AN END TO END SYSTEM FOR WORKOUT MANAGEMENT

Group Members :
Ayyori Vishal
Aditya Choudhari
Yash Kharte
Manasi Mhatre

Guide : Prof. Priyanka Sherkhane

INTRODUCTION

- Technology used for increasing convenience of workout management.
- Facing a problem of not having a proper workout plan, users cannot decide and have no idea how to manage and plan workout.
- With the help this system, user can easily manage and will not require a personal trainer for workout planning.
- Also by performing customer segmentation on all the people registered, personalized recommendations can be provided to everyone.

PROBLEM STATEMENT

- To create a website which will provide an end to end workout management which includes recommendations regarding workout equipment, products by segmenting them into appropriate clusters.

- Also integrating various features / methods like Workout Monitoring and correction as well as Cart Abandonment Analysis for E-commerce website.

OBJECTIVES & SCOPE

OBJECTIVES

- To build an end to end system for workout management.
- To build E commerce website on gym products in which Recommendation system and Customer Segmentation is performed to make recommendation in real time.
- Additional features like Workout Monitoring and Cart Abandonment Analysis will also be performed.

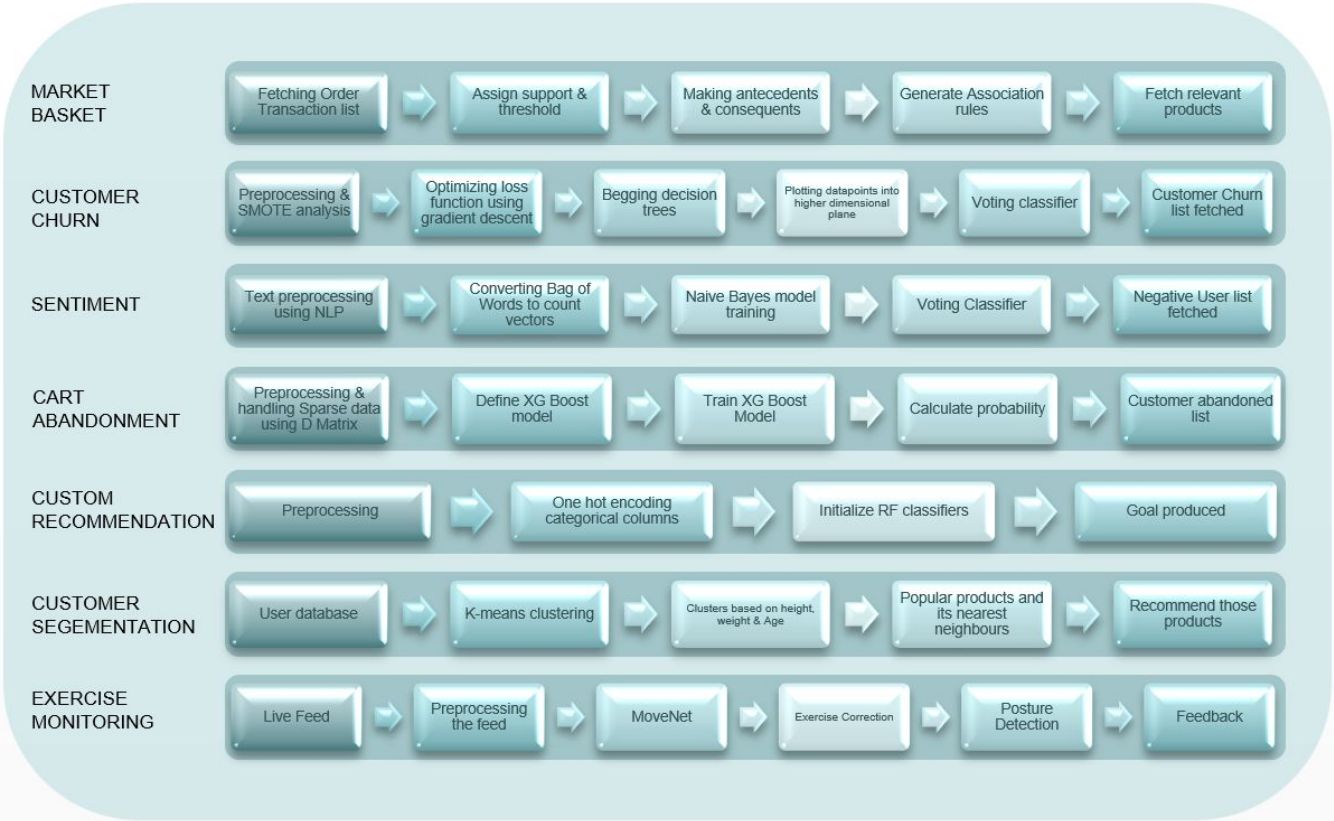
SCOPE

The main objective of this work is to improve and manage the workout of an individual. Techniques like Customer segmentation based recommendations, Live posture of workout monitoring and Cart Abandonment Analysis .

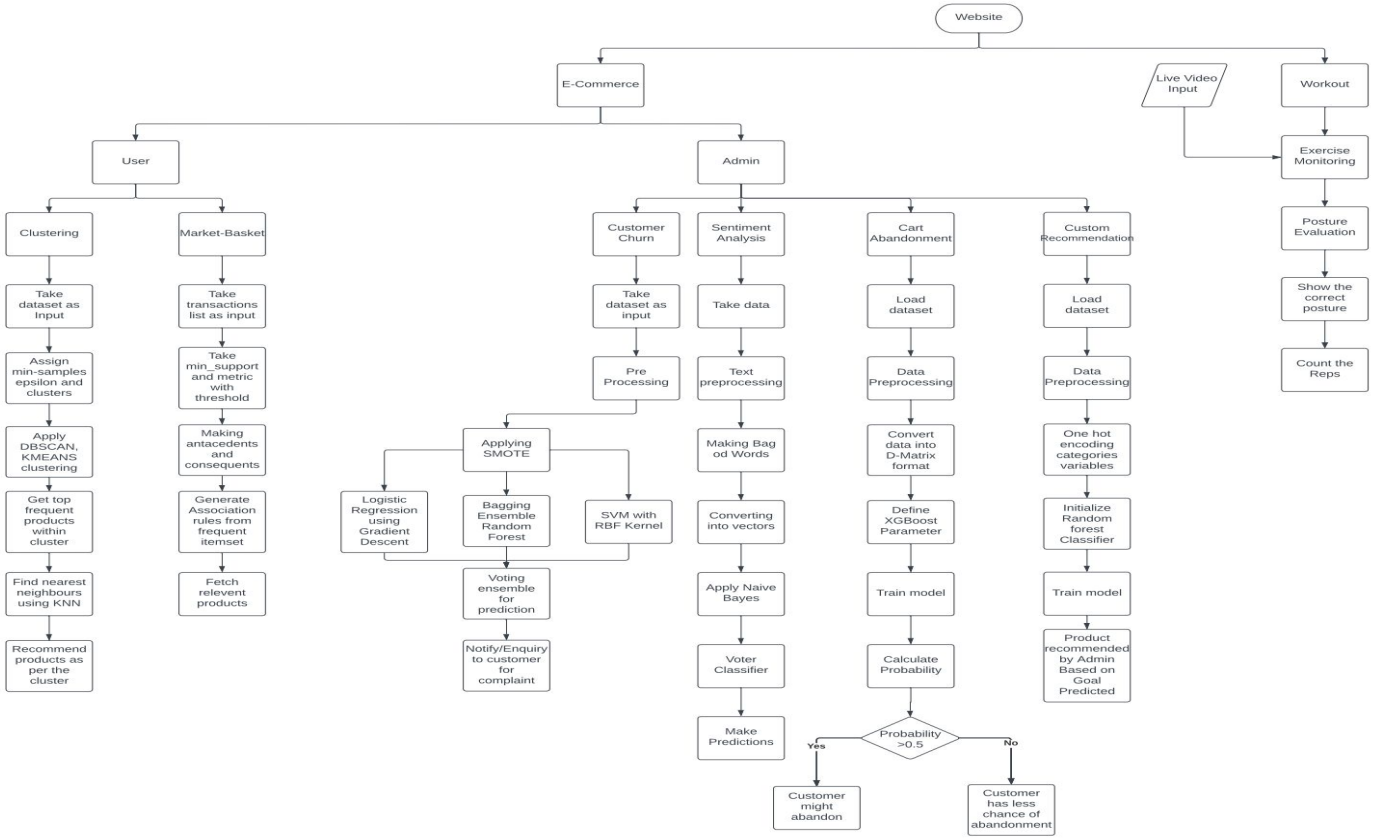
LITERATURE SURVEY

Paper	Authors	Year Of Publication	Journal	Model/Technique used	Accuracy
Customer Segmentation of E-commerce data using K-means Clustering Algorithm[1]	Lucky Rajput, Shailendra Narayan Singh	2023	13th International Conference on Cloud Computing, Data Science & Engineering	K-Means Clustering , Agglomerative Clustering , Mean Shift Clustering	NA
An End-to-end Machine Learning System for Mitigating Checkout Abandonment in E-Commerce[2]	Md Rifatul Islam Rifat, Md Nur Amin, Mahmud Hasan Munna, and Abdullah Al Imran	2022	FedCSIS	XGBoost , LightGBM , CatBoost , mGBDTs , TabNet	76%
Customer Segmentation Using Machine Learning[3]	Nikitha Gankidi, Sagarika Gundu, Mohd viqar Ahmed, Tahneeyath Tanzeela, Ch.Rajendra Prasad, Srikanth Yalabaka	2022	2nd International Conference on Intelligent Technologies (CONIT)	K-Means Clustering, Hierarchical Clustering	NA
Smart gym trainer using Human pose estimation.[4]	Grandel Dsouza, Deepak Mourya, Anoop Patel	2020	IEEE International Conference for Innovation in Technology (INOCON)	Convolutional Neural Network	NA

PROPOSED SYSTEM ARCHITECTURE



PROPOSED DATA FLOW OF SYSTEM



FEATURES

- A website that has a basic to intermediate knowledge for a user regarding exercise and fitness.
- Recommendations of products and exercises based on various factors.
- Exercise detection, monitoring and correction.
- Workout related e-commerce platform where purchasing of products can be done.

1) Customer Segmentation

- Groups users based on age, weight, height and products purchased.
- Assists in identifying the ideal target physiographic.
- **Algorithm used** : K-Means, DB-SCAN.
- **Dataset columns** :
  First Name | Last Name | Email | Age | Height | Weight | Gender | Goal | Product

Metric used : Silhouette score (-1 to 1)

a) DB-SCAN : 0.59

b) K Means : 0.76

Recommendation Using Segmentation

Customer Segmentation

K means clustering based users on age, height and weight

New clusters

Popular products in each cluster

New user details

User belongs to which cluster ?

Recommend most popular product from the cluster (Collaborative Filtering)

2) Market Basket Analysis

- Market basket analysis uncovers patterns in consumer purchasing behavior by examining co-occurrences of products in transactions.
- By identifying frequently purchased item combinations, it enables businesses to optimize product placement, cross-selling strategies, and promotional campaigns, ultimately boosting sales and customer satisfaction.

Example:

In a grocery store dataset:

Frequent item sets: {Milk, Bread}, {Butter, Bread}

Association rule: If Milk and Bread are bought, Butter is likely bought too.

3) Sentiment Analysis

- Product review sentiment analysis utilizes advanced algorithms to gauge customer opinions, helping shoppers make informed decisions.
- By analyzing reviews, it provides valuable insights into product satisfaction levels, aiding both consumers and businesses alike.
- **Algorithms used** : Naive Bias Classifier (Gaussian, Multinomial, Bernoulli)

Metric used : Accuracy

Accuracy : 94.7 % (Voting Accuracy)

4) Customer Churn Prediction

- Customer churn prediction utilizes predictive modeling to forecast which customers are likely to stop using a service or product.
- By analyzing historical data and identifying patterns and indicators, businesses can proactively implement retention strategies to reduce churn rates and enhance customer loyalty.
- **Algorithms Used** : Logistic Regression, Random Forest, Support Vector Machine
- **Dataset columns** :
  UserId | Age | Gender | AvgOrderValues | TotalMoneySpent | ProductClicks | APIsCalled | AvgRatingOnAllProduct | Churn

Metric used : Recall

Recall: 90.1 % (Voting Accuracy)

5) Cart Abandonment Analysis

- Cart abandonment analysis involves studying the behavior of users who add items to their online shopping carts but do not complete the purchase.
- It typically includes identifying reasons for abandonment, such as high shipping costs or lengthy checkout processes, analyzing user interactions with the cart, and implementing strategies to reduce abandonment rates, such as improving website usability or offering incentives to complete purchases.
- **Algorithm Used** : XGBoost
- **Dataset columns** :
  ID | No_Items_Added_InCart | No_Items_Removed_FromCart | No_Cart_Viewed | No_Checkout_Confirmed | No_Checkout_Initiated | No_Customer_Login | No_Page_Viewed

Metric used : Recall

Recall: 98.1 %

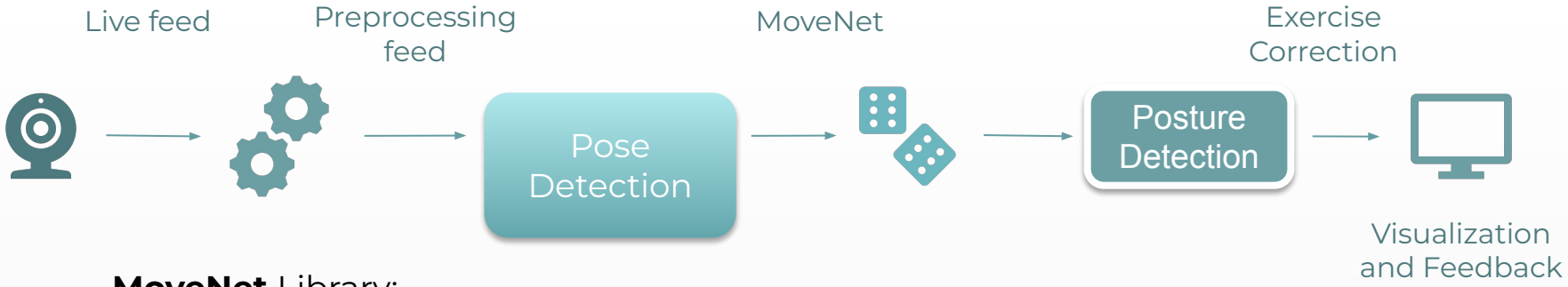
6) Custom Recommendation

- A custom recommendation system allows administrators to suggest products tailored to users' health parameters, offering personalized recommendations based on individual health profiles.
- By integrating user health data, such as medical history, dietary preferences, fitness goals, and biometric measurements, the system can generate recommendations that align with users' health needs and objectives.
- **Algorithm used** : Random Forest

Metric used : Accuracy and F1 Score

Accuracy : 85 %

7) Workout Monitoring



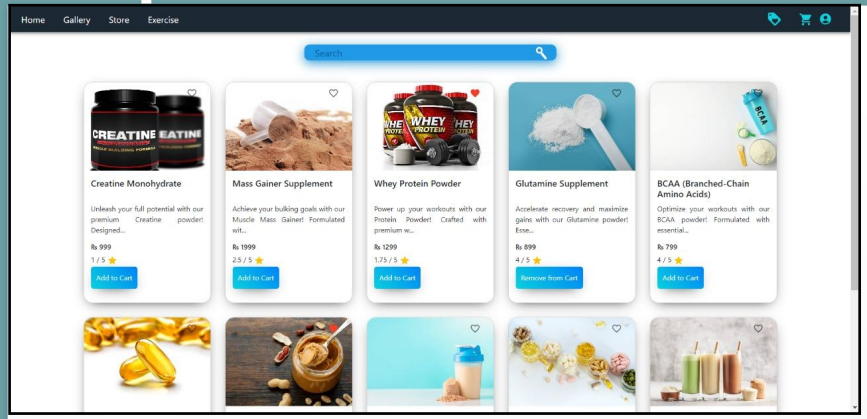
MoveNet Library:

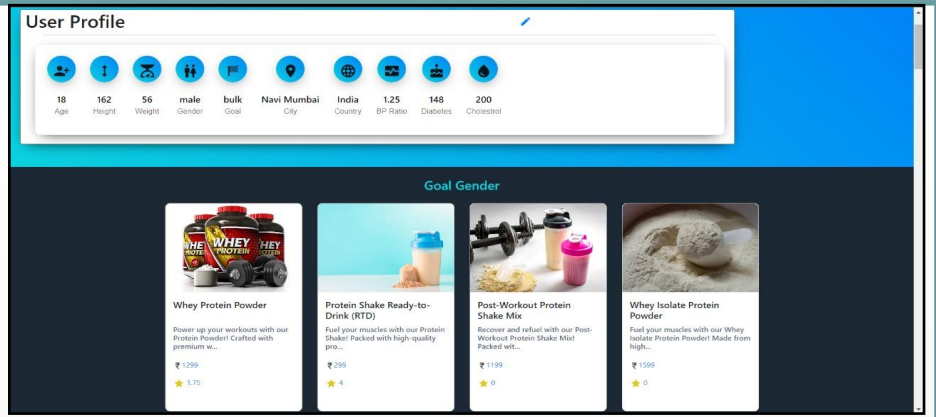
MoveNet is a cutting-edge model designed for detecting 17 key points of the human body.
It's available on TensorFlow Hub (TF Hub) in two variants: Lightning and Thunder.

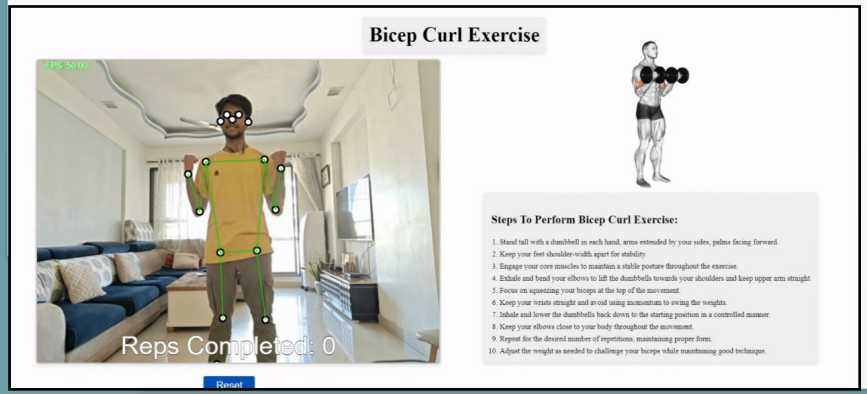
Lightning Variant: Designed for low-latency applications, prioritizing speed for real-time scenarios like live fitness tracking.

Thunder Variant: Tailored for high-accuracy applications, focusing on precision in detecting body key points for detailed health and wellness analysis.

Output


Home
Gallery
Store
Exercise
Search
Creatine Monohydrate
Mass Gainer Supplement
Whey Protein Powder
Glutamine Supplement
BCAA (Branched-Chain Amino Acids)
Add to Cart
Remove from Cart


User Profile
18 Age
162 Height
56 Weight
male Gender
bulk Goal
Navi Mumbai City
India Country
1.25 BP Ratio
148 Diabetes
200 Cholestrol
Goal Gender
Whey Protein Powder
Protein Shake Ready-to-Drink (RTD)
Post-Workout Protein Shake Mix
Whey Isolate Protein Powder


Bicep Curl Exercise
Reps Completed: 0
Reset
Steps To Perform Bicep Curl Exercise:
1. Stand tall with a dumbbell in each hand, arms extended by your sides, palms facing forward.
2. Keep your feet shoulder-width apart for stability.
3. Engage your core muscles to maintain a stable posture throughout the exercise.
4. Exhale and bend your elbows to lift the dumbbells towards your shoulders and keep upper arm straight
5. Focus on squeezing your biceps at the top of the movement.
6. Keep your wrists straight and avoid using momentum to swing the weights.
7. Inhale and lower the dumbbells back down to the starting position in a controlled manner.
8. Keep your elbows close to your body throughout the movement.
9. Repeat for the desired number of repetitions, maintaining proper form.
10. Adjust the weight as needed to challenge your biceps while maintaining good technique.


Bicep Curl Exercise
Reps Completed: 1
Reset
Steps To Perform Bicep Curl Exercise:
1. Stand tall with a dumbbell in each hand, arms extended by your sides, palms facing forward.
2. Keep your feet shoulder-width apart for stability.
3. Engage your core muscles to maintain a stable posture throughout the exercise.
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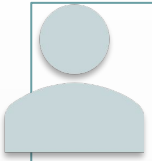
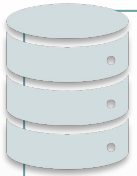
E-Commerce platform for gym products



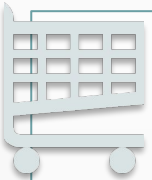
User authentication & navigation

- User registration and login.
- User roles (admin, user and employee).



Product Management

- Product listing with categories and filters.
- Product details, images, and descriptions.
- Inventory management.



Shopping Cart

- Add/remove products to/from the cart.
- Update quantities and calculate totals.

Checkout & payment

- Address and payment details.
- Integration with payment gateway.

Navigation

- Efficient search functionality.
- Browsing products by categories and subcategories.

Benefits

Personalized Recommendation

Products will be recommended on e-commerce site

Real Time Tracking

Used to track and monitor real time movements of exercises

Virtual Trainer

A virtual trainer to assist while exercising.

Workout Recommendation

Recommendation for exercises to be done according to user's body goal

Anticipating Customer Actions

Predicting customer churn and cart abandonment, enabling proactive intervention to retain customers and boost sales.

Product Shopping

One stop online shopping website for all fitness products

Requirements

Software

IDE : VsCode, Colab

Languages : React JS, Node JS, Python

Database : MongoDB

Hardware

Camera

Processor : Intel or AMD processors are suitable for running MoveNet library

Minimum 4GB Ram

Future Enhancements

1. Expansion of Exercises:

2. Enhanced Personalization

3. Virtual Reality (VR) Integration

4. Continuous Improvement and Feedback Mechanisms

5. ChatBot

6. Product Recommendations based on Ingredients.

Conclusion

- The Workout Management System offers significant advancements in fitness technology, providing users with a comprehensive platform for managing workouts and receiving personalized recommendations.

- Through advanced algorithms and real-time feedback, users can maintain proper form, minimize injury risks, and optimize their fitness routines.

- The system's emphasis on personalized guidance and accessibility caters to users of all fitness levels, making it a versatile and user-friendly solution for the fitness community.

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