FUSION PIONEERS

DATA REPORT

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Project overview

Healthcare is vital for individuals and society, as it promotes well-being, prevents diseases,promoting health equity and many more.
This project is crucial for creating healthier societies and fostering a culture of proactive health management.

Business Understanding

In today's thriving fitness and wellness industry, the development of a recommender system for exercise intensity presents valuable business opportunities. Fitness centers, gyms, and personal trainers can leverage this system to offer tailored workout programs that align with individual goals, preferences, and fitness levels, ultimately attracting and retaining members. Wellness apps and platforms can integrate the recommender system to deliver personalized exercise recommendations, enhancing the user experience and setting them apart from competitors. Healthcare providers can utilize the system to promote physical activity as a means of disease prevention and management, while corporate wellness programs can leverage it to support employee well-being and productivity. By incorporating an exercise intensity recommender system, businesses can optimize workout effectiveness, increase customer satisfaction, and differentiate their offerings in a competitive market.

Stakeholders: Healthcare providers, personal trainers,fitness centers

Challenges

- Subjectivity: Exercise intensity can be subjective and vary from person to person. Factors such as fitness level, age, health conditions, and individual preferences can influence how individuals perceive and experience exercise intensity.
- Individual Variability: Even with standardized measures, individuals may respond differently to exercise intensity. What may be considered a moderate intensity for one person could be high intensity for another, depending on their fitness level and physiological factors.
- Objective Measurement: Accurately measuring exercise intensity can be challenging. While heart rate and perceived exertion scales are commonly used, they have limitations. Heart rate can be influenced by various factors other than exercise intensity, and perceived exertion is subjective and may not always align with physiological responses.
- Lack of Awareness and Education: Many individuals may not have a clear understanding of exercise intensity or the knowledge to self-assess and monitor their intensity levels. This can lead to either underestimating or overestimating their exercise intensity, which may impact the effectiveness and safety of their workouts.
- Lack of Accessible Monitoring Tools: Monitoring exercise intensity in real-time can be challenging for some individuals. Not everyone has access to wearable devices or heart rate monitors that can provide accurate and immediate feedback on exercise intensity.

Problem statement

Develop a recommendetion system for exercise intensity that provides personalized recommendations on appropriate workout intensities based on individual characteristics, including age, gender, BMI, exercise duration, heart rate, calories burned, weather conditions, and desired weight goals. The goal is to guide individuals in selecting exercise intensities that optimize their fitness outcomes, taking into account their specific attributes and preferences.

Objectives

Overall Objective: Develop a Recommender System for Personalized Exercise Intensity

1. To personalize exercise intensity recommendations. Build a recommendation system based on individual characteristics such as age, gender, body mass index (BMI), exercise duration, heart rate, calories burned, weather conditions, and desired weight goals.
2. Develop a model that can predict the optimal exercise intensity for a given individual.
3. Identify the factors that contribute to optimal exercise intensity.
4. To develop a recommender system that can dynamically adjust exercise intensity recommendations based on changing weather conditions. The system should consider the impact of different weather conditions on workout performance and suggest appropriate exercise intensities accordingly.

Metrics of Success

The exercise intensity recommendation model aims to achieve a low RMSE value, preferably below 2.86, indicating a high level of accuracy in predicting optimal exercise intensities for individuals. By minimizing the RMSE, the model strives to provide personalized exercise intensity recommendations that closely align with the true optimal intensities, enhancing the effectiveness and relevance of the recommendations for users. Regular monitoring and evaluation will be conducted to ensure that the RMSE remains within the target range, indicating the model's ability to generate accurate and reliable exercise intensity guidance.

Data Understanding

The exercise_dataset.csv file was used as the primary data source for this project. The dataset contains information on exercise-related factors such as calories burned, heart rate, duration, BMI, age, gender, weather conditions, and weight goals. The dataset was explored to understand its structure, variables, and data types. Summary statistics, data visualizations, and correlation analysis were performed to gain insights into the relationships between variables and identify any missing values or data quality issues.

Data Preparation

During the data preparation phase, several steps were taken to ensure the dataset's suitability for modeling. This involved handling missing values through imputation or deletion, addressing outliers, standardizing or normalizing numerical variables, and encoding categorical variables. Feature engineering techniques were applied to extract additional meaningful features, such as body mass index (BMI) from weight and height variables. The dataset was split into training and testing sets to facilitate model development and evaluation.

Modeling

Various machine learning algorithms were employed to develop the exercise intensity recommendation model. Regression algorithms, such as Random Forest Regressor, XGBoost,Logistic regression were trained on the training dataset using appropriate techniques. The model was tuned by adjusting hyperparameters to improve its performance. Cross-validation techniques, such as k-fold cross-validation, were used to assess the model's generalization ability and reduce overfitting. The model with the lowest RMSE (Root Mean Squared Error) was selected as the final model for deployment.

Evaluation

The selected model was Random Forest which was evaluated using performance metrics such as RMSE.. The model's predictions were compared against the actual exercise intensities in the testing dataset. The RMSE values were calculated to measure the average magnitude of prediction errors.

Deployment

The final model was deployed in the intended business contexts, such as fitness centers, wellness apps, healthcare providers, or corporate wellness programs. User interfaces was performed to provide personalized exercise intensity recommendations based on individual characteristics. The project was documented, including the steps taken, findings, recommendations, and any relevant code or technical details.