## Artificial Intelligence

## and

## Machine Learning

Project Abstract

Semester-IV (Batch-2022)

Music Recommendation System using ML

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Description automatically generated with low confidence

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**Title:** A Comprehensive Music Recommendation System: Integrating Collaborative Filtering and Content-Based Approaches

**Introduction:** The rapid growth of digital music consumption has necessitated the development of advanced recommendation systems to assist users in discovering new and relevant music. This paper presents a comprehensive music recommendation system that seamlessly integrates collaborative filtering and content-based approaches. By combining these two methods, our system aims to overcome the limitations of individual techniques, providing users with more accurate and diverse music recommendations.

**Collaborative Filtering:** The collaborative filtering component of our system relies on user behavior data to establish connections between users with similar preferences. We employ both user-based and item-based collaborative filtering algorithms to enhance recommendation accuracy. Through the analysis of user listening histories, ratings, and preferences, our system identifies patterns and similarities among users, enabling the generation of personalized music recommendations. To address the cold start problem, where new users lack sufficient data, we incorporate hybrid collaborative filtering techniques that integrate content-based features.

**Content-Based Approach:** The content-based recommendation component focuses on extracting and analyzing intrinsic features of music items, such as genre, tempo, and mood. We employ advanced audio analysis techniques, including signal processing and machine learning, to extract meaningful features from audio tracks. By integrating this information with user preferences, the content-based approach enriches the recommendation process. Additionally, we leverage natural language processing to analyze metadata, user reviews, and artist information, providing a more holistic understanding of music items.

**Integration and Fusion:** The strength of our recommendation system lies in the seamless integration of collaborative filtering and content-based approaches. We propose a novel fusion technique that combines the strengths of both methods to generate more accurate and diverse recommendations. The integration process involves creating a hybrid user-item matrix that incorporates collaborative filtering and content-based similarity scores. Through advanced weighting and normalization techniques, our system optimally combines the strengths of each approach, ensuring a balanced and personalized recommendation experience.

**Evaluation and Results:** We evaluate the performance of our recommendation system using standard metrics such as precision, recall, and F1-score. The results demonstrate a significant improvement in recommendation accuracy compared to individual collaborative filtering or content-based systems. User feedback and satisfaction surveys further validate the effectiveness of our approach in providing relevant and enjoyable music recommendations.

**Conclusion:** This paper presents a novel and comprehensive music recommendation system that leverages the strengths of collaborative filtering and content-based approaches. The integrated system addresses the limitations of individual techniques, offering users more accurate and diverse music recommendations. Through rigorous evaluation and positive user feedback, we affirm the effectiveness of our approach in enhancing the overall music discovery experience. Future work will focus on incorporating real-time user feedback, exploring hybrid deep learning models, and adapting to evolving music consumption patterns.