# **Artificial Intelligence and Machine Learning (AIML) – Project**

**Names: Sec: 5**

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**Problem Statement: Echo Tunes: A Machine Learning-Based Music Recommendation System**

**"Echo Tunes: A Machine Learning-Based Music Recommendation System"**

Abstract:

Echo Tunes is a music library project that leverages machine learning algorithms to recommend songs based on a user's current listening preferences. By analysing the audio features of the user's current song, Echo Tunes generates a personalized playlist of songs that share similar characteristics, such as genre, mood, tempo, and instrumentation.

**Dataset:**

1. Title: Music Library Dataset

**Algorithm:**

Step 1: Data Preparation: Extract relevant features from the music library dataset, including song metadata, audio features (e.g., spectral features, tempo, etc.), and user listening history.

**Step 2**: Feature Extraction: Compute crucial features from the extracted data:

a) Auditory features: Extract features such as spectral features, tempo, and rhythm.

b) Content-based filtering: Analyse song metadata (e.g., genre, artist, etc.) and user . listening history.

c) User behaviour patterns: Identify patterns in user listening behaviour (e.g., playlists, . . . . favourite. artists, etc.).

**Step 3**: Models For Predicting Recommendations: Train machine learning models using the extracted attributes:

a) Random Forests, Support Vector Machines (SVM), or Deep Learning Models (like Recurrent Neural Networks or Convolutional Neural Networks).

b) Train models using labelled data from the music library dataset to predict song recommendations for each user.

**Step 4**: Threshold determination: Define a threshold above which recommended songs are deemed suitable for a user's current listening preferences.

**Step 5**: Visualization and Interpretation: Visualize the recommended playlist and analyze the relationships between recommended songs and user listening history.

**Step 6**: Biological Implications: Use recommendation predictions to analyze user listening behaviour and identify trends in music preferences.

**Step 7:** Validation and Experimental Confirmation: Validate predictions using user feedback and experimental testing (e.g., A/B testing).

**Step 8:** Application in Music Recommendation Systems: Use predicted recommendations to improve music recommendation systems and enhance user experience.

**Step 9**: Iterative Refinement: Continuously update and refine the algorithm based on new data and insights.

**Expected Outcome:**

Our goal is to develop a machine learning-based music recommendation system that accurately predicts songs based on a user's current listening preferences. By analysing audio features, content-based filtering, and user behaviour patterns, we aim to create personalized playlists that cater to individual tastes. The expected outcome will be a robust music recommendation system that enhances user experience and fosters music discovery.