

AI Product Service Prototype Development and Business/Financial Modelling.

HEALTH AND FITNESS AI APP

-AI-driven fitness, your way: Unleash the power of personalized routines for a journey that's uniquely yours.

Submitted by

Preathi J.S

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Code Implementation

Link: [GitHub](#)

Abstract

AI helps it to make it 100x times better. When you ask anything to the trainer, they may respond after a while, sometimes even longer but with AI being infused, responses will be provided in a fraction of a second. The fitness market is lacking this facility & there was a lack of accountability or a wall between a coach/trainer and the client. Thus, AI can help erase this barrier efficiently.

Here I am introducing the Health and Fitness AI app using Machine Learning. The AI Fitness App is an innovative wellness platform designed to revolutionize personal health and fitness journeys through advanced technologies and machine learning techniques. Users input comprehensive data including personal information, medication history, biometric data, nutritional details, and wearable device metrics, enabling the app to perform a holistic health analysis. Leveraging machine learning algorithms. The key feature of the app is its capability to recommend nearby fitness centers based on user location and health goals. Upon successful enrollment in a recommended fitness center, the app earns a commission of 20%, establishing a unique monetization model that aligns business growth with user fitness outcomes.

Prototype Selection

a. Feasibility

Artificial Intelligence has created a buzz across all major industry sectors. Talking about the fitness sector, AI can give intelligent solutions to wellness and fitness-related issues. Many gyms and fitness clubs want to leverage the benefits of AI app development and attract more people. This trend has opened the doors of new opportunities for AI in a thriving global fitness technology market, which is expected to reach \$62.1 billion by the year 2025.

The AI Health and Fitness App demonstrates high feasibility for short-term development (2-3 years). The current technological landscape supports the integration of artificial intelligence and machine learning into health and fitness applications. The availability of wearable devices, advanced algorithms, and widespread connectivity contributes to the feasibility of creating a sophisticated health and fitness platform.

b. Viability

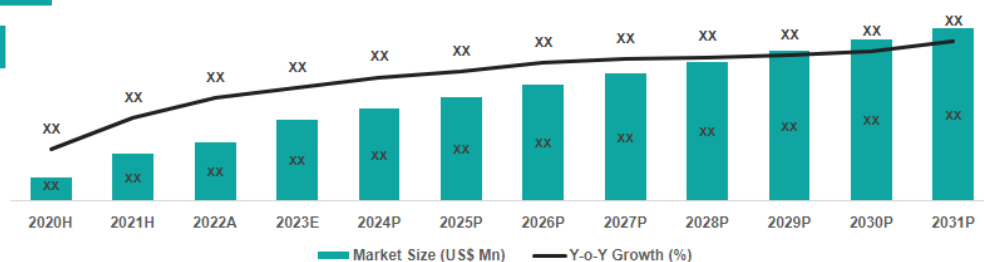
The global **fitness app market** has been on a rapid upward trajectory. In 2023, it was valued at **USD 1.54 billion**, and projections indicate a **compound annual growth rate (CAGR) of 17.7%** from 2024 to 2030. The **COVID-19 pandemic** accelerated this growth due to nationwide lockdowns and social distancing measures. People shifted from conventional gyms to virtual fitness, leading to increased downloads and subscriptions of fitness apps¹. **Awareness** about health and well-being has surged, driving more users toward fitness apps. Daily Active Users (DAUs) of fitness apps increased significantly during the pandemic.

- **Explosion of AI Fitness:** With forced isolation during the pandemic, AI-powered fitness apps, services, platforms, and wearable devices are set to **explode** in the coming years.
- **Global Market Growth:** The global AI fitness app market is projected to reach an astonishing **\$23.98 billion by 2026**.
- **Continuous Innovation:** App vendors will focus on introducing **innovative solutions**, expanding their reach, and offering free premium access to users. Expect ongoing advancements in personalized recommendations and health monitoring.
- **Integration with Wearables:** As wearable technology evolves, AI fitness apps will seamlessly integrate with smart wearables, providing even more accurate data and personalized insights.

Fig XX: Global Fitness App Market Size & Forecast

Global Outlook

2020-2031



By Type

Android
iOS
Other

By Application

Lifestyle Monitoring
Health Monitoring
Diet & Nutrition
Women's Health

By Device

Smartphones
Tablets
Wearables
Others

By Gender

Male
Female

Global Fitness App Market

Basis Point Share (BPS) & Market Attractiveness Analysis

Fig. 04: Basis Point Share (BPS) Analysis, By Type, 2022 vs 2031

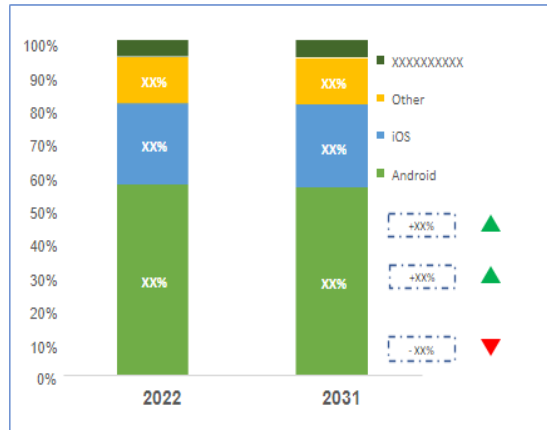
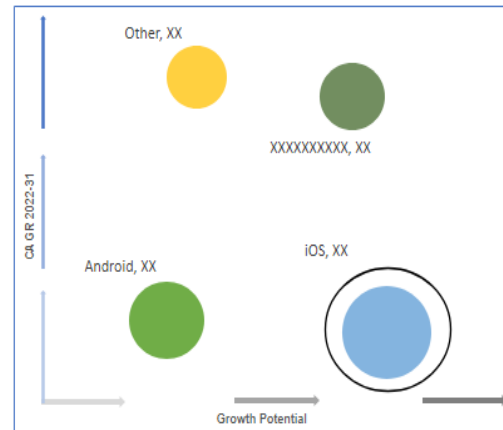


Fig. 05: Market Attractiveness Analysis By Type, 2022-2031



Source: Dataintelo Analysis

Email: sales@dataintelo.com

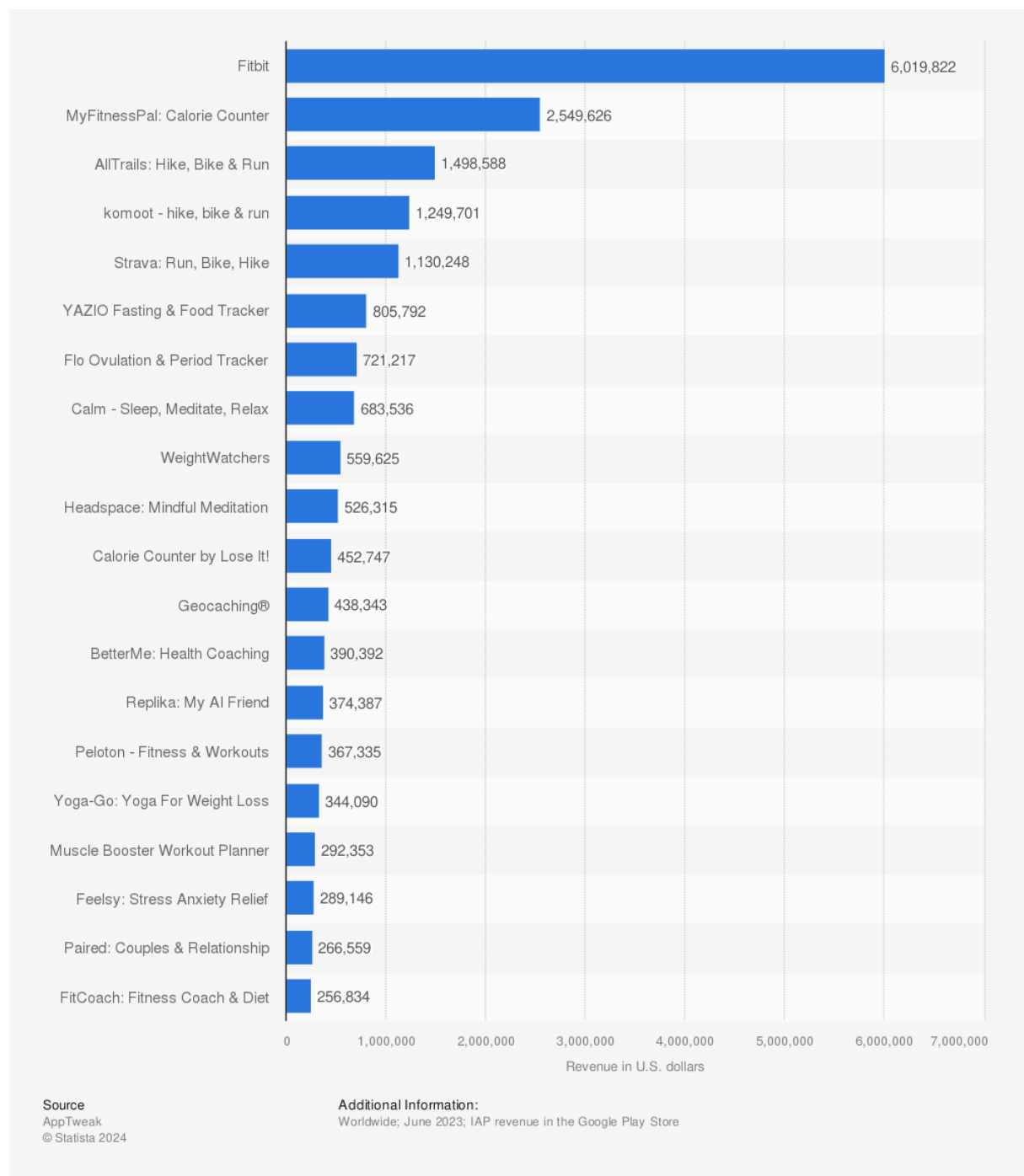
Website: dataintelo.com

c. Monetization Strategy

The AI Health and Fitness App revolutionizes monetization in the fitness industry through a commission-based recommendation system. By suggesting nearby fitness centers based on user health data, the app earns a **20% commission upon enrollment**. Further, it introduces an automated personal trainer subscription, eliminating the need for human trainers and providing an additional revenue stream.

Strategic partnerships with fitness-related businesses and targeted advertising offer lucrative opportunities for sponsored content. The app's continuous learning approach, fueled by developer-fed data and ongoing research, enhances personalized recommendations, ensuring sustained user engagement.

Diversified revenue streams also include exploring user subscription models for premium features and exclusive content. In essence, the app's monetization strategy is a dynamic blend of commission earnings, subscription services, strategic partnerships, and targeted advertising, aligning seamlessly with its mission of redefining personalized health and fitness solutions.



Prototype Development

Code Implementation: Linear Regression model for Health and Fitness AI app using Machine Learning.

1.Importing Essential Libraries for Model Development

In this section, crucial libraries for model development, including pandas, scikit-learn, and matplotlib, are imported.

```

1 import pandas as pd
2 from sklearn.model_selection import train_test_split
3 from sklearn.linear_model import LinearRegression
4 from sklearn.metrics import mean_squared_error
5 import matplotlib.pyplot as plt
6 import seaborn as sns

```

2.Installing mglearn Library for Enhanced Visualization

```
1 !pip install mglearn
```

Collecting mglearn

Downloading mglearn-0.2.0-py2.py3-none-any.whl (581 kB)

----- 581.4/581.4 kB 641.8 kB/s eta 0:00:00

Requirement already satisfied: numpy in c:\users\dell\anaconda3\lib\site-packages (from mglearn) (1.21.5)

Requirement already satisfied: scikit-learn in c:\users\dell\anaconda3\lib\site-packages (from mglearn) (1.0.2)

Requirement already satisfied: matplotlib in c:\users\dell\anaconda3\lib\site-packages (from mglearn) (3.5.2)

Requirement already satisfied: pillow in c:\users\dell\anaconda3\lib\site-packages (from mglearn) (9.2.0)

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Requirement already satisfied: cycler in c:\users\dell\anaconda3\lib\site-packages (from mglearn) (0.11.0)

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Requirement already satisfied: pandas in c:\users\dell\anaconda3\lib\site-packages (from mglearn) (1.4.4)

Requirement already satisfied: fonttools>=4.22.0 in c:\users\dell\anaconda3\lib\site-packages (from matplotlib->mglearn) (4.25.0)

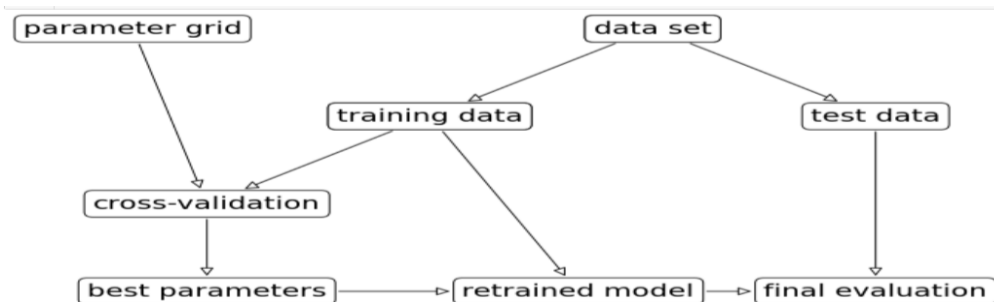
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Requirement already satisfied: packaging>=20.0 in c:\users\dell\anaconda3\lib\site-packages (from matplotlib->mglearn) (21.3)

Requirement already satisfied: python-dateutil>=2.7 in c:\users\dell\anaconda3\lib\site-packages (from matplotlib->mglearn) (2.8.2)

3.Visualize Grid Search Overview

This code snippet utilizes the mglearn library to create a visual representation of the grid search overview. Grid search is a technique used for hyperparameter tuning in machine learning models, and this visualization provides an insightful overview of the hyperparameter combinations explored during the optimization process.



4.Loading Activity Tracking Data into a Pandas DataFrame

This code segment focuses on loading the activity tracking data, a sample dataset for the AI Health and Fitness App, into a Pandas DataFrame. This dataset serves as a representative sample to ensure the correct functioning of the app's functionalities and features during the model development and analysis stages.

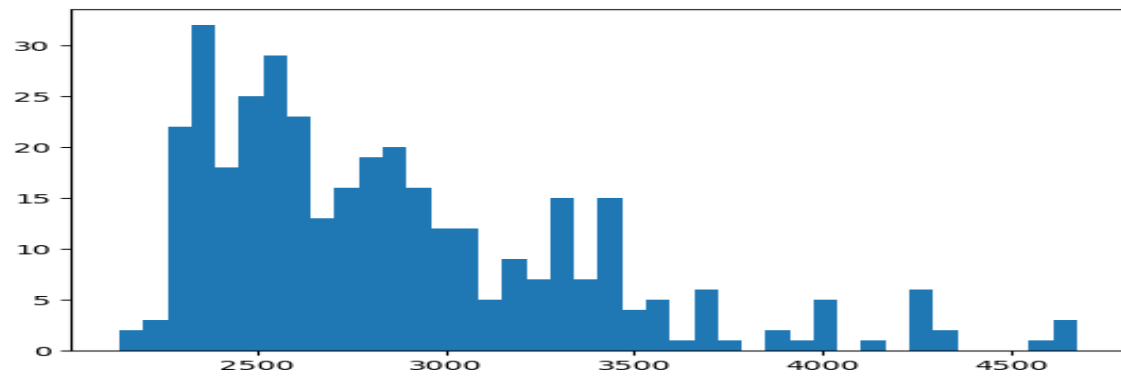
```
1 df = pd.read_csv('Activity_tracking_data.csv')
```

	Activity Type	Distance	Calories	Avg HR	Max HR	Aerobic TE	Total Reps	Total Sets	Elapsed Time (hours)	Total Calories	Steps	Goal_Achieved
0	Calgary Walking	3.81	245	94	121	0.9	0	0	0.729	3666	11385	1
1	Calgary Hockey	11.93	1049	113	139	2.2	0	0	3.065	3666	11385	1
2	Calgary Walking	5.02	332	92	112	1.1	0	0	1.004	2379	7439	1
3	Strength	0.00	18	88	110	0.1	101	1	0.267	2382	4174	0
4	Strength	0.00	13	86	119	0.2	105	1	0.939	2382	4174	0
5	Strength	0.00	11	87	102	0.1	101	1	0.211	2382	4174	0
6	Calgary Running	3.16	227	151	171	2.9	0	0	0.281	2382	4174	0
7	Calgary Hockey	4.72	507	120	158	2.2	0	0	1.164	2886	3853	0
8	Calgary Hockey	4.78	422	116	156	2.2	0	0	0.976	2886	3853	0
9	Strength	0.00	105	94	121	0.4	301	1	0.810	2732	3514	0

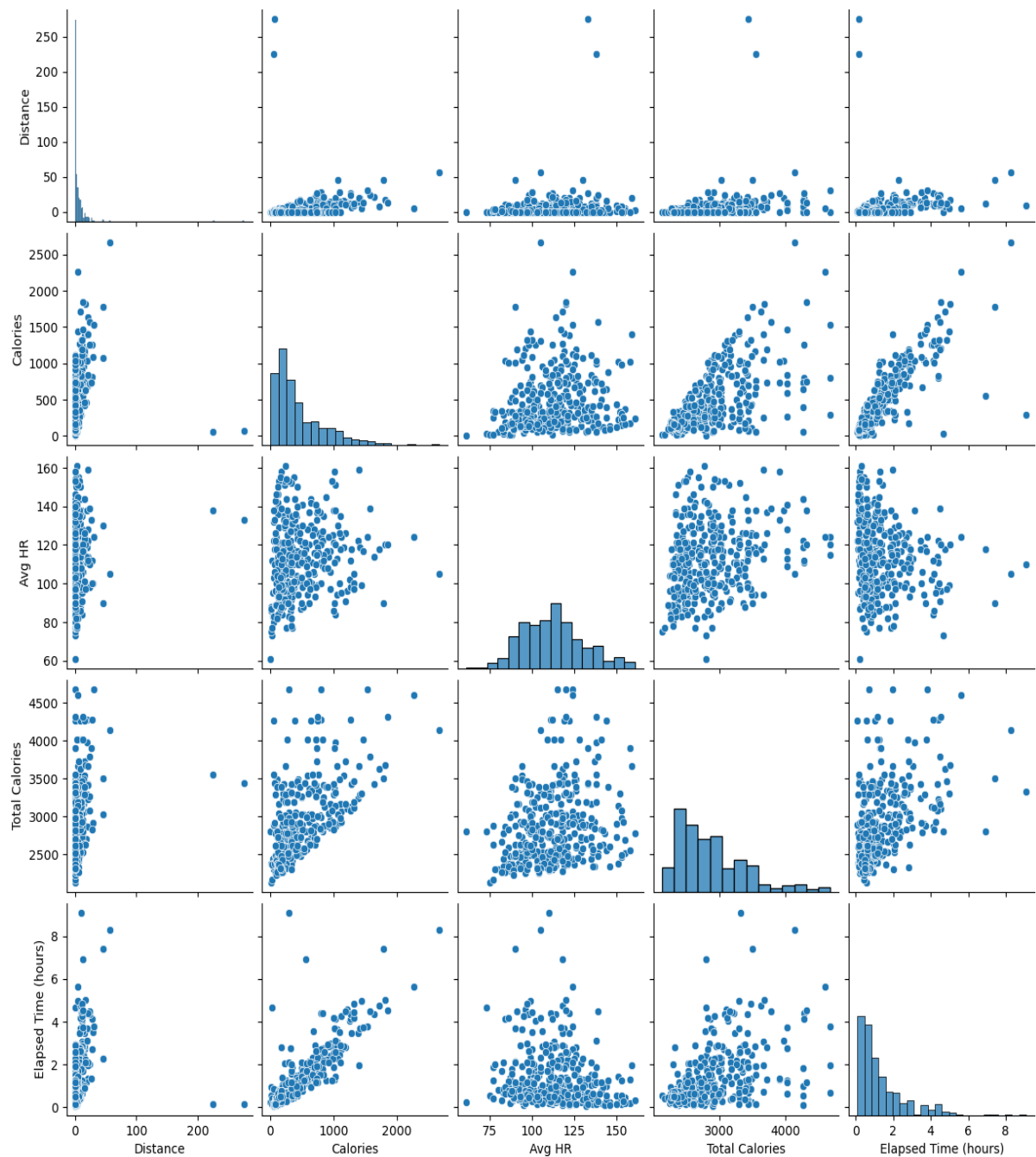
5. Visualizing Distribution of Total Calories in the Dataset

This code snippet is dedicated to visualizing the distribution of total calories within the dataset. The histogram, generated using matplotlib, provides an insightful overview of the spread and concentration of total calorie values. This visualization is instrumental in understanding the data's central tendencies and aids in making informed decisions during the analysis of the AI Health and Fitness App dataset.

```
1 plt.hist(df['Total Calories'], bins = 40)
2 plt.show()
```



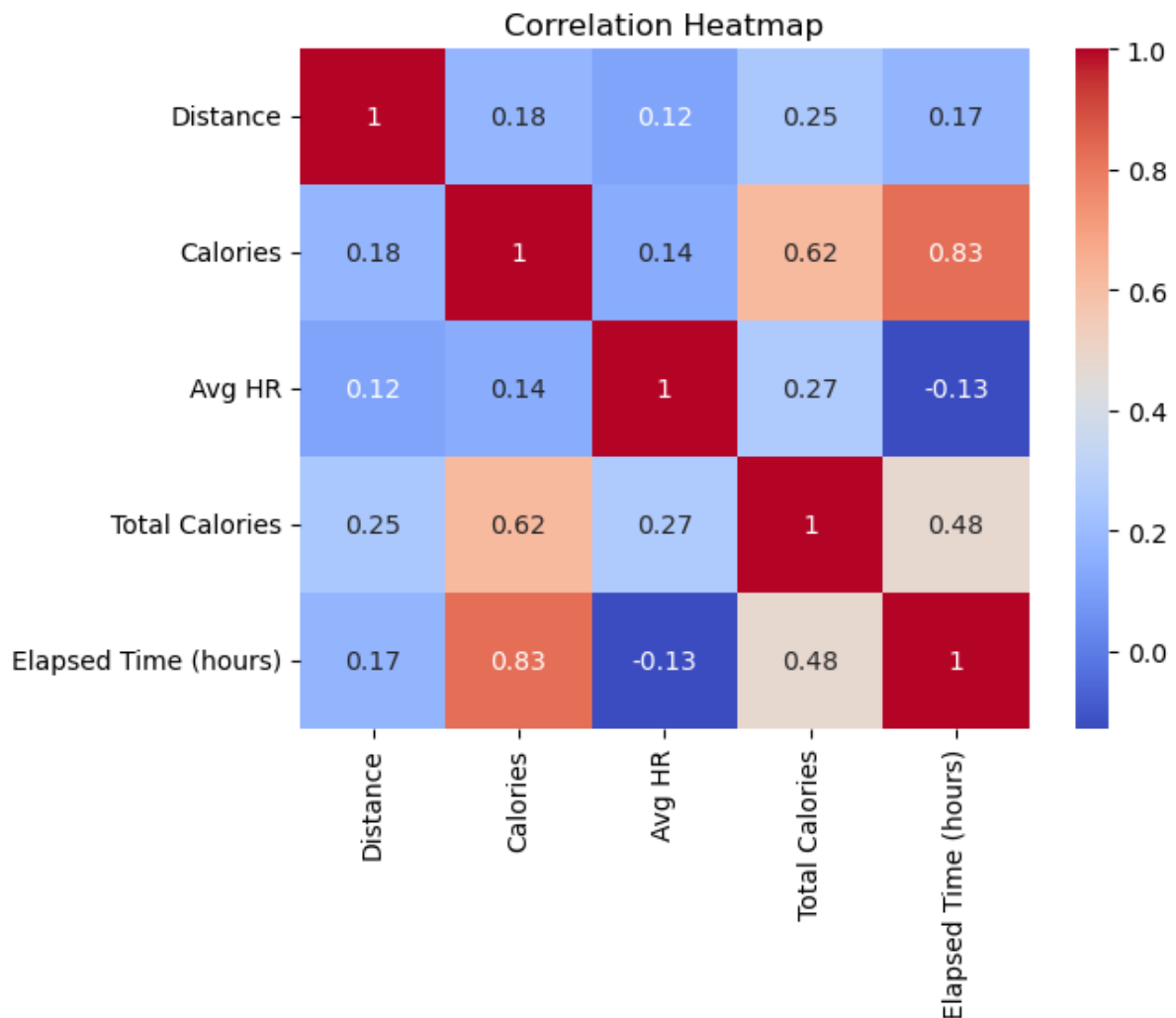
6.Exploring Pairwise Relationships in Selected Activity Metrics



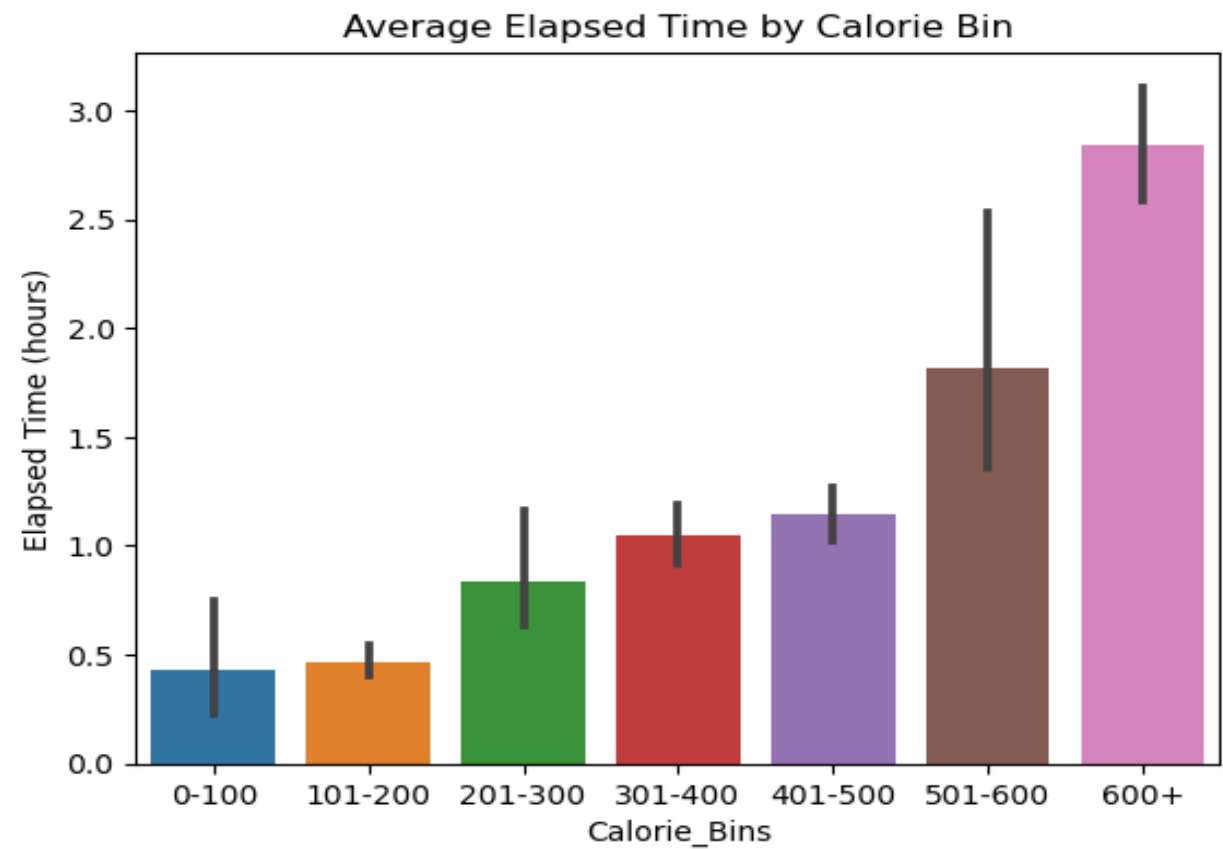
7. Analyzing Correlation Among Activity Metrics: Heatmap Visualization

This section involves creating a pairplot using seaborn to explore the pairwise relationships among selected activity metrics. The visualization aims to provide a comprehensive overview of how these metrics interact, aiding in the identification of potential patterns and correlations in the AI Health and Fitness App dataset.

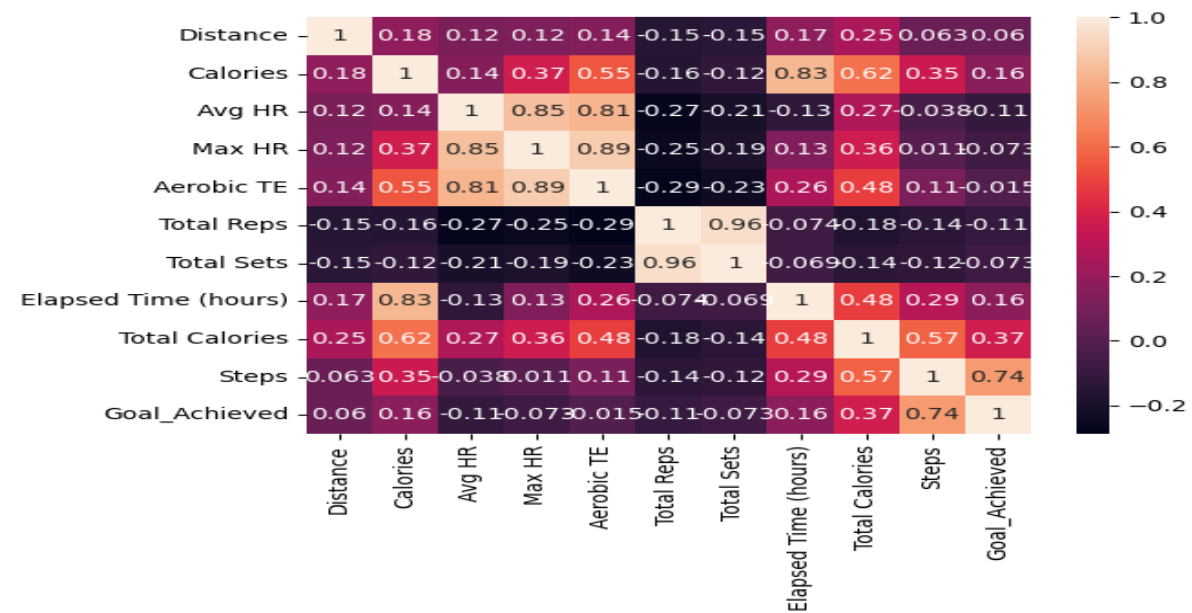
```
1 correlation_matrix = df[['Distance', 'Calories', 'Avg HR', 'Total Calories', 'Elapsed Time (hours)']].corr()
2 sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm')
3 plt.title('Correlation Heatmap')
4 plt.show()
```



8. Average Elapsed Time Analysis by Calorie Bin: Barplot Visualization

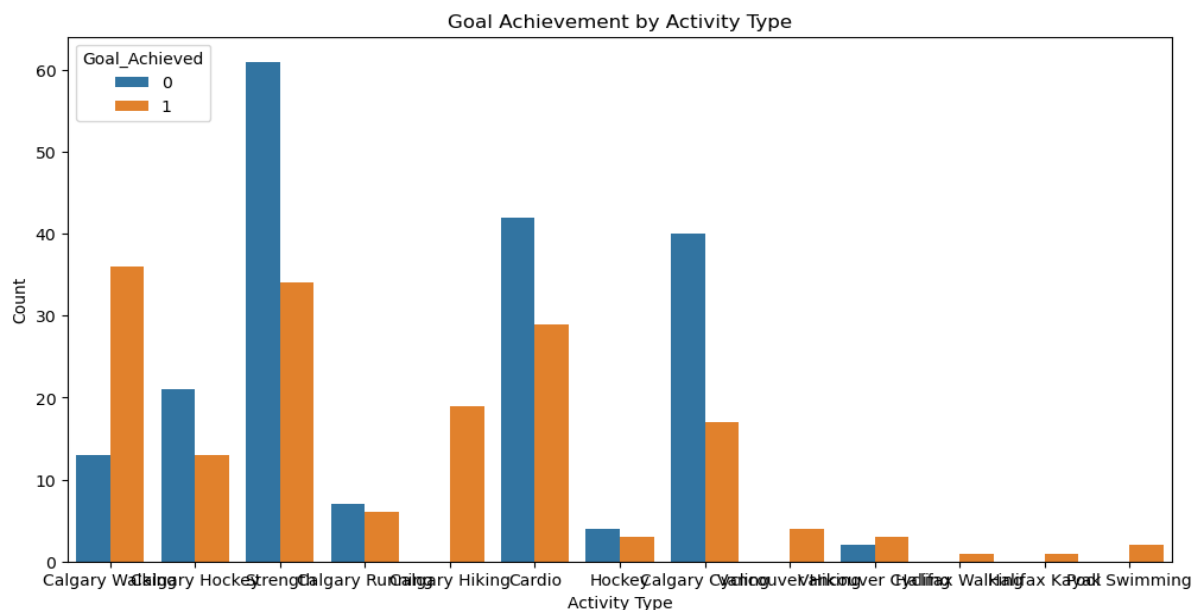


9. Comprehensive Correlation Heatmap of Activity Metrics



10. Analysis of Goal Achievement by Activity Type: Countplot Visualization

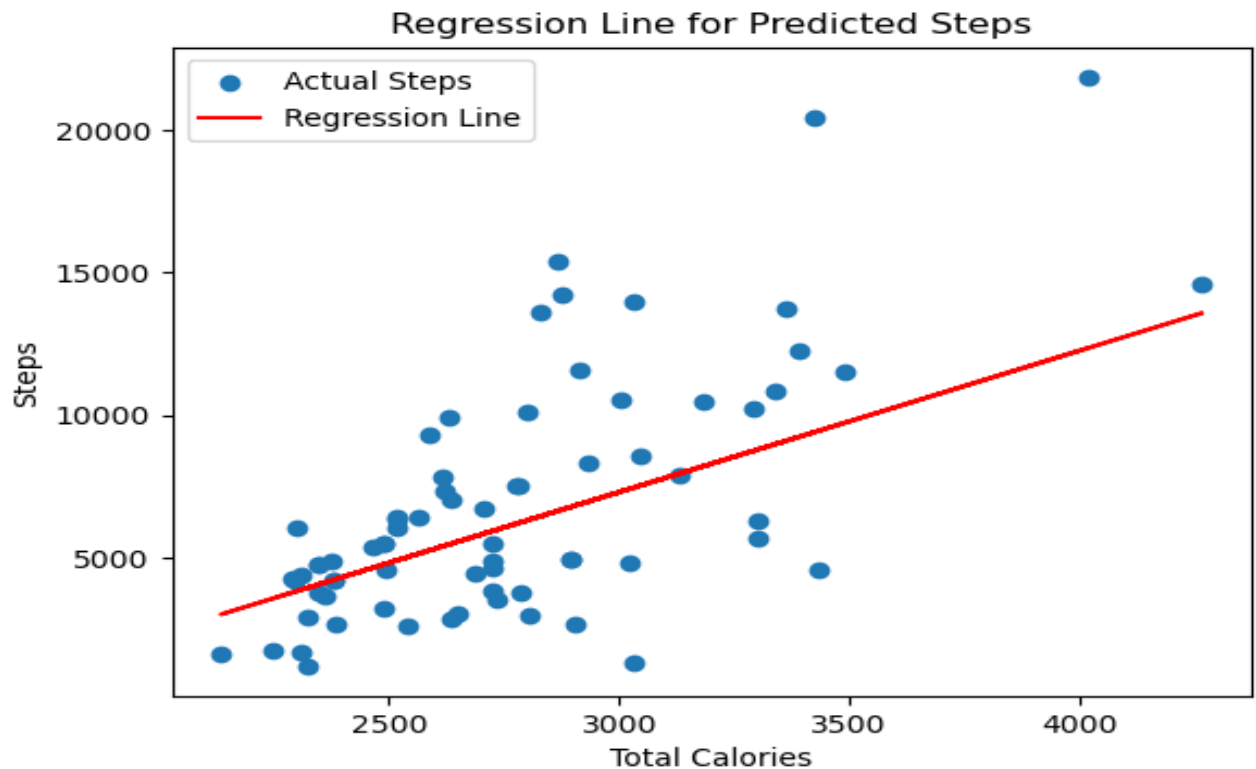
```
1 plt.figure(figsize=(12, 6))
2 sns.countplot(x='Activity Type', hue='Goal_Achieved', data=df)
3 plt.title('Goal Achievement by Activity Type')
4 plt.xlabel('Activity Type')
5 plt.ylabel('Count')
6 plt.show()
```



11. Building and Evaluating Linear Regression Model: Predicting Steps Based on Total Calories.

A linear regression model is constructed to predict the number of steps based on various activity metrics, including distance, calories burned, average heart rate, total repetitions, total sets, elapsed time, and total calories. Subsequently, predictions are made on the testing set to evaluate the model's performance.

The visualization depicts the scatter plot of actual steps against total calories, showcasing the regression line that represents the model's predictive capabilities. This model serves as a foundational element for understanding the correlation between total calories and step count.



Business Modelling

In the dynamic landscape of health and fitness, we present an innovative and holistic solution—AI-enhanced fitness app. This groundbreaking platform leverages machine learning techniques to provide users with personalized health and wellness recommendations. The app not only analyses user inputs, including **personal information, medication history, biometric data, and nutritional information** but also integrates data from wearable devices, such as smartwatches, to accurately assess vital signs like weight and heart rate. The goal is to revolutionize the fitness industry by seamlessly connecting users with nearby fitness centers while offering an AI-powered personal trainer experience. The app performs an in-depth analysis of user-provided inputs, ensuring a personalized and accurate health profile.

Utilizing wearable devices, the app tracks weight, heart rate, and sleep quantity, enhancing the precision of health assessments. By recording the user's location, the app recommends nearby fitness centers tailored to individual preferences and needs. The app earns a 20% commission for successfully recommending a fitness center where users subsequently enroll.

Monetization Model:

The primary revenue stream involves earning a commission for successfully directing users to fitness centers. This incentivizes fitness centers to collaborate with our platform, creating a mutually beneficial ecosystem.

AI-Powered Personal Trainer:

Through meticulous research, expert interviews, and case study analyses, the app's AI model is programmed to recommend personalized daily exercises and nutrient plans, eliminating the need for a human trainer. The AI continually learns from user data, adapting recommendations to track progress and dynamically adjust routines for optimal results.

Business Impact:

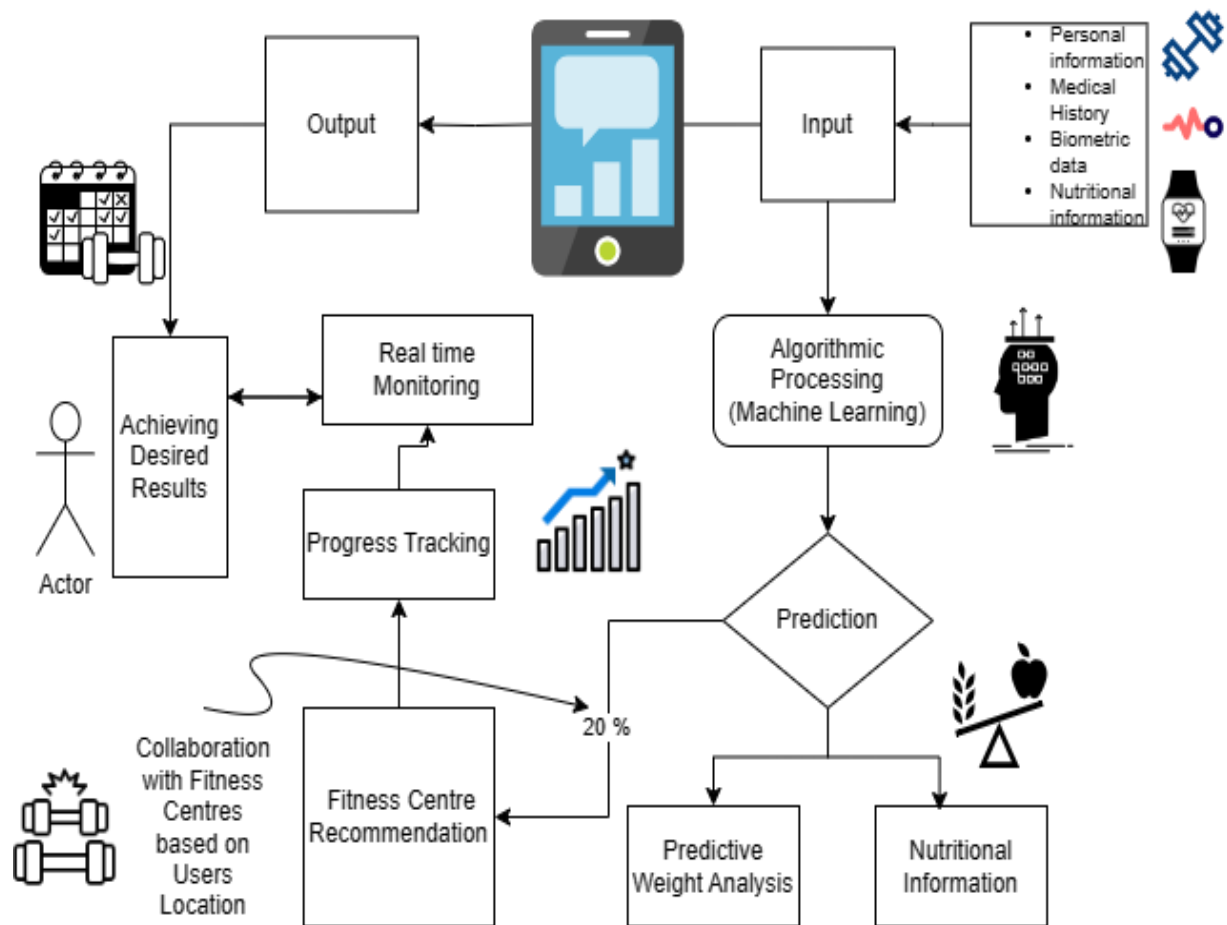
By replacing the traditional personal trainer with an AI-driven solution, users experience a cost-effective and personalized approach to fitness. The integration of machine learning enhances user engagement, offering a seamless and automated fitness journey, personalized to each individual.

Future Developments:

Regular updates based on user feedback and advancements in health and fitness science ensure that the app remains at the forefront of personalized wellness solutions. In the evolving landscape of health technology, our AI-enhanced fitness app not only addresses the diverse needs of users but also establishes a sustainable business model through strategic partnerships with fitness centers. By combining cutting-edge technology with a commitment to user well-being, we aim to redefine the future of fitness, making personalized health and wellness accessible to all.



Business Monetization Model



Financial Modelling (Equation) with Machine Learning and Data Analysis

In this financial equation, I aim to model the relationship between the number of steps (Y variable) and various activity metrics (X variables) such as Activity Type, Distance, Calories, Avg HR, Max HR, Aerobic TE, Total Reps, Total Sets, Elapsed Time (hours), and Total Calories.

$$y = mx + b$$

By leveraging a linear regression model, I intend to quantify how changes in these activity metrics impact the number of steps taken. This equation will serve as a predictive tool, allowing for the estimation of step counts based on the observed values of the specified activity metrics. The resulting financial equation provides valuable insights into the interplay between different activity

factors and step counts, enabling a deeper understanding of user behavior and engagement with the AI Health and Fitness App.

Here **step counts 0** referred as “Goal is not achieved” and **1** referred as “Goal is achieved”

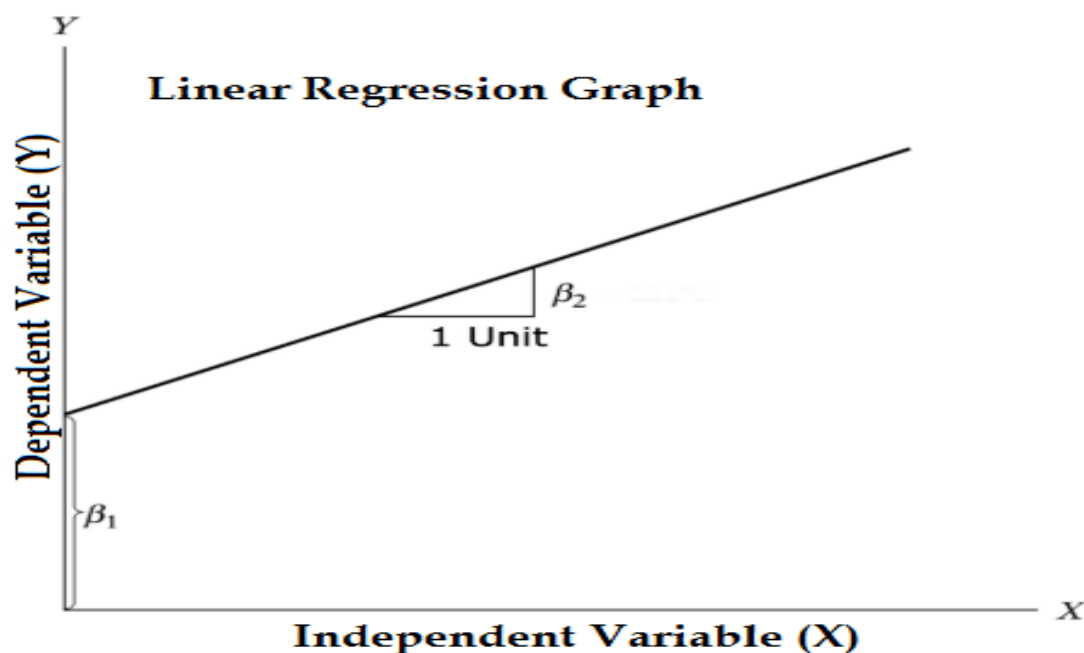
- **Y** is the dependent variable (prediction variable)
- **X** is the independent variable (the variable used for prediction)
- **m** is the slope of the line (the coefficient that represents the change in y for a unit change in x)
- **b** is the y-intercept (the value of y when x is 0)

Equation:

$$m = 2; \quad b = 0; \quad x = 25; \quad y = ?$$

$$\begin{aligned} y &= m(x) + b \\ &= 2(25) + 0 \\ &= 50 \end{aligned}$$

As x increases, y also increases linearly, and if x decreased y also decreases.



Similarly iterating the variable values for the further steps , it results in a Linear Graph which specifies that increasing and maintaining the appropriate workout activities , step values will also increases (Goal Achieved).

The financial equation derived from the linear regression model showcases the quantitative relationship between the number of steps and various activity metrics in the AI Health and Fitness App. This equation acts as a predictive tool, enabling the estimation of step counts based on observed values of key activity factors. By analyzing the coefficients of the equation, we gain insights into the relative impact of each activity metric on step counts, contributing to a nuanced understanding of user engagement and behavior within the app.

Conclusion

Health and fitness industry is booming as people having a lot of seriousness towards their health. They are looking for some practical ways to remain fit and healthy, and get peace and tranquility.

The prototype development involves the implementation of machine learning models to accurately detect and predict vital health metrics such as weight, heart rate, and caloric expenditure. The integration of wearable devices and location-based services enhances user engagement and ensures real-time monitoring. In terms of market segmentation, the app caters to a diverse audience seeking personalized fitness solutions, thereby ensuring broad market viability. The linear regression model developed for step prediction demonstrates the feasibility and effectiveness of incorporating machine learning in the app's functionality.

Taking exercise, yoga, workouts, physical activities and having balanced diets is the mantra for winning over the challenge of fitness and health. For all these things, you need someone and something to guide through. Fitness app is the right way to go ahead.

Code Implementation Link: [GitHub](#)