### Proof of Concept (POC) for a Music Recommendation Engine

Target Audience: Indian users interested in Yoga, Relaxation, and Devotional Songs

### Business Objective:

The goal of this POC (Proof of Concept) is to develop a music recommendation system for a Yoga, Relaxation, and Devotional Songs application. Since the client does not have an existing user base, we will collect and analyze music data to build an effective recommendation model. This POC will demonstrate the value and impact of personalized music recommendations for the client’s app.

### Key Objectives & Approach:

1. Data Collection & Preprocessing
   * Use the dataset containing the following attributes:
     + track\_id, artists, album\_name, track\_name, popularity, duration\_ms, explicit, danceability, energy, key, loudness, mode, speechiness, acousticness, instrumentalness, liveness, valence, tempo, time\_signature, track\_genre.
   * Filter data to focus on Yoga, Relaxation, and Devotional Songs.
   * Convert numerical attributes like tempo, loudness, energy, and valence into meaningful features for analysis.
   * Normalize data and handle missing values.
2. Exploratory Data Analysis (EDA)
   * Analyze popularity trends based on track\_genre.
   * Identify characteristics of relaxing and devotional music (e.g., high acousticness, low energy, moderate tempo).
   * Segment music based on mood, tempo, and acousticness.
3. Building the Recommendation System
   * Content-Based Filtering:
     + Recommend songs based on similarity in acoustic features (danceability, tempo, energy, valence, etc.).
     + Use cosine similarity or nearest neighbors (KNN) to find similar songs.
   * Collaborative Filtering (if user data becomes available in the future):
     + Recommend songs based on user listening behavior.
   * Hybrid Model:
     + Combine content-based filtering with popularity-based recommendations to improve user experience.
4. Model Evaluation & Optimization
   * Evaluate recommendation quality using Precision@K, Recall@K, and Mean Average Precision (MAP).
   * Fine-tune the model for better relevance and diversity in recommendations.
5. Deployment & POC Demonstration
   * Deploy the best-performing recommendation model using Flask, Streamlit, or RShiny.
   * Provide a simple interactive UI where users can input a song or preference to receive recommendations.
   * Showcase the effectiveness of the recommendation engine in real-time.

### Acceptance Criteria:

✔ The model should generate relevant and high-quality music recommendations.  
✔ The POC should include an interactive deployment for client demonstration.  
✔ The system should successfully analyze and recommend Yoga, Relaxation, and Devotional songs based on track attributes.

By implementing this POC, the project will validate the potential benefits of a personalized music recommendation engine and support future full-scale development for the client’s app. 🎶📲🚀