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Health - Driven Exercise and Diet Recommendation Using Machine Learning

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ABSTRACT — The program focuses on creating a practical application that uses technology to improve personal health. The goal is to provide personalised exercise and meal planning based on the user's health. The application uses machine learning algorithms like Random Forest to analyse physical health data from real users. Thanks to simple communication, people can access their own health information, allowing the system to create exercise habits and behaviours. These recommendations are designed to meet specific health needs and improve overall health. Fitness programs are designed according to each user's circumstances, including their health status and concerns. Additionally, the system recommends meal plans that meet dietary needs, dietary restrictions, and personal preferences. This brand is designed to encourage users to make informed decisions about their lifestyle. By offering personalised guidance for lifestyle choices and healthcare access, the application aims to facilitate informed decision-making and contribute to long-term well-being.

KEYWORDS — Exercise prediction, Diet prediction, Machine Learning, Random Forest, Recommendation system

I. INTRODUCTION

Nowadays, the importance of health is very important to maintain health. Although everyone wants to be healthy, it is equally important to know how to manage it. The application is an important tool that guides people to determine the appropriate level of exercise their body needs based on their health. Many times, people face health risks due to excessive exercise, leading to serious problems such as heart disease. The application is designed to reduce such risks by providing guidelines for exercise. Using the Random Forest algorithm, this application helps prevent treatment. It protects one's health by adjusting exercise plans according to certain conditions.

This individual approach allows people to eat healthily without the risk of overtraining, addresses underlying health problems and supports the body. The emergence of smart healthcare, leveraging advances in machine learning and computer vision, has opened new potential avenues for preventing disease, testing for pain, and improving healing. Much research focuses on developing technologies and systems to use these resources to deliver better healthcare.

Algorithmic analysis takes into account important customer factors such as age, gender, height, weight and health to create recommendations. Age is an important determinant of metabolic rate and changes in health; This can lead to changes in exercise and diet over time. Develop recommendations taking into account the specific needs of men and women, taking into account gender-specific physiological nuances.

Height and weight are simple anthropometric measurements that help measure body composition and calculate body mass index (BMI) to create nutrition and exercise recommendations. The current health decisions enable algorithms to address specific clinical problems and produce recommendations that improve overall health.

Machine learning can predict personalised exercise plans, including activities such as cardio and strength training, and create actionable nutrition plans based on individual nutritional needs, calorie requirements and dietary restrictions. This positive and personalised approach not only increases the effectiveness of health recommendations, but also improves compliance by reducing recommendations tailored to each user's unique characteristics and circumstances. The emergence of smart healthcare leveraging advances in machine learning and computer vision has opened new possibilities for improved prevention, diagnosis, and treatment of diseases. Several research efforts have focused on developing techniques and systems to take advantage of these capabilities for better healthcare services.

This positive and personalised approach not only increases the effectiveness of health recommendations, but also improves compliance by reducing recommendations tailored to each user's unique characteristics and circumstances. As technology continues to advance, the combination of machine learning and traditional healthcare systems represents an exciting future in personal and wellness pursuits.

This highlights innovations in applying machine learning for smart health monitoring and other healthcare applications. The techniques show significant promise in improving healthcare services through intelligent data



analysis.

Machine learning algorithms analyse different data, including genetic data, lifestyle and health history, to identify patterns and relationships that may not be obvious to others through traditional methods. Using the power of artificial intelligence, health, exercise and nutrition recommendations are designed to provide people with more accurate, personalised and effective advice to individuals who want to improve their health. Integration of machine learning enables an efficient and adaptable approach that continuously adjusts recommendations based on real-time feedback and new clinical data. This enables people to access guidance that changes with their changing needs, making the journey a healthier and more fulfilling experience. Health-focused exercise and diet recommendations powered by machine learning not only enable people to manage their health but also contribute to the beneficial and healthy ecosystem. As we delve deeper into the world of health information, the potential for positive public health outcomes is enormous, as prevention and personal intervention play a key role in improving health in the future.

II. LITERATURE REVIEW

[1] Miss Shreya B.Ahire, Ms. Harmeet Kaur Khanuja[2020], “A Personalized Framework for HealthCare Recommendation”, In this world, for any kind of information, people depend on internet. They use search engines like Google to search information over internet. The queries that are written on the web must be accurate which would give the relevant information related to user's Health Care.

[2] Chenguang Shen, Bo-Jhang Ho, Mani Srivastava[2020], “MiLift: Efficient Smartwatch-based Workout Tracking Using Automatic Segmentation”, The use of smartphones and wearables as sensing devices has created innumerable context inference apps including a class of workout tracking apps. Workout data generated by mobile tracking apps can assist both users and physicians in achieving better health care, rehabilitation, and self-motivation.

[3] Serkan Balli, Ensar Arif Sagbasx and Musa Peker[2019], “Human activity recognition from smart watch sensor data using a hybrid of principal component analysis and random forest algorithm”, The use of wearable technology is rapidly increasing, and its effects are observed positively in the user's healthcare follow-up. Wearable sensors are small devices that people can carry around while performing their daily activities.

[4] YOUNGSUN KONG AND KI H. CHON[2019], “Heart Rate Tracking Using a Wearable Photoplethysmographic Sensor During Treadmill Exercise”, We present a beat-to-beat heart rate tracking algorithm that is designed especially to handle the nonstationary motion artefacts often encountered using photoplethysmographic (PPG) signals acquired from smartwatches or a forehead-worn device, during intense exercise.

[5] Arushi Singh, Nandini Kashyap, Rakesh Garg [2019], “Fuzzy based approach for diet prediction”, In the current era, people are too busy to think about what they are eating and its effects on their health. Over the years there has been an accretion of such diseases due to the loss of nutrition owing to unhealthy diet followed on an everyday basis and motionless life.

[6] Abrar Zahin, Le Thanh Tan, Rose Qingyang Hu[2020], “A Machine Learning Based Framework for the Smart Healthcare System”, Detecting fall down actions from image streams. Thus, the primary purpose of this study is to reconstruct the image as visibly clear as possible and hence it helps the detection step at the trained classifier.

[7] Ghenadie Usic[2020], “Development of a Patient-Specific Model for Patients with Diabetes Type I Using Meal and Exercise Guidelines from Modern Schools of Diabetes”, Several studies have proved that special diet, appropriate exercises and long-term lifestyle changes can help in managing of diabetes, holding it in a compensated form and decreasing complications severity.

[8] Honey Pandey, S. Prabha [2020], “Smart Health Monitoring System using IOT and Machine Learning Techniques”, The task manages IOT using sensor (pulse sensor to watch pulse) with Arduino and furthermore the outcome can be checked in sequential screen.

[9] Amit Nagarkoti, Revant Teotia, Amith K. Mahale and Pankaj K. Das[2021], “Realtime Indoor Workout Analysis Using Machine Learning & Computer Vision”, The techniques of machine learning have been successfully employed in assorted applications including Disease prediction.

[10] Divya Mogaveera, Vedant Mathur, Sagar Waghela[2021], “e-Health Monitoring System with Diet and Fitness Recommendation using Machine Learning”, For this, they have broadly classified their system into 2 modules: 1. Health Monitoring, 2. Diet & Exercise Recommendation. In the Health Monitoring module, the system would suggest follow-up sessions until the reports come normal. For the Diet and Exercise Recommendation module, the algorithm that is used is a Decision tree for classification.



[11] Megh Shah, Sheshang Degadwala, Dhairya Vyas[2022] recommended by a nutritionist or a medical assistant, it is associated with a longer lifestyle, lowering the risk of new diseases, and improving overall quality of life, according to recent research. But doctors are still investigating why patients prefer nutrition advice from chefs to machines. To improve nutritional recommendations, this review provides an in-depth look at methods, modalities, features and classifications, highlighting their strengths and weaknesses.

[12] Muhib Anwar Lambay, Ph.D. S.Pakkir Mohideen [2022] "In today's world, big data and cloud computing are required to solve real-world problems, especially in the healthcare sector where large amounts of data are collected. The framework is called Health Recommendations (HRS). It uses machine learning for big data analysis and word processing. It is a system that combines ML) and is used for preliminary data (NLP) to create nutritional recommendations.

[13] Rutika Bhagat1, Prof. Pragati Patil2[2023], " Health Monitoring System Using Machine Learning Techniques Algorithm", Applications of health monitoring using machine learning include early identification of cardiovascular diseases and cardiac disorders, as well as Clinical Decision Support System (CDSS) that can help doctors, nurses, patients, and other carers in making better decisions.

[14] Author Akshay R. Jain, Rudrang R. Darade, Akshay V. Dandwate, Shubham S. Joshi, Sahil S. Kothmire [2023]. According to them, "Getting healthy is easy with our personal gym! Our user-friendly interface tailors exercise and diet plans to your goals, interests and health needs. Just type your message and let our recommendations follow you. So much more. One system is your health partner, It makes it easier for you to manage healthy use and support. It is very easy to achieve your health goals with our innovative and effective suggestions.

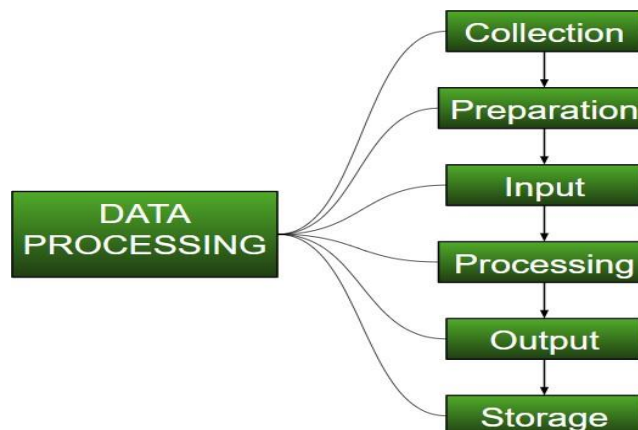
III. REVIEW FINDINGS

1. Based on the above reviews, we get the idea that health exercise and diet predictions have a widerange of usage and implementation.
2. We also learned how the Random Forest algorithm is used for implementation of Exercise andDiet predictions.
3. Majorly this type of applications is done by using IOT devices which may not be that efficient. so, this application is done by using machine learning and trained data.

IV. PROPOSED WORK

The Plan is a platform designed to help people improve their health through behavioural, cultural and simple treatments. To start the process, users enter clear health information, including pre-existing health conditions, current health levels, and health goals. The system analyses this data to create a custom plan using machine learning algorithms. These plans are designed to address specific health issues and meet individual limitations. Join the many exercise guide libraries that provide clear instructions for all recommended activities. The system uses the best nutritional analysis techniques to create personalised meal plans, ensuring protein and calorie intake meets personal health goals.

FIG : 1 Stages of Data Preprocessing



From FIG : 1, Collection – Firstly, the data will be collected from different sources. Here, we need to collect real-



time data from the users consisting of factors like Age, Gender, BMI, Health conditions in the form of dataset.
 Preparation – The data will be prepared by checking if there are any errors and correcting them. There may be duplicate values, null values and they should be removed for accuracy. Input – The input factors will be given to the system to be processed and give desired output. Processing – Here, after giving the input the data will be processed by training the data and by applying some machine learning algorithms like Random Forest.
 Output – After the processing of data the output will be displayed. Here, Exercise and Diet Predictions will be displayed in the output screen.

Storage – Storage is done by using databases like SQL, MongoDB. In this application we used MongoDB to store all the data related to the user for security purposes.

This holistic approach is geared towards fostering informed decision-making and promoting long-term well-being. By encouraging healthy lifestyle choices and ensuring convenient access to specialised healthcare, the system becomes a valuable tool in the user's health management journey.

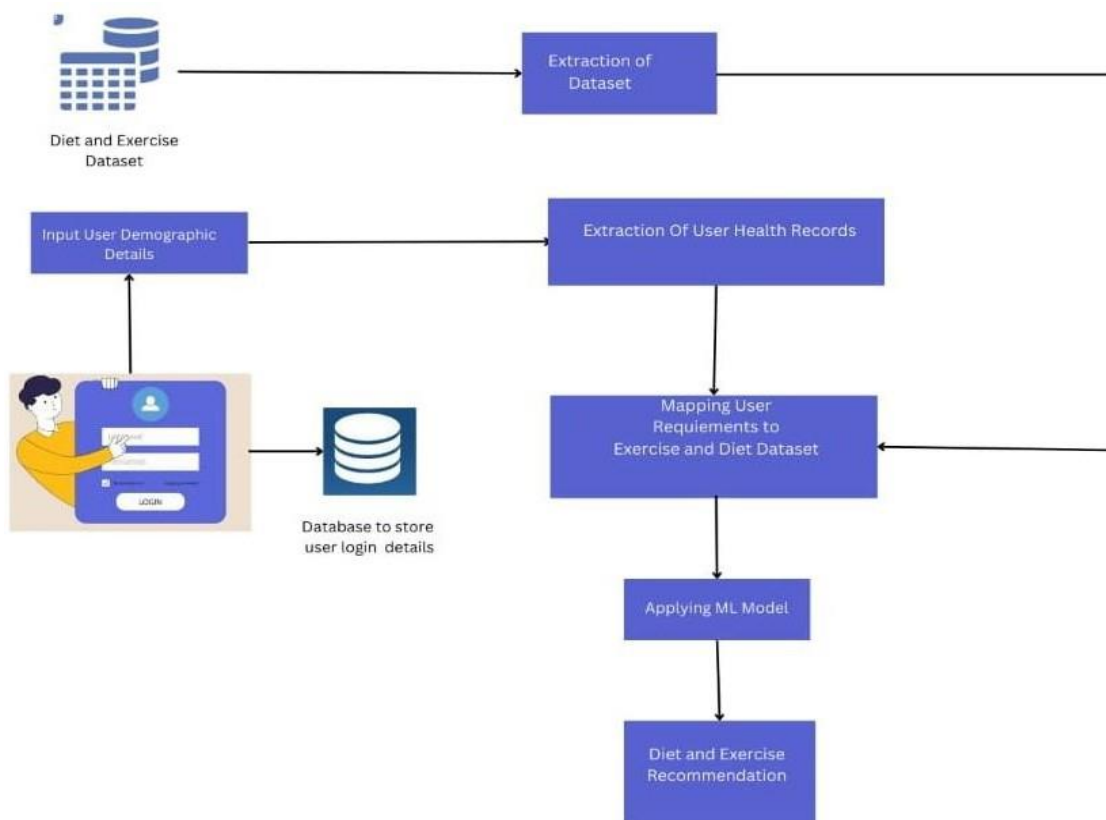


FIG : 2 System Architecture

From FIG : 2, User inputs his/her demographic details such as Age, Gender, BMI, Health Conditions and all this data will be stored in the database called MongoDB.

We consist of a dataset which includes different types of health conditions for the users with different demographic factors and also a dataset for Exercise and Diet Recommendations. This dataset should be extracted and should be cleaned by removing null and duplicate values.

And then the user requirements and Exercise and Diet dataset will be mapped to give desired output. Now, the Machine learning model will be applied to the preprocessed data and then the system predicts the exercise and diet recommendations for the user.

This proposed system leverages machine learning to create a personalised health management tool. By combining user data and machine learning models, the system can recommend effective exerciseroutines and diet plans to guide individuals towards their health goals.

Utilising sophisticated algorithms, the system thoroughly analyses this data to generate tailored exercise plans. These



plans are designed to address specific health concerns and accommodate individual limitations. A diverse and detailed exercise database is incorporated, offering explicit instructions for each recommended activity.

V. RESULTS

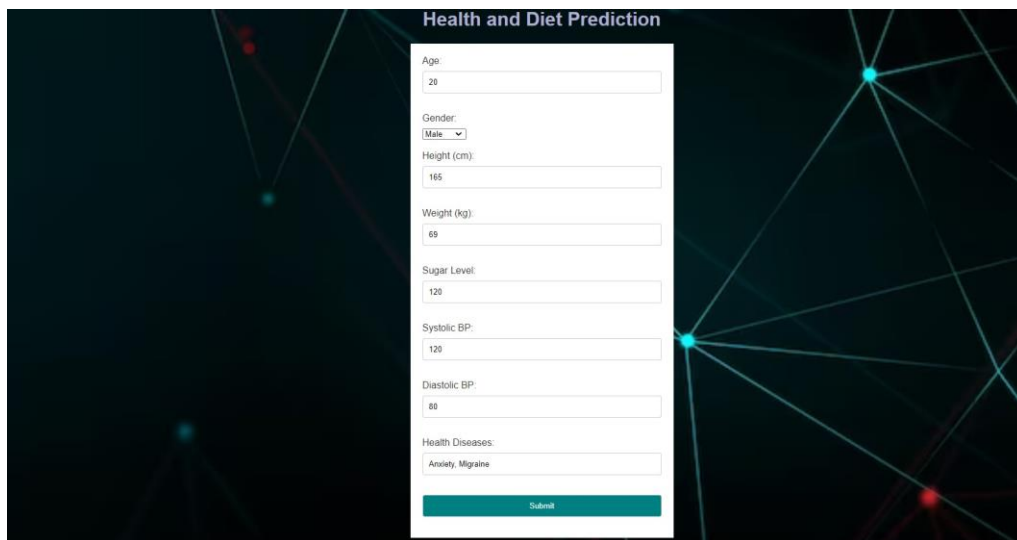


FIG : 3 Output Screen 1

From FIG : 3, User enters the demographic details which will be contained in the dataset and after submitting the recommendations will be displayed. The details should be given properly to get desired and accurate recommendations.

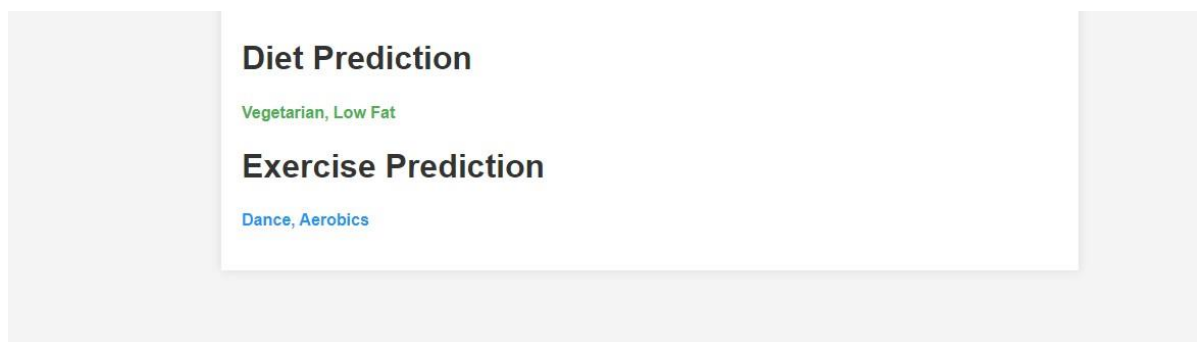


FIG : 4 Output Screen 2

From FIG : 4, In the above figure we can see the desired Exercise and Diet Predictions from the system according to the user input details.

```

---
> show databases
admin 0.000GB
backend 0.000GB
config 0.000GB
cse2 0.000GB
diet 0.000GB
ecom 0.000GB
harshi 0.000GB
knee 0.000GB
local 0.000GB
users 0.000GB
> use diet
switched to db diet
> show collections
users
> db.users.find()
{ "_id" : ObjectId("65f07fefe75585f114a3ba97"), "name" : "Harshi", "email" : "harshi@gmail.com", "password" : "harshi" }
>
    
```

FIG: 5 Output Screen 3



From FIG: 5, Above figure shows that, when the user enters his/her credentials then they should be stored in the database for security. So here MongoDB database is used.

VI. CONCLUSION

In Conclusion, we highlight innovations in applying machine learning for smart health monitoring and other healthcare applications. The techniques show significant promise in improving healthcare services through intelligent data analysis.

This application will be useful and helpful for the people who are facing majorly chronic diseases. Overall, this machine learning-driven system offers a great way to self-regulate. By combining user data, sensor data and smart algorithms, the system can recommend good apps and meal plans based on individual needs and goals. This can lead to increased user engagement, better adherence to health plans, and ultimately better health outcomes. But successful implementation requires careful consideration of data privacy, integration with existing AI products, and ongoing monitoring of the model to ensure the system is still accurate and valid. Considering these factors, this system has the potential to support people in managing their health and achieving their health goals.

The Future Enhancement for this application can be monitoring user exercise positions by videomonitoring, and the system can improve efficiency.

REFERENCES

- [1] Miss Shreya B. Ahire, Ms. Harmeet Kaur Khanuja, "A Personalized Framework for HealthCare Recommendation", 2020.
- [2] Chenguang Shen, Bo-Jhang Ho, Mani Srivastava, "MiLift: Efficient Smartwatch-based Workout Tracking Using Automatic Segmentation", 2020.
- [3] Serkan Balli, Ensar Arif Sag'basx and Musa Peker, "Human activity recognition from smart watch sensor data using a hybrid of principal component analysis and random forest algorithm", Measurement and Control 52(1-2), 2019.
- [4] YOUNGSUN KONG AND KI H. CHON (Senior Member, IEEE), "Heart Rate Tracking Using a Wearable Photoplethysmographic Sensor During Treadmill Exercise", Received September 9, 2019, accepted October 12, 2019, date of publication October 17, 2019, date of current version October 31, 2019, This work was supported in part by the National Institutes of Health (NIH) under Grant 1R01HL137734, and in part by the National Science Foundation (NSF) under Grant 1522087.
- [5] Arushi Singh, Nandini Kashyap, Rakesh Garg, "Fuzzy based approach for diet prediction", 2019.
- [6] Abrar Zahin, Le Thanh Tan, Rose Qingyang Hu, "A Machine Learning Based Framework for the Smart Healthcare System", 2020 International Engineering, Technology and Computing (IETC).
- [7] Ghenadie Usic, "Development of a Patient-Specific Model for Patients with Diabetes Type I Using Meal and Exercise Guidelines from Modern Schools of Diabetes", The 8th IEEE International Conference on E-Health and Bioengineering - EHB 2020-Grigore T. Popa University of Medicine and Pharmacy, Web Conference, Romania, October 29-30, 2020.
- [8] Honey Pandey, S. Prabha, "Smart Health Monitoring System using IOT and Machine Learning Techniques", 2020.
- [9] Amit Nagarkoti, Revant Teotia, Amith K. Mahale and Pankaj K. Das, "Realtime Indoor Workout Analysis Using Machine Learning & Computer Vision", 2021.
- [10] Divya Mogaveera, Vedant Mathur, Sagar Waghela, "e-Health Monitoring System with Diet and Fitness Recommendation using Machine Learning", 2021.
- [11] Megh Shah, Sheshang Degadwala, Dhairya Vyas, "Diet Recommendation System based on different Machine Learners", 2022.
- [12] Muhib Anwar Lambay, Dr. S. Pakkiri Mohideen, "A Hybrid Approach Based Diet Recommendation System using ML and Big Data Analytics", 2022.
- [13] Rutika Bhagat, Prof. Pragati Patil, "Health Monitoring System Using Machine Learning Techniques Algorithm", International Journal for Research in Applied Science & Engineering Technology (IJRASET), ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538, Volume 11 Issue VI Jun 2023.
- [14] Akshay R. Jain, Rudrang R. Darade, Akshay V. Dandwate, Shubham S. Joshi, Sahil S. Kothmire, "Personalized Exercise and Diet plan Recommendation System for GYM", 2023.



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