

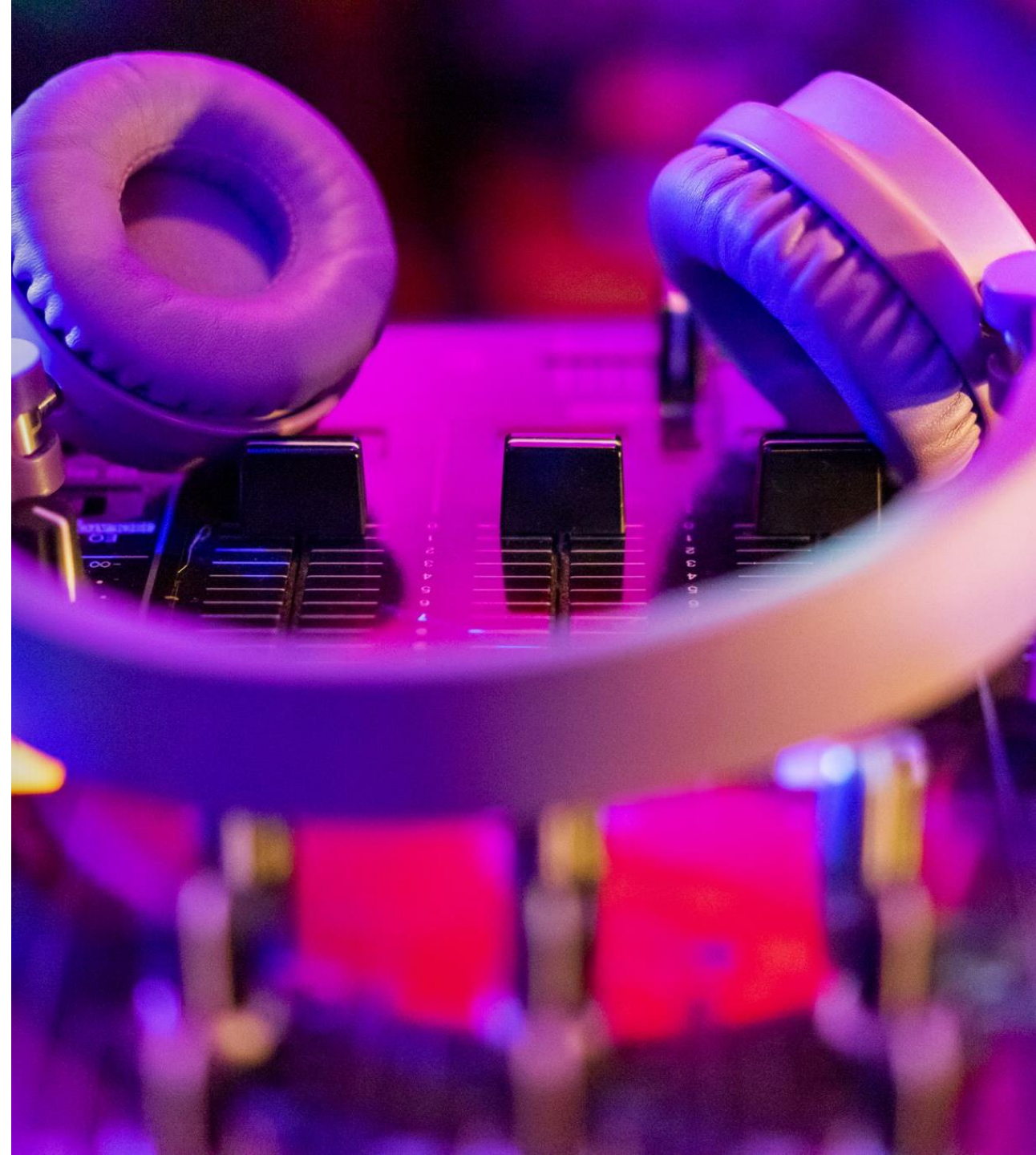


NeuralBeats: A Deep Learning Approach to Music Discovery

Enhancing Personalization and Music Discovery with AI

INTRODUCTION

- In today's fast-evolving music industry, traditional recommendation systems often limit discovery by relying heavily on genre and artist similarity. This creates repetitive playlists and prevents users from exploring diverse music options.
- NeuralBeats aims to disrupt the industry by introducing a cutting-edge, AI-powered music recommendation system that goes beyond conventional methods. By leveraging Machine Learning (ML) and Deep Learning (DL), NeuralBeats will create a context-aware, mood-driven, and user behavior-based recommendation engine.



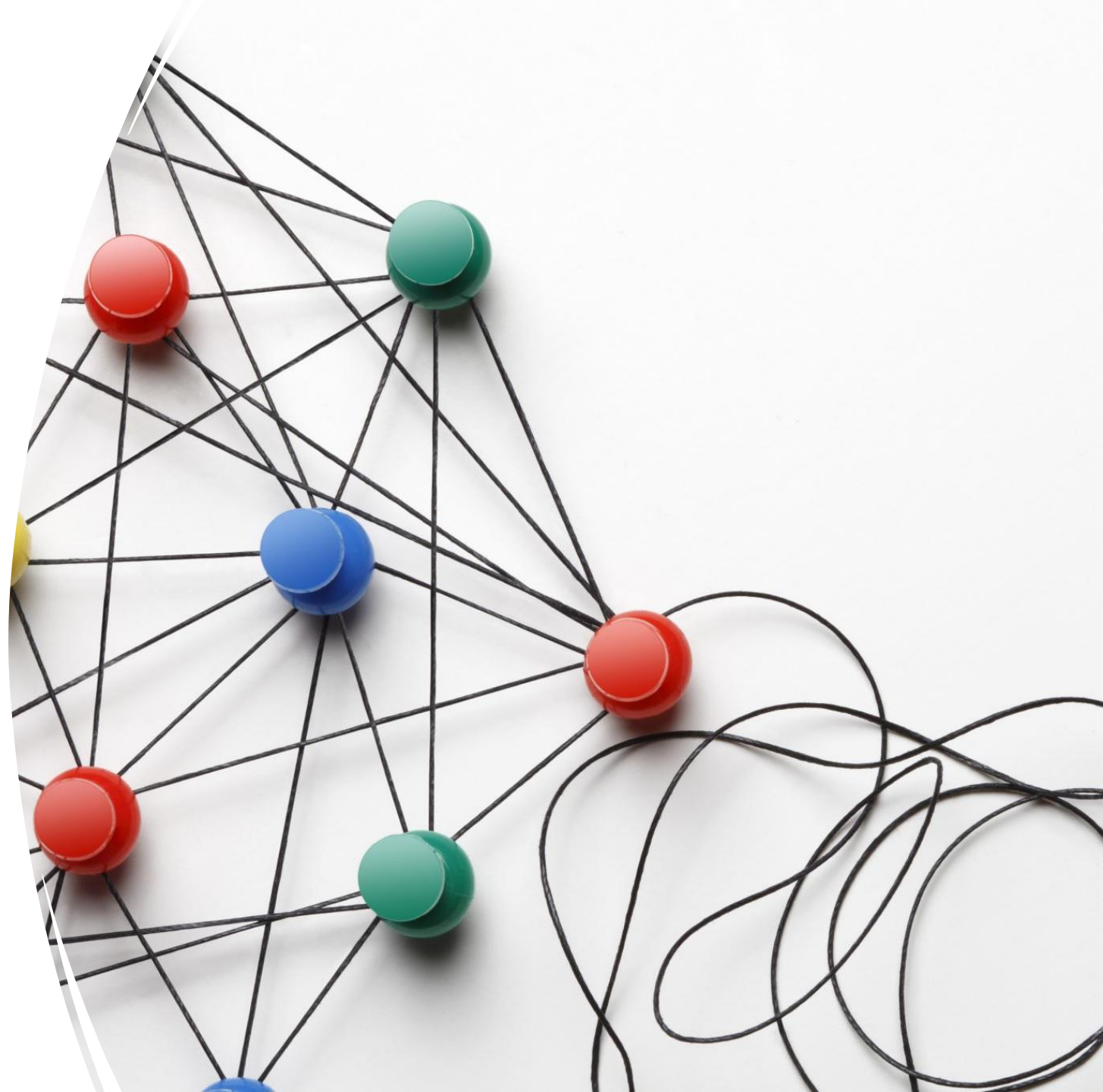
Business Understanding and Problem Statement

The Music Industry Challenge

- Traditional streaming platforms rely on:
 - Genre & Artist Similarity – Limited personalization
 - Historical Listening Patterns – Reinforces “music bubbles”
 - Lack of diversity in recommendations

NeuralBeats: The Game Changer

- AI-powered recommendations – Mood, activity & behavior-based
 - Deep Learning for context-aware music suggestions
 - Enhancing user engagement & discovery





The Problem with Traditional Recommendations

What's Wrong with Current Systems?

- Repetitive Suggestions – Users get the same type of music over and over.
- Limited Exploration – Hard for users to discover new music
- Lack of Context Awareness – No adaptation to mood or activities

NeuralBeats' Solution:

- Move beyond genre & artist-based recommendations.
- Personalized, mood-driven playlists.
- Adaptive AI to ensure fresh & relevant music discovery.

Stakeholders & Their Impact

Listeners

- **Benefit:** Mood-based, engaging music recommendations
Impact: Higher satisfaction, longer engagement, and improved retention

Music Artists & Creators

Benefit: Fairer exposure and better discovery for independent artists

Impact: Helps emerging artists gain visibility & diversifies content

Business & Marketing Teams

- **Benefit:** Personalized platform = Higher user retention & revenue
Impact: Stronger market position, competing with Spotify & Apple Music



Key Business Questions & AI Strategy

- **Personalization & User Experience**

How can NeuralBeats reduce repetitive recommendations & enhance music discovery?

What audio features (e.g., valence, tempo, energy) predict user preferences?

How do mood & context-based recommendations improve engagement?

- **Engagement & Retention**

How can we balance personalization vs. Exploration?

Does context-aware music increase session time & reduce churn?

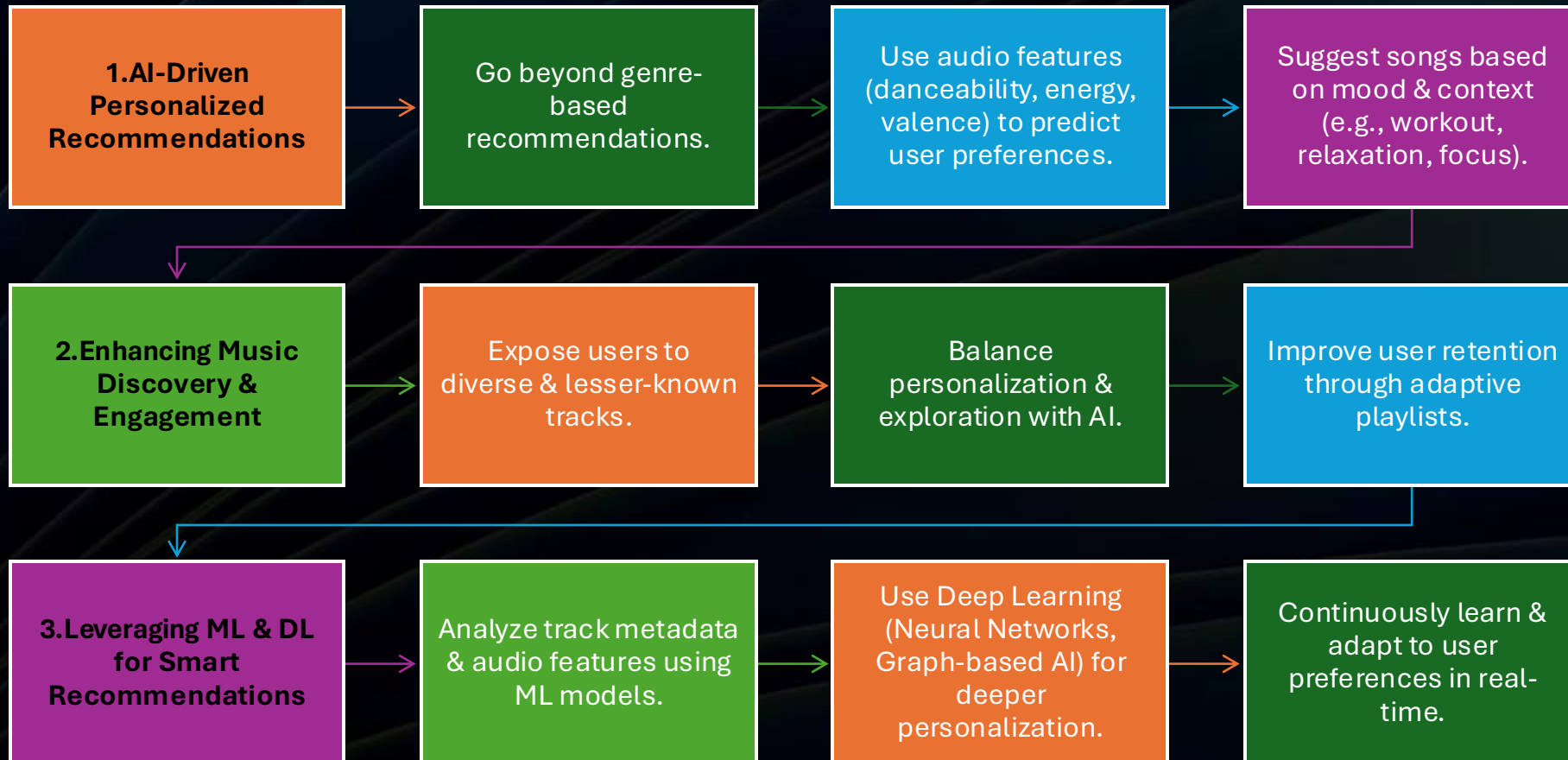
- **AI Strategy & Business Growth**

Which ML/DL models work best for real-time, dynamic recommendations?

How can AI-driven discovery boost subscriptions & premium sign-ups?

Can personalized playlists increase overall music streaming consumption?

Project Objectives



Data Understanding

- **Data Source**

Dataset: Spotify Tracks Dataset (Kaggle)

Format: CSV (Tabular)

Tracks Covered: 125+ genres with metadata & audio features

- **Key Features**

Track Metadata

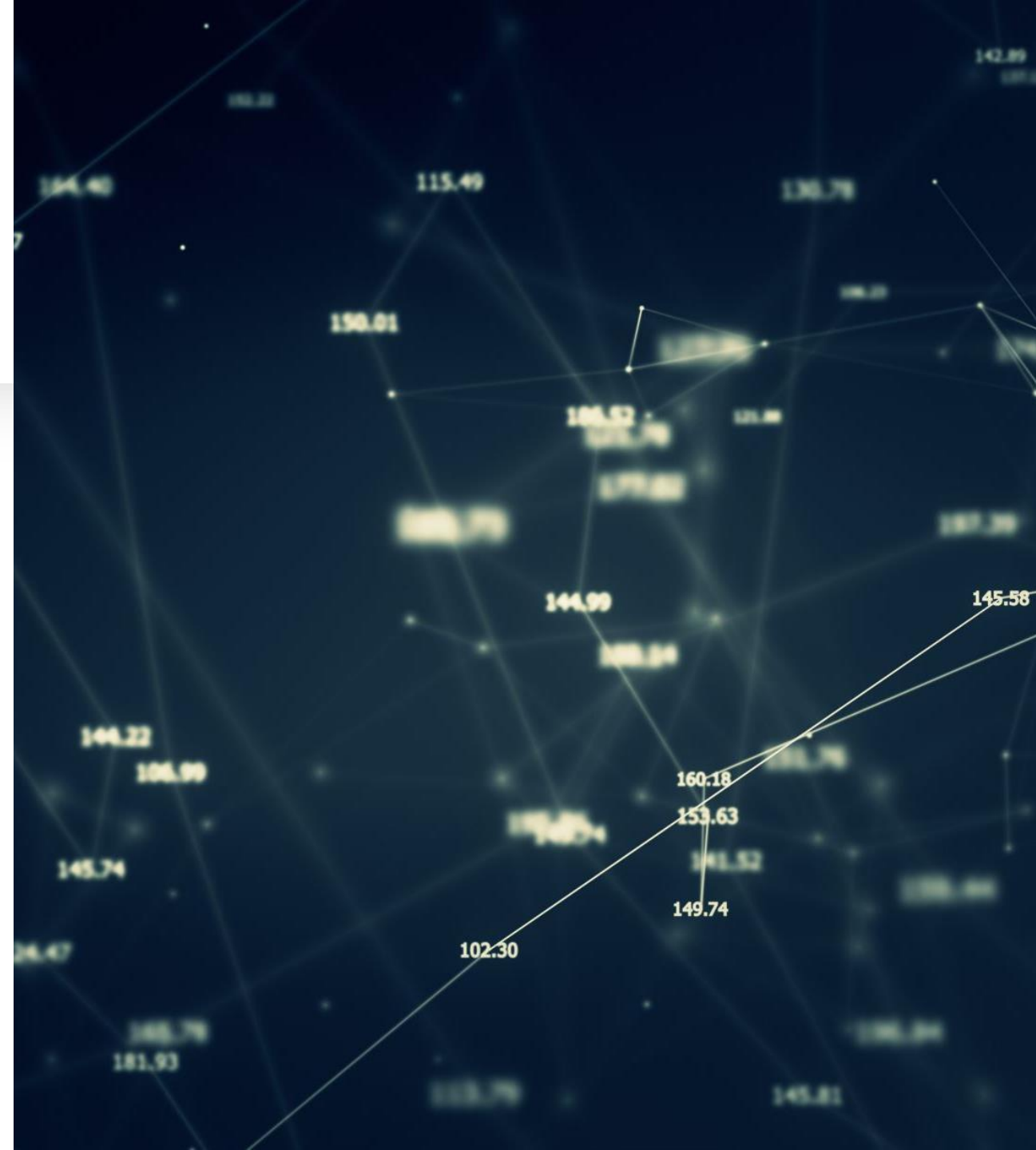
Track Name, Album, Artist(s), Genre, Duration

- **Audio Features**

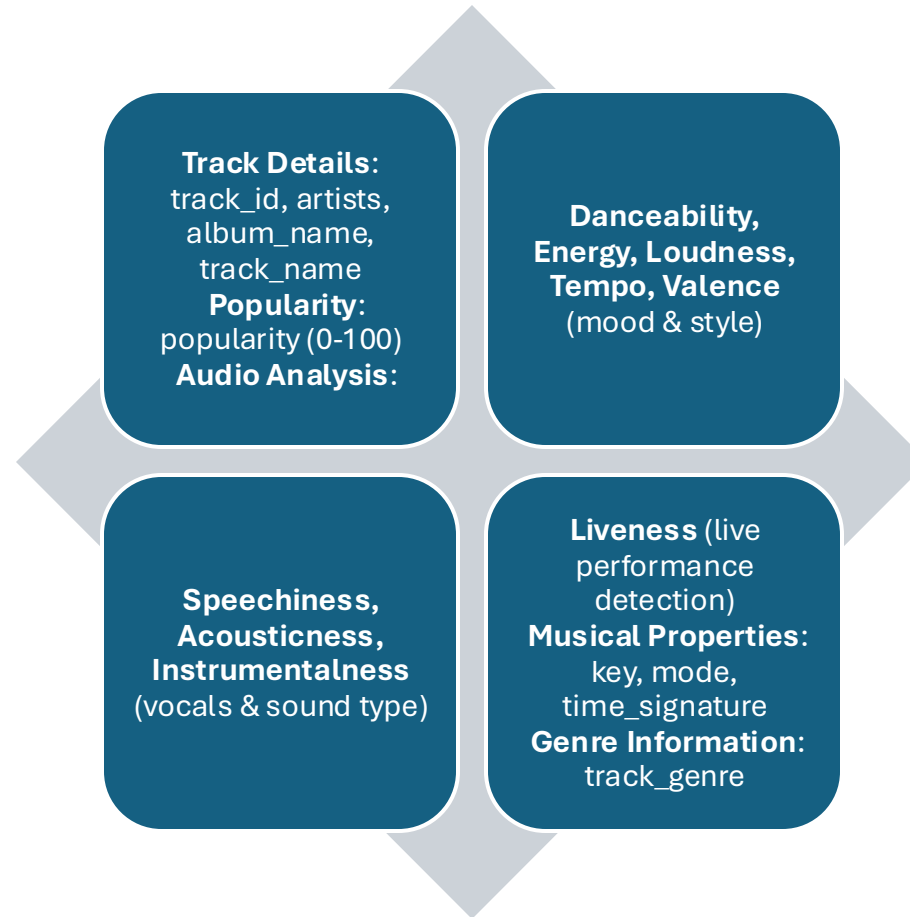
Danceability, Energy, Loudness, Tempo, Valence

- **User Engagement**

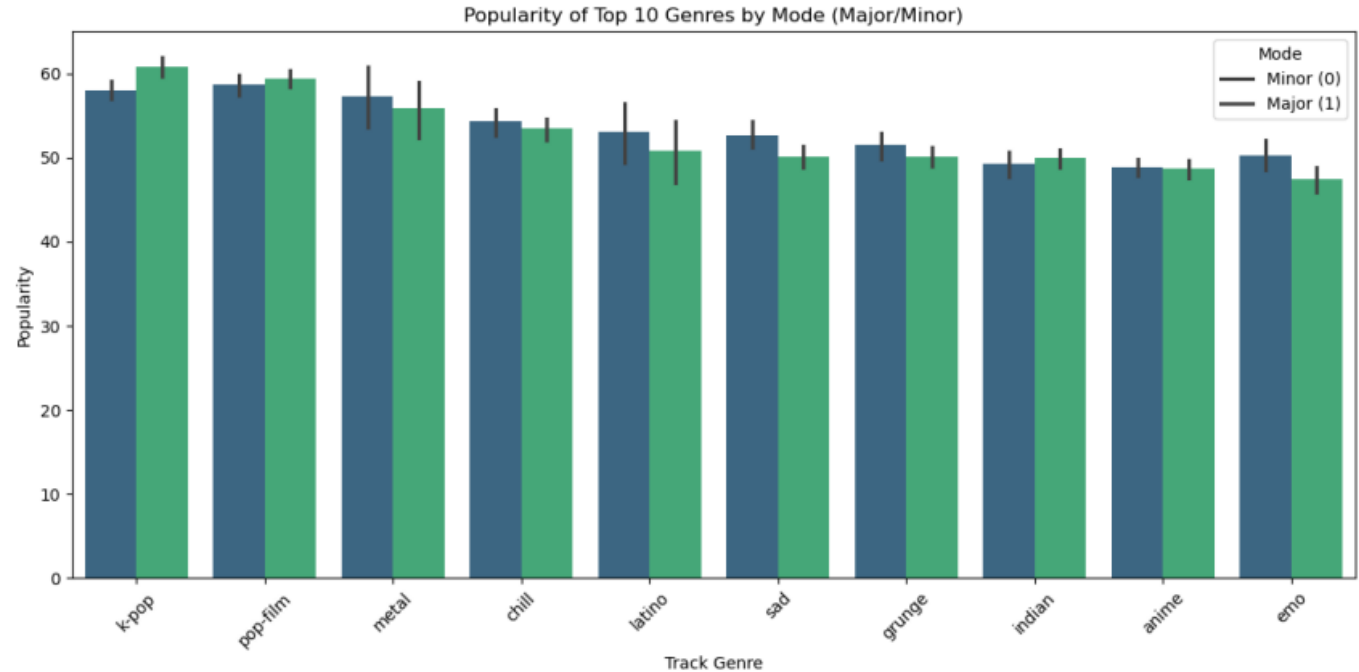
Popularity Score (based on plays & recency)



Feature Breakdown

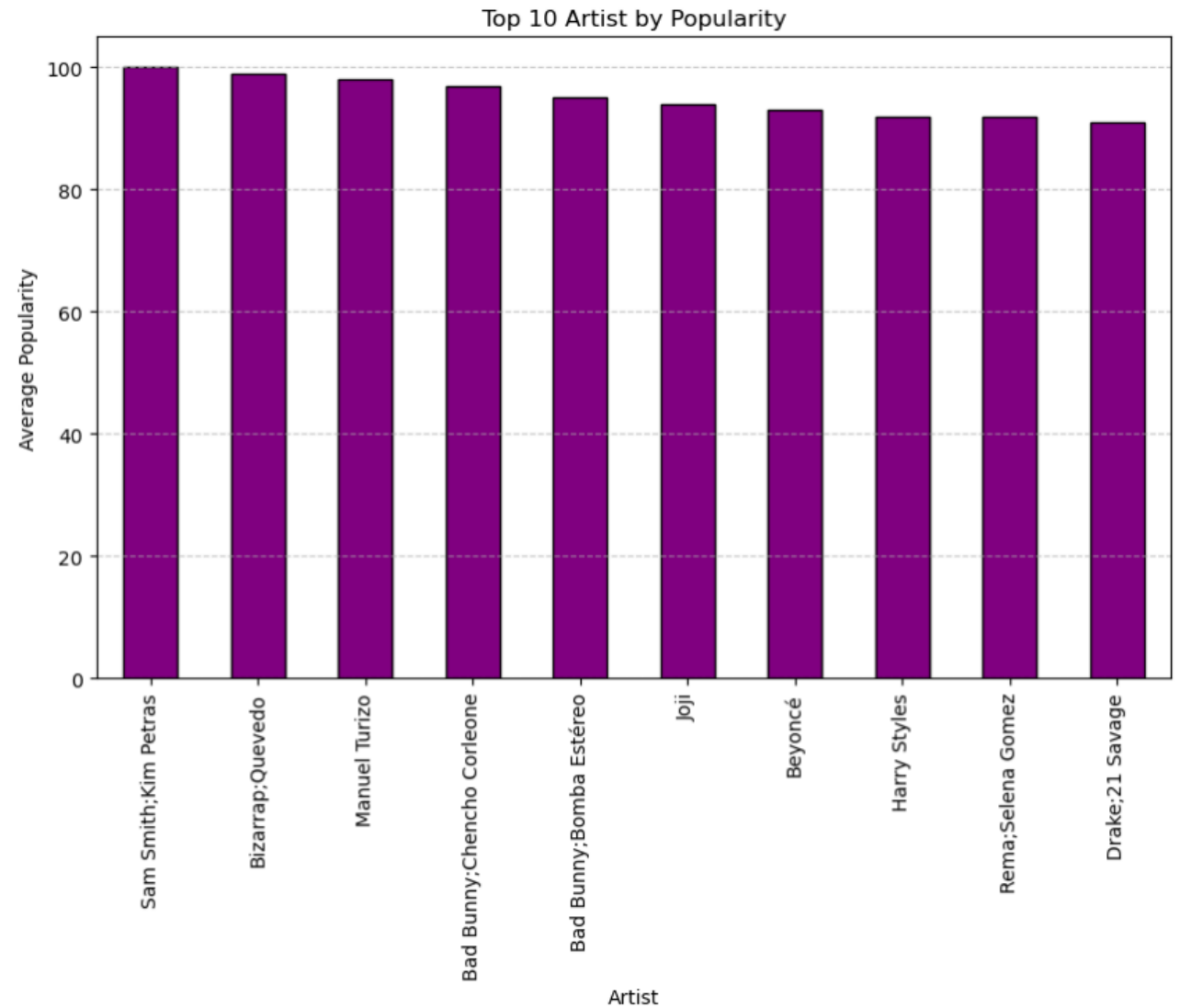


EXPLORATORY DATA ANALYSIS

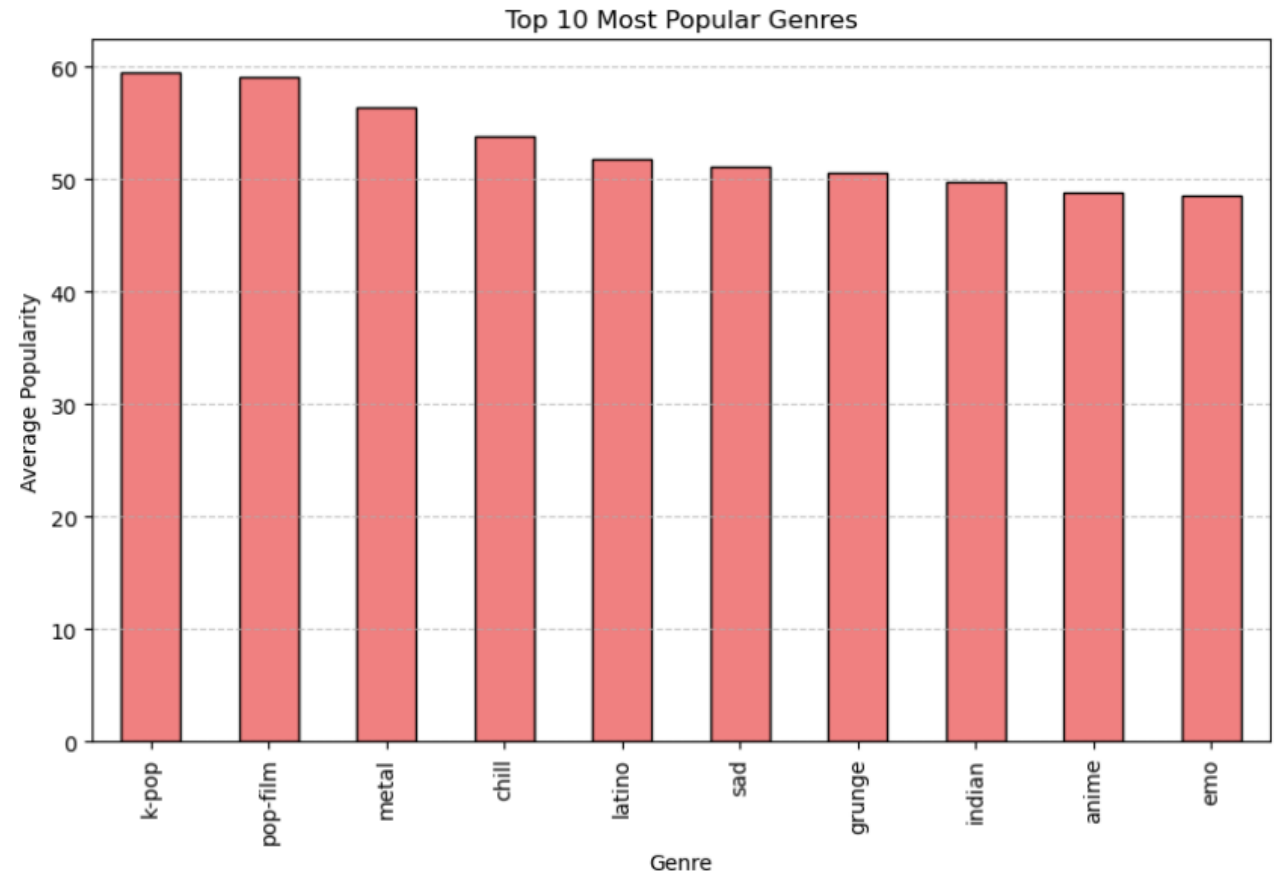


- The dominance of pop genre in major mode suggests a widespread appeal for upbeat
- Genres like blues and jazz maintain a balanced mood representation while indie and electronic have a minor-mode popularity.

- All artists demonstrate very high popularity with scores nearly reaching 100, indicating widespread acclaim.
- Sam Smith/Kim Petras lead the chart with the highest bar, showing their global recognition.



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- Mainstream genres like K-pop dominate popularity charts. Unique genres like Indian and Emo retain niche yet loyal audiences.



Recommendations



✓ Improving Music Discovery The model successfully groups artists with similar audio characteristics, promoting discovery beyond mainstream artists. Users will be introduced to new artists aligned with their listening preferences, increasing engagement.



✓ Scalability & Efficiency The low-dimensional embeddings from the Autoencoder make the system faster and more scalable than traditional similarity-based models. This approach is suitable for large-scale music databases and can be integrated into streaming platforms via an API.



✓ Enhancing Recommendations with Additional Data While the model captures audio-based similarities, incorporating user listening behavior could refine recommendations further. Future improvements could integrate real-time user preferences and social listening patterns.

Conclusion



- In conclusion ;

1. Popularity Trends:

- - Collaborations boost popularity (e.g., Sam Smith & Kim Petras).
- - Certain artists, like Bad Bunny, dominate multiple times.

2. Genre Diversity:

- - Both mainstream and niche genres can achieve high popularity.
- - Emerging artists have the potential to attract large audiences.

3. Music Features:

- - Factors like danceability, energy, and tempo link to genre and popularity.
- - Similar songs are grouped through shared audio features.