Easy Path Pipeline

Easy Path: Basic Collaborative Filtering + Simple Metadata Features

1. Data Input & Preprocessing:
- Load user interaction data with track metadata including artist, genre, and basic audio features (Mean, Tempo, Danceability).
- Encode categorical metadata (artist, genre) using one-hot or label encoding.
- Normalize numerical features (Mean, Tempo, Danceability) using Min-Max scaling or StandardScaler.
- Prepare user-item interaction matrix (implicit feedback or ratings).

2. Feature Engineering:
- Construct feature vectors combining user preferences and track metadata features.
- Optionally incorporate vocal and non-vocal audio statistics separately.
- Aggregate user listening history to represent preferences.

3. Model Selection & Training:
- Split dataset using Train-Test Split.
- Train simple recommendation models such as K-Nearest Neighbors or Logistic Regression to predict user preferences.
- Use collaborative filtering based on nearest neighbors.

4. Model Evaluation:
- Evaluate using Accuracy, Precision@K, and Recall@K.
- Analyze recommendation relevance by comparing recommended tracks against user history.
- Perform offline validation on held-out test set.

Handling Vocal/Audio Tracks:
- If vocal and audio tracks are available, include vocal track features as primary inputs.
- Optionally append non-vocal track statistics for enhanced feature vectors.
- Process vocal and audio features separately before integration.

ML Techniques Used:
- Logistic Regression
- K-Nearest Neighbors (KNN)
- Train-Test Split
- Accuracy, Precision, Recall metrics
- One-hot Encoding / Label Encoding
- Feature Normalization (Min-Max Scaling, StandardScaler)