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AI Based Food and Diet Recommendation System

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ABSTRACT: In healthcare, artificial intelligence (AI) has been changing the way doctors and health experts take care of people. This paper will cover how AI is making major changes in the health care system, especially with diet, fitness, weight and nutrition. A healthy diet is essential for good health and nutrition. It protects you against many chronic non communicable diseases, such as heart disease, diabetes and cancer. Eating a variety of foods and consuming less salt, sugars and saturated and industrially-produced trans-fats, are essential for healthy diet. Healthy diet improves the quality and span of the life. The essential need before starting the diet is to know about BMI of that individual to realise the quantity of intaking food and the necessary exercises to maintain their weight and diet. To achieve this system, we use deep learning algorithm such as artificial neural network (ANN).

KEYWORDS: BMI, Artificial Neural Networks,

I.INTRODUCTION

People from all around the world are getting more concerned in their health and way of life in today's modern environment. However, avoiding junk food and exercising alone are insufficient, we also need to eat a balanced diet and lead a healthy life. Based on our age, gender,height and weightwe can calculate our BMI and according with that we need to take the necessary food and exercise to maintain a healthy life.Your diet can help you achieve and maintain a healthy weight, lower your chance of developing chronic diseases and improve your general health when combined with physical activity. Our proposed work, enhances artificial neural network algorithm in deep learning which suggest exercise for the people according to their BMI value to lead a healthy diet and successful life style.

II.RELATED WORKS

The epidemic of diabetes in American Indian (AI) communities is a serious public health challenge. The incidence and prevalence of diabetes have increased dramatically with accompanying increases in body weight and diminished physical activity. In this paper, we propose a proactive diabetes selfcare recommendation system specifically for AI patients. It recommends healthy life style to users to fight for their diabetes. Thanks to the quasi-ubiquitous use of cell phones in most AI tribes, we choose cell phones as the platform to provide smart personal care for AI patients. By integrating the AI users' ontological profile with general clinical diabetes recommendation and guidelines, the system can make personalized recommendations (e.g., food intake, physical workout) based on the special socioeconomic, cultural, and geographical status particularly to AI patients. The proposed system was implemented as mobile applications. Evaluations performed by use case studies and human expert verification demonstrate the effectiveness of the system.[1]

Recent studies have shown that robust diets recommended to patients by Dietician or an Artificial Intelligent automated medical diet-based cloud system can increase longevity, protect against further disease, and improve the overall quality of life. However, medical personnel are yet to fully understand patient-dietician's rationale of recommender system. This paper proposes a deep learning solution for health base medical dataset that automatically detects which food should be given to which patient base on the disease and other features like age, gender, weight, calories, protein, fat, sodium, fiber, cholesterol. This research framework is focused on implementing both machine and deep learning algorithms like, logistic regression, naive bayes, Recurrent Neural Network (RNN), Multilayer Perceptron (MLP), Gated Recurrent Units (GRU), and Long Short-Term Memory (LSTM). The medical dataset collected through the internet and hospitals consists of 30 patient's data with 13 features of different diseases and 1000 products. Product section has 8 features set. The features of these IoMT data were analysed and further encoded before applying deep and machine and learning-based protocols. The performance of various machine learning and deep learning techniques was

carried and the result proves that LSTM technique performs better than other scheme with respect to forecasting accuracy, recall, precision, and F1-measures.[2]

Predicting Virtual assistants are an essential part of modern life and are crucial to how we do our everyday business. About 27% of people utilize AI virtual assistants to complete daily chores, according to a 2019 Clutch survey report that was published. With our idea for an AI-based fitness trainer, we intend to investigate the rapidly developing field of artificial intelligence. Our research led us to create Fitcercise, a programmed that counts the repetitions of a particular exercise while detecting the user's workout stance and providing detailed, individualized suggestions on how the user can improve their form. Using AI-driven human pose estimation technology, the software recognizes a person's stance, analyses the geometry of the posture using data and real-time video, and then counts the number of repetitions of the specific exercise.[3]

Nowadays virtual assistant is playing a very important role in our daily activities and has become an inseparable part of our lives. As per the Clutch survey report that was published in 2019, almost 27% of people are using AI virtual assistants for performing their day-to-day activities. AI is an emerging field that we aim to explore through this project of AI-based workout assistants. In our work, we introduce Fitcercise, an application that detects the user's exercise pose counts the specified exercise repetitions and provides personalized, detailed recommendations on how the user can improve their form. The application uses the MediaPipe to detect a person's pose, and afterwards analyses the geometry of the pose from the dataset and real-time video and counts the repetition of the particular exercise.[4]

Recently the number of people exercising at home has increased especially due to the COVID19 pandemic. Therefore, the need for no contact exercise instructions is in great demand since physical access to the gym is limited or discouraged. To meet this demand, many online exercise instruction videos are available. However, the systems are both passive and have no real time feedback to aid the user. In this work, we propose an AI based fitness monitoring system (AI Fitness Coach) that can offer real time guidance during exercise. The AI Fitness Coach, consists of a pose recognition unit, a fitness movement analysis unit, and a feedback unit. The user captures their pose by a fixed camera. The pose recognition unit processes the captured image and outputs the recognition results to the fitness movement analysis unit. After the results are processed by the fitness movement analysis unit, advice is output from the device through video or voice. On comparison to existing methods, the proposed method results are at par and encouraging.[5]

III. PROPOSED METHODOLOGY

This paper provides an overview of the current state of AI applications in healthcare with a focus on the utilization of AI-driven recommender systems in nutrition. It will discuss the positive outcomes and challenges that arise when AI is used in this field. It accepts user input of humans age, gender, height and weight for calculating BMI value to suggest the report of diet and exercises. We proposed this system using ANN algorithm.

ARTIFICIAL NEURAL NETWORK [ANN]

The Artificial Neural Network (ANN) is a deep learning method that arose from the concept of the human brain Biological Neural Networks. The development of ANN was the result of an attempt to replicate the workings of the human brain. There are three layers in the network architecture: the input layer, the hidden layer (more than one), and the output layer. Here we consider age, gender, height and weight as dataset (input layer) and BMI values as hidden layer and the exercise, diet and food recommendation as output layer.

CALCULATE BMI

BMI is a measurement of a person's leanness or corpulence based on their height and weight, and is intended to quantify tissue mass. It is widely used as a general indicator of whether a person has a healthy body weight for their height. Specifically, the value obtained from the calculation of BMI is used to categorize whether a person is underweight, normal weight, overweight, or obese depending on what range the value falls between. These ranges of BMI vary based on factors such as region and age, and are sometimes further divided into subcategories such as severely underweight or very severely obese. Being overweight or underweight can have significant health effects, so while BMI is an imperfect measure of healthy body weight, it is a useful indicator of whether any additional testing or action is required. Refer to the table below to see the different categories based on BMI that are used by the calculator



Normal	18.5 - 25
Overweight	25 - 30
Obese Class I	30 - 35
Obese Class II	35 - 40
Obese Class III	> 40

Fig-1 BMI Metrics

This is the World Health Organization's (WHO) recommended body weight based on BMI values for adults. It is used for both men and women, age 20 or older. Under the BMI value of < 18.5 need to focus on nutrient-rich foodsto promote weight gain and muscle development.

DATASET AND DATA PROCESSING

We collect normal people's age, gender, height and weight to give as input in BMI calculator to get the BMI value as output. According to the BMI value human beings need to change their style in diet. A proper diet includes intake of food quantity and exercise. Our system calculates BMI value and tells us the proper food quantity and necessary exercise so that we can maintain our health

BMI VALUE BETWEEN 18.5 TO 24.9

The people between these values are normal people they just need to maintain their present condition. OUTPUT - They need to include some mild exercises such as walking, cycling, swimming or jacking. If they wish they can also undergo a strengthening exercise. The intake of food quantity is 400grams per day. They should include more fruit, vegetables, grains and low-fatdairy products to maintain health.

BMI VALUE BETWEEN 25 TO 29.9

The people between this value are pre obesity people they must be careful because whenever they can reach an obesity. OUTPUT - They can also follow the exercise as normal people but intake of food must be controlled and they should only take low calorie foods.

BMI VALUE IS ≥ 30.0

These peoples are obese people and they need more physical activities than any another people. OUTPUT - Consult any healthcare professional or a fitness expert to create personalized exercise plan. Combine aerobic exercises with strength training for optimal results. They must control the intake of sugar, saturated fats and processed foods.

IV. RESULT & DISCUSSION

Nowadays, many people skip a meal or turn to methods such as hydrotherapy and diuretics to lose weight, while such approaches cause physical harm and neither of them are helpful (21). The best way to control weight, whether in weight gain or loss diets, is to manage daily calorie intake, which the food recommender system suggests the best option by combining the amount of calories needed in each meal and the user's interests. Another application of this system is to provide group recommendations to the management of the university nutrition department based on the calories of each food and the amount of calories needed by each user (22). In this system, first, the foods selected by the users are divided into segments according to their energy level; 5 segments are allocated to the amount of extra energy received in each meal and 5 segments are allocated to the amount of calories less than the users' needs. Each meal is reviewed in its own section. This analysis is performed over a 90- day time window frame and allows the nutrition management to decide and plan to increase or decrease the amount of food or the energy content of each meal based on the level of acceptance of the food and the energy required by the users. Figures 4 and 5 show the number of meals served based on the difference in energy required and received per meal. By checking these values, it is possible to reduce extra energy in foods or plan to reduce food waste

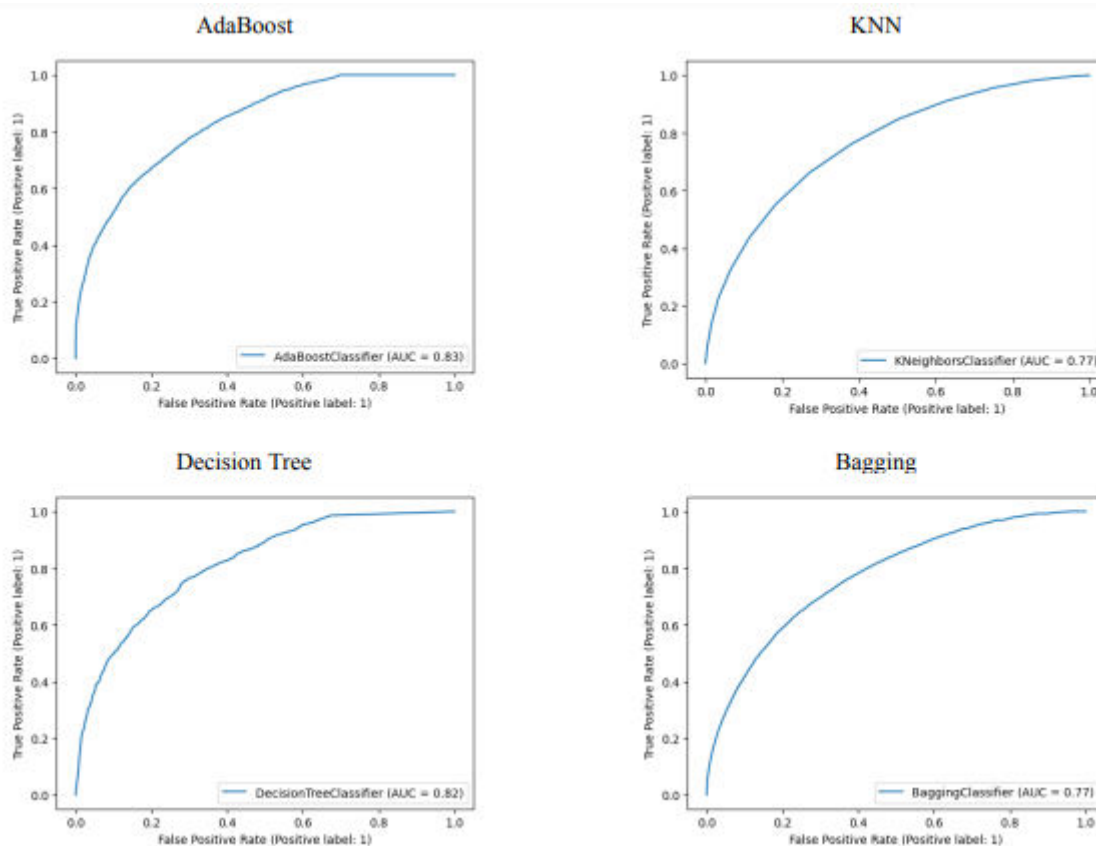


Fig-2 Comparison Analysis

V. CONCLUSION

In this work, we propose an artificial intelligence-based food and diet recommendation system that provides real-time guidance for people. The experimental results prove the effectiveness and viability of the proposed method. They show that the system can work normally, and the development of the function library is effective, which can greatly save the time of developers. Because of the function library, developers who do not know how to code can use csv files to edit and add, thus effectively joining the development of contact-less fitness. The results of the proposed method are identical and encouraging compared to the existing method. The proper diet and exercise are necessary for a healthy life.

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