# Fitness Analytics through Data Mining: Leveraging Wearable Device Data and Mock Datasets

## Introduction

The growing availability of fitness data from wearable devices presents a valuable opportunity to analyze user behavior and develop personalized fitness plans. Data mining techniques are powerful tools for uncovering patterns and relationships within this data, enabling insights that can inform tailored health and fitness recommendations. This project explores data mining methods to analyze basic fitness metrics and identify trends that contribute to personalized fitness planning.

## Research Questions

This study addresses the following research questions:

1. What patterns can be identified in user fitness metrics, such as step counts, heart rate, and sleep duration?

2. How do these patterns reflect user behavior and activity levels?

3. How can the insights gained be utilized to create effective, personalized fitness plans?

## Datasets

The analysis will utilize datasets collected from wearable devices and fitness data, specifically publicly available data on Kaggle: https://www.kaggle.com/datasets/singhakash/fitbit-dataset. These datasets include structured and time-series data such as daily activity levels, resting heart rates, and sleep patterns, along with user demographics and fitness goals. If the Kaggle data does not fully meet my analysis requirements, I will use mock data generated using ChatGPT.

## Proposed Approach

Data mining techniques, including clustering to segment users based on activity patterns, association rule mining to uncover relationships between fitness behaviors, and anomaly detection to identify irregularities in user data, will be applied. These methods will provide actionable insights into user habits and preferences.

## Conclusion

This project aims to leverage data mining to identify meaningful patterns in fitness data, enabling the development of data-driven, personalized fitness plans. The results are expected to improve user engagement and promote healthier lifestyles through targeted fitness recommendations.