

Project Name

Music Recommendation System – Clustering Based Approach

GitHub: https://github.com/Ashish-3007/Music_Recomendation_System-Kmeans_Clustering

Highlights

- Built a **content-based music recommendation system** using **KMeans clustering** on audio features.
- Preprocessed and scaled numerical features like **danceability, energy, tempo, and valence** for accurate clustering.
- Applied the **Elbow Method** to determine optimal clusters and performed cluster-level analysis with **Seaborn visualizations**.
- Implemented a recommendation function to suggest **similar songs** based on feature similarity.

Technology Used

- **Data Source:** CSV (Spotify-like features)
- **Data Processing & Modeling:** Python (Pandas, NumPy, Scikit-learn)
- **Clustering Algorithm:** KMeans (Unsupervised Learning)
- **Visualization:** Matplotlib, Seaborn
- **Recommendation Logic:** Cluster-based similarity retrieval

Conclusion

The Music Recommendation System successfully groups songs into clusters that reflect similar moods, energy levels, and acoustic features. It enables efficient music discovery by suggesting tracks with comparable audio profiles, offering a scalable foundation for personalized recommendations.

Future Scope

- **Cosine Similarity Ranking:** Replace random cluster sampling with nearest-neighbour similarity for more precise results.
- **NLP Integration:** Incorporate **lyrics embeddings** and **genre tags** for richer recommendations.
- **User Personalization:** Build listener profiles for adaptive, personalized playlists.
- **API Integration:** Connect with **Spotify API** for real-time recommendations and metadata expansion.

Overall Summary

This project demonstrates the use of **unsupervised machine learning** for real-world recommendation problems. By applying clustering and feature scaling, it provides a data-driven approach to understanding music similarity. It highlights skills in **data preprocessing, clustering analysis, and recommender system design** with Python.

Articulation of Learning

Through this project, I strengthened my understanding of **feature engineering, clustering algorithms, and recommendation logic**. I learned to interpret and visualize cluster behavior while implementing a functional recommender system. This experience enhanced my ability to **translate raw data into applied machine learning solutions**.