A SURVEY ON PERSONALIZED DIET FOOD RECOMMENDATION SYSTEM

Azhageshwaran*1, Tamilselvan*2, Neethirajan*3, Vanitha*4

*1,2,3Students, Department Of Information Technology, Kumaraguru College Of Technology, Tamil Nadu, India.

*4Professor, Department Of Information Technology, Kumaraguru College Of Technology, Tamil Nadu, India.

ABSTRACT

In today's modern world, human beings around the sector are getting more and more interested in their very own health and lifestyle. It is not enough to keep away from junk meals and workout, we additionally want to devour a balanced diet plan. With a balanced food regimen based totally on our age, height and weight, we can stay an amazing and wholesome existence. Combined with physical exercise, diet plan allows you to acquire and preserve a wholesome weight and promote your common fitness. A balanced weight loss program is one that provides the frame with the vitamins it needs to function well. The calorie content of a food is a degree of the quantity of strength it carries. Our bodies use calories for just about the entirety like respiration, running, walking, and so forth. On common, a person needs 2000 calories for day, but the precise calorie intake relies upon on the physical elements of the character, which includes height, weight, gender and age. So, the selection of food you eat every day affects your fitness - the way you sense today, the following day and in the destiny. So, the proposed system recommends you a good and healthy diet plan primarily based to your physical characteristics and goal.

Keywords: Diet Plan, Machine Learning, KNN, Random Forest Algorithm, Recommendation System, BMI, Calories.

I.   INTRODUCTION

One of the important components of a healthy life is your day-by-day weight diet plan and body nutrition. Especially for humans with mild or intense infection. eHealth's initiatives and studies efforts are geared toward supplying green end-users with various ubiquitous applications to improve their fitness. various studies have proven that inadequate and insufficient vitamins is a major reason of various fitness troubles and ailments. according to a observe carried out through the World Health Organisation (WHO), approximately 30% of the world's overall populace suffers from various sicknesses, and it is expected that 60% of the children who die every 12 months are due to malnutrition. Another WHO observe located that an inappropriate and unbalanced food regimen is responsible for approximately 9% of coronary heart assault deaths, approximately 11% of ischemic heart ailment deaths, and 14% of gastrointestinal most cancers deaths global. pronounced to be causing similarly, about 250 million children be afflicted by vitamin A deficiency, 200 million from iron deficiency (anaemia) and seven-hundred million from iodine deficiency. The primary attention of this interest is to provide nutritional guide to a various organization of folks who may additionally or may not be suffered by common illnesses. They are mainly utilized in industrial applications. The recommendation technique basically consists of three Phases: Information amassing phase, learning phase, recommendation segment. First, gather data related to a specific problem statement and classify diverse solutions to that problem. After the information gathering, there is a learning phase in which one-of-a-kind conclusions are drawn from the gathered statistics, and within the final section, particularly the recommendation phase, the outcomes are issued with distinct recommendations made. This device is a nutrients recommendation system, so suggestions are related to nutrition making plans. for example, what have to you eat, what is your BMI (body Mass Index), which suggests whether you are Healthy, overweight, or skinny. The price of fast-meals consumption is alarmingly excessive, ensuing in bad meals intake, which results in numerous fitness issues including weight problems, diabetes and blood pressure and etc. consequently, it has emerged as very vital for people to eat a balanced and healthy food plan. but, on this rapid-paced technology, now not anyone has the money and time for a personal dietitian or nutritionist to take care of their fitness by way of recommending healthy consuming plans in keeping with an individual people's data. In this report, this period attempted to discuss people's unhealthy consuming habits and offer satisfying recommendation to lead a good and healthy life.

The goal of this takes a look at is to remember various crucial factors of the consumer's way of life and make sure that these elements are included whilst the device works on a method to build and propose a healthy and nutritious food regimen for the consumer. a terrific nutritious healthy weight loss program and a mild quantity of physical interest can assist in keeping a wholesome weight. however, the blessings of proper vitamins have loads greater to do than simply coping with the weight. Being in shape is all approximately the 70/30 rule. here's how it is going, for a person to stay wholesome he/she must attention 70% on his nutritional consumption and 30% on his bodily activity or exercise.

II.　　LITERATURE SURVEY

Numerous works were proposed for many different recommendation systems related to diet and meals. those structures are used for healthy diet food recommendation, menu suggestions, diet plan guidelines, fitness hints for unique illnesses, and food recipe recommendation. Majority of these recommendation models extract person's preferences from exceptional sources like users' rate scores.

A Food Recommendation System (FRS) [1] is built for diabetic sufferers that used k-mean clustering and also Self Organizing Map for clustering analysis of food. The proposed system recommends the substituted food ingredients in step with nutrition and meals parameters. However, FRS does not thoroughly address the disease level issue because the extent of diabetes may range hourly in different conditions of the patient and the food guidelines can also range for this reason.

Tags and latent factor are used for android based food recommender system [2]. The model suggests a personalized food recipe to each user based on the tags and rankings of preferences provided by the user. The proposed machine used latent characteristic vectors and matrix factorization of their algorithm. Prediction accuracy is done by using tags, which are more relevant to recommendations with users' preferences. However, the authors do not consider nutritional factors as balancing the user's meal plan according to his preferences.

A Content based food recommender system [3] is proposed which recommend meals recipes in keeping with the choices already given by means of the person. The favored recipes of the user are fragmented into ingredients which can be assigned rankings in line with the saved users' possibilities. The recipes with the matching aspect are encouraged. The authors do not take into account the vitamins factors and the stability in the weight loss program. moreover, probabilities of equal recommendation are also present due to the fact the choice of the user might not change on every day basis.

Fitness Advisor System Using Data Mining [4] this cautioned the person in keeping with their hassle related to body weight with the aid of an efficient analysis of the equal and spreading proper focus approximately the health hazards. The authors taken into consideration various factors in the device along with Height, weight, body Health, Gender, smoking and drinking habits, physical activity, sleeping fitness and many others. A combination of classification, clustering and association algorithms used to best possible and expert recommendation to the person's problem changed into used by authors. The final result of the system become expert's recommendation in terms of diet and exercise.

Application for managing diabetic patients' nutrition [5] used the artificial intelligence to design a knowledge base according to the guiding principle laid out by the "American diabetes association". The favorites and the health status of the patients was analyzed to suggest a perfect snack for the affected.

Diabetes Prediction Using Random Forest Classifier and Intelligent Dietician [6] completed a performance observe of a healthy weight loss plan recommendation gadget utilizing on-line facts mining, in which the layout and implementation of a healthful food regimen recommendation gadget become based totally on net records mining. The authors proposed a singular framework based totally on information mining technology for developing a web-page recommender gadget, which might be applied as the middle framework for the wholesome ingesting device. The authors evaluated two records filtering strategies for giving the favored facts. The facts filtering operations might be performed before to the real suggesting system with the aid of using records mining strategies, which stepped forward the machine response time and made the framework scalable.

Insights from machine-learned diet success prediction [7] tried to get insights from gadget studying - diet fulfillment prediction, which might resource human beings attempting to stay healthy and healthful by using tracking their dietary consumption. The scientists studied the capabilities of a failed weight loss plan using public food diaries from over 4,000 lengthy-time period energetic MyFitnessPal customers. Authors mainly

constructed a system getting to know model to forecast going over or beneath self-set each day calorie goals regularly after which examined which elements contribute to the version's prediction, with research concentrating on "quantified self" facts. The authors discovered that classification performance changed into adequate, and that the token-based version outperformed the category-primarily based model, and that such information might be utilized for further in-intensity records mining

Diet Recommender System Using Web Data Mining [8] presented a proposal for a wholesome food addiction and eating device primarily based on on-line information mining, which could tune eating conduct and prescribe the types of food that could sell health while fending off the forms of meals on the way to growth the hazard of ailment. To extract meaningful records about humans' consuming behavior, the authors hired data mining techniques consisting of class, clustering, and association rules. The nutritional structure of each kind of food changed into tested, and the percentages of fat, electricity, and nutrients in the recipe have been computed. The class mining technique became then used to assess the composition facts and determine if the weight loss plan become healthy or no longer. therefore, particular suggestions have been made for every person.

Analysis of meal patterns with the use of supervised data mining techniques [9] This illustrated how a coding system at the meal level can be tested the usage of facts mining techniques on these works. They tested the usefulness of supervised records mining algorithms for predicting an element of dietary exceptional based on dietary intake using a food-based totally coding device and a novel meal-based totally coding device. meals consumption data from the North South Ireland food intake Survey 1999. A score for healthy eating (HEI) turned into created. Artificial neural networks (ANNs) and decision tree were used to are expecting HEI quintiles based totally on meal pairings. consequently, the ANN had incredibly higher accuracy than the decision tree in terms of predicting HEI.

Mining Nutrition Survey Data [10] employed mining questionnaires to measure the existing expertise of kid members and how this knowledge increases after the learning session. The authors used data preprocessing to keep away from inconsistencies present in the data. The primarily used algorithm employed for this goal were a few simple algorithms to be had in WEKA tool. On the dataset, there are three type techniques have been used Naive Bayes, Bayes network, C4.5 and Decision trees. The authors used two clustering strategies of their analysis K-means and DBSCAN. As a result, it become located that data mining turned into able to inferring the outcomes a way higher than general statistical analysis.

Fitness Advisor System Using Data Mining [11] to create a fitness advising system. The authors' fitness consultant become a computer software that endorsed the user primarily based on their problem with body weight through an efficient diagnostic and spreading accurate records approximately the health issues. The writers investigated several machine parameters including height, weight, body kind, sex, smoking, drinking, fitness situation, physical hobby, sleeping hours, and so on. The authors employed an aggregate of clustering, association, and class algorithms to effectively give the pleasant feasible expert recommendation to the consumer's scenario. The authors generated association guidelines the usage of the Apriori method. The machine's closing end result become expert hints on nutrition and workout.
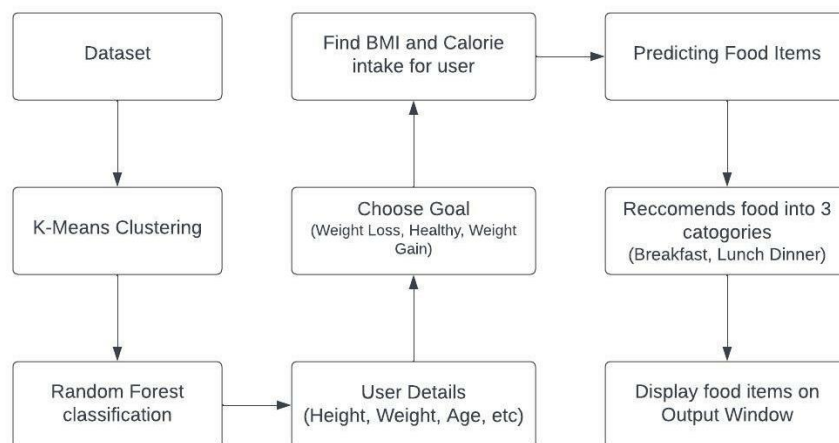
III.   PROPOSED SYSTEM

Fig.1 FLOW DIAGRAM

The model works in a Machine Learning surroundings, where it calculates the person records and consequently give the endorsed diet regime to work on. in this challenge the dataset is split into three classes Lunch Menu, Breakfast Menu, Dinner Menu. as a consequence, additionally train the system mastering model with one-of-a-kind inputs to get the favored outcomes for the user. Here this model used mainly two Algorithms here which are K-Means and Random Forest. Consistent with the choice which person takes in healthy weight loss plan, weight gain or weight loss the version as in line with the facts and category selected will generate a healthy diet plan for each individual user.

3.1 K-Means Algorithm

K-Means algorithm is an iterative algorithm that tries to partition the dataset into pre-defined distinct nonoverlapping subgroups (clusters) where each data point belongs to only one group. It tries to make the intra-cluster data points as similar as possible while also keeping the clusters as different (far) as possible. It assigns data points to a cluster such that the sum of the squared distance between the data points and the cluster's centroid (arithmetic mean of all the data points that belong to that cluster) is at the minimum. The less variation has within clusters, the more homogeneous (similar) the data points are within the same cluster. In this project the data set is divided into three categories lunch, breakfast, dinner with the help of k means clustering algorithm the below diagram shows how all three categories are separated from the cluster a dataset This helps us to finally divide the dataset into train and test dataset for all three categories and further the model is built in using the random forest algorithm.

3.2 Random Forest Algorithm

Random Forest algorithm is a supervised learning algorithm mainly used for classifications. It is a procedure of combining multiple classifiers to resolve a complex problem and to enhance the overall performance of the model. As name implies that Random Forest is a classifier algorithm that consists of different subsets of the given particular Dataset and takes the mean to enhance the predictive accuracy of that dataset. Random forest takes the prediction from every tree and primarily based on the majority votes of predictions, and it predicts the final output.

Random Forest now helps to generate classes from the dataset when the system classifies the dataset into different categories. A random forest is a set of decision trees, if you input a training dataset of features and labels into the decision tree, the model will generate some set of rules which is used to make predictions.

IV.   TECHNIQUES TO BE USED FOR BUILDING A RECOMMENDATION SYSTEM

4.1 Random Forest Algorithm

The content-based technique is a domain- independent algorithm which specializes in a whole lot greater on the assessment of the characteristics of things to find predictions. when files like pages, publications in addition to news are being recommended, the content-based filtering strategy might be the most worthwhile. In a content-based filtering method, the recommendation is made primarily based upon the character profiles with parameters acquired from the statistics within the matters the person has tested in preceding times.

4.2 Collaborative based Filtering Method

Collaborative filtering method is a domain-independent prediction method for content that cannot effortlessly and competently be defined by metadata which includes movies and music. Collaborative filtering method works through building a database of possibilities for items by using customers. In the new, narrower sense, collaborative filtering method is used for making automatic predictions about a user's interests by collecting preferences or taste from multiple users. The basic assumption of the collaborative filtering technique is that if a person A has the same opinion as a person B in a difficulty, A is much more likely to have B's opinion on a difficulty than that of a randomly selected person.

4.2.1 Memory based Filtering Method- Items previously rated by the user play a relevant role in searching for neighbors who share appreciation with him. Once a person's neighbors are found, a variety of algorithms can be used to combine friends' tastes to create recommendations. Due to the utility of these techniques, they have achieved extensive results in real-time applications.

4.3.2 Model based Filtering Method- In this method, models are implemented using different machine learning and data mining algorithms to predict unrated products rating od users. There are numerous Model-based CF algorithms. Latent semantic models such as Bayesian networks, clustering models, singular value decomposition, probabilistic latent semantic analysis, multiplicative factor, latent Dirichlet allocation and

Markov decision process-based models.

4.3 Hybrid based Filtering Method

A number of applications combine model-based CF and memory-based algorithms. Those overcome the native CF techniques limitations and increase prediction performance. Especially, they conquer the CF troubles inclusive of sparsity and information loss. But they have increased complexity and require more cost to implement. Generally, most recommender models are hybrid, as an example, the Google news recommender model.

V. CONCLUSION

The emerging technologies such as machine learning and artificial intelligence are playing an important role in the development of information technology (IT) industries. A system for people who want to lead a healthy life by consulting their diet using these technologies. The significance of nutritional guidance is increasing day by day to live a healthy and wholesome life and a healthy diet plan is developed by adapting to the user's preferences and user's profile.

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