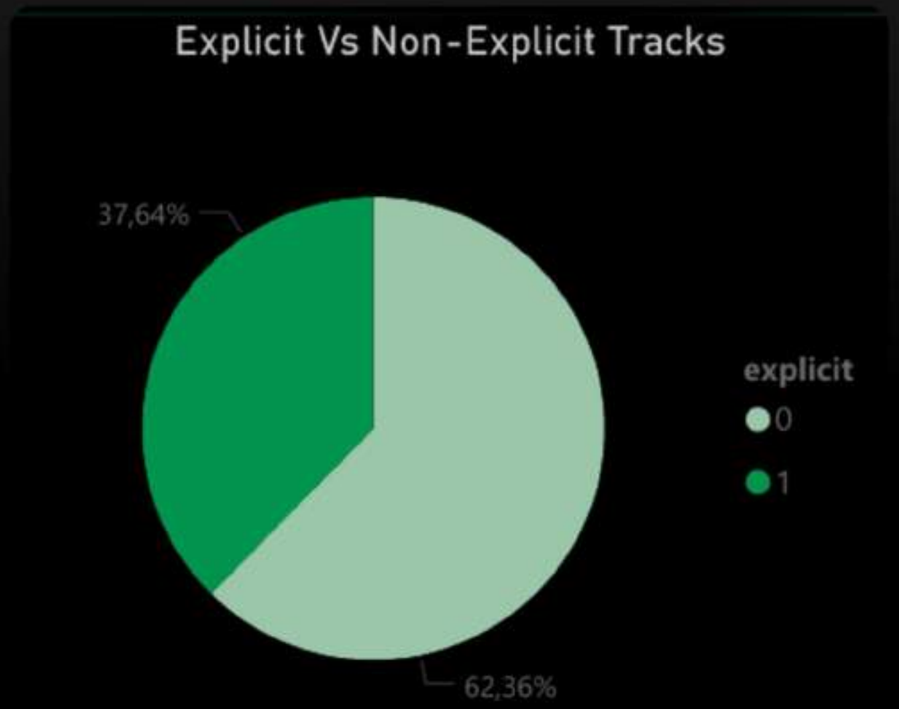
Standardized Track Duration

Average of 3.46 minutes across 12K tracks. Duration is not a differentiating factor.

Key Insights Generated

Explicit Content Balance

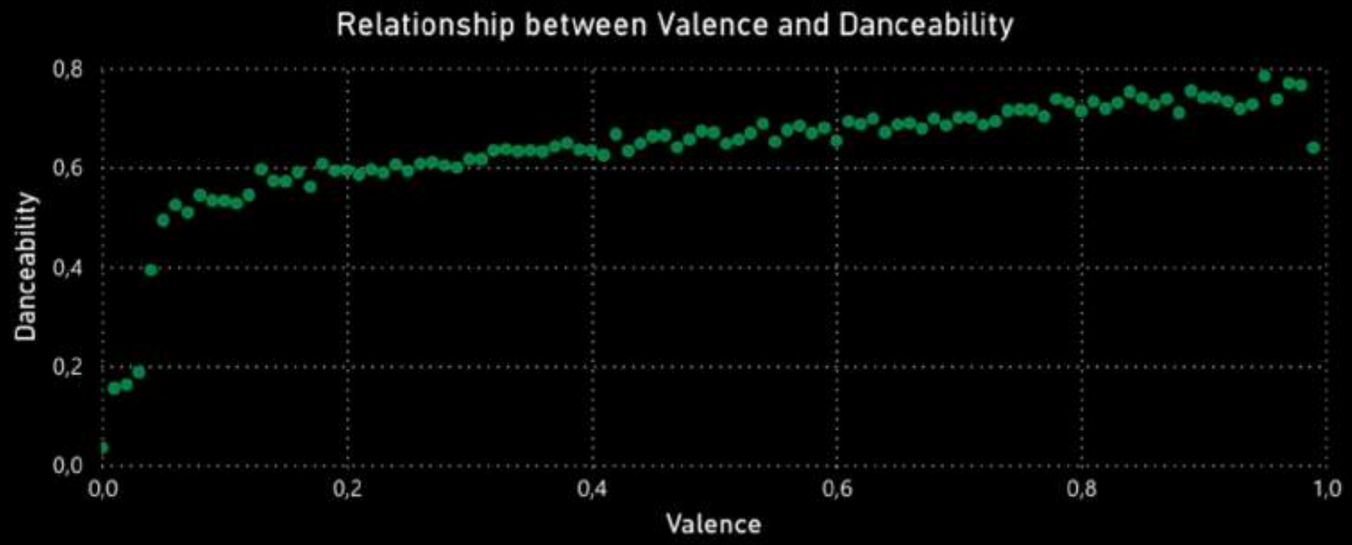
37.64% explicit vs 62.36% clean tracks. Balance needed between freedom and accessibility.



Key Insights Generated

Valence-Danceability Link

Moderate correlation exists. Balanced emotional tones (0.4-0.6 valence) with high danceability perform best.



Recommendations

Strategic Recommendations Playlist

Based on data insights

- Audio-Driven Playlist Design
- Genre-Aware Recommendation Logic
- Early Detection of High-Potential Artists
- Playlist Freshness via Artist Diversity
- Early-Trend Monitoring Dashboards
- Actionable Insights for Artists

Expected Impact

- Higher engagement
- Better personalization
- Long-term growth

Recommendations

Audio-Driven Playlist Design

Apply clear audio thresholds (danceabiliity, energy) for context-based playlists to ensure consistency and higher engagement.

- Workout
- Party
- Focus

Genre-Aware Recommendation Logic

Customize recommendation rules by genre insteaad of using one universal model, making suggestions more relevant and personalized.

- Pop
- Hip-Hop
- EDM

Recommendations

Early Detection of High-Potential Artists

Leverage audio features (energy, danceability, valence) to spot emerging artists with strong popularity potential before they trend.

Emerging Artist

Pop | Hip-Hop | EDM

Playlist Freshness Through Artist Diversity

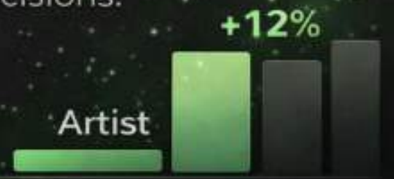
Limit repeated appearances of the same top artists to enhance discovery while maintaining listener engagement.

Top Artists | New Artists

Recommendations

Actionable Insights for Artists

Provide simple, comparative performance metrics against genre averages to support artists' creative and marketing decisions.



Artist vs Genre Avg

Early-Trend Monitoring via Dashboards

Use real-time dashboards combining audio features and popularity trends. to identify and promote rising tracks faster.

Top Artists | New Artists

Thank You