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Diet Recommendation Using Machine Learning

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ABSTRACT: We expect to use the new headway in innovation to foster dietary as evaluation arrangements which is a more helpful way to deal with screen day to day food admission and control dietary patterns. Food, calorie and sustenance estimation framework is exceptionally advantageous for people groups to quantify and deal with their everyday food consumption. AI will make suggestions in view of the things that are of client's advantage or enjoyed by them before. Additionally these calculations are utilized to suggest the food that the client might like. The recommended food and food in standard recipes set by user's own situation are in the same cluster, which meets the user's nutritional balance. We highlight the issue of selection of proper diet that must fulfill everyone's nutritional requirements. In this paper we are using svm classifiers for recommending the diet. In that Breakfast, Lunch, Dinner all these three things providing the svm classifier.

KEYWORDS: Machine Learning, Support Vector Machine, Food Recommendation system, Linear regression

I. INTRODUCTION

In the present furious world, the significance of diet the board has expanded definitely. Because of undesirable and random dietary patterns, the spread of diet related illnesses is at an untouched high. In India, in excess of 2 out of each and every 100 individuals experience the ill effects of diabetes, while 32 out of each and every 100 individuals experience the ill effects of coronary illness. There are a large group of diet related applications and arrangements accessible today. While the significance of adjusted diet continues to build, the range of uses in plain view today actually need culmination. This application will help users structure their daily diet according to various individual factors which include BMI, allergies, diseases, etc

BMI	Weight Status
Below 18.5	Underweight
18.5 – 24.9	Healthy Weight
25.0 – 29.9	Overweight
30.0 and Above	Obesity

Fig.1 BMI Types

II. LITERATURE SURVEY

Anonnya Banerjee et al. [1] stated that, to provide a better dietary solution our paper proposes a model to basis of their potassium level in blood. Classification of the patients is implemented recommend food for patients suffering from kidney disease on the using WEKA and then further using query-based matching we recommended food for the identified levels based on the seriousness of the disease.

Akash Maurya, Rahul Wable [2] proposed that proposed m extracts the features which are responsible for CKD, then machine learning process can automate the classification of the chronic kidney disease in different stages according to its severity. The objective is to use machine learning algorithm and suggest suitable diet plan for CKD patient using

classification algorithm on medical test records. Diet recommendation for patient will be given according to potassium zone which is calculated using blood potassium level to slow down the progression of CKD.

Heba Abdelgader Mohammed [3] proposed that work in progress to develop a type 2 fuzzy logic based diet recommendation system for diabetes to help achieving a healthy lifestyle to control the disease.

Celestine Iwendi et al. [4] stated that in this paper, 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).

[5] Divya Mogaveera, Vedant Mathur, Sagar Waghela **“e-Health Monitoring System with Diet and Fitness Recommendation using Machine Learning”** proposed that to recommend diet and exercise based on their latest reports and personal health details. For this, author have broadly classified our 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. To be precise, C4.5 is used to give recommendations of diet and exercise. A C4.5 Decision tree will help recommend and determine if a particular food item and exercise should be given to a particular individual or not with respect to our customized datasets.

[6] Prithvi Vasireddy **“An Autonomous Diet Recommendation Bot Using Intelligent Automation”** proposed solution is capable of sending a large number of diet recommendations to hundreds of users in a database at a very expeditious rate.

[7] Rung-Ching Chen, Chung-Yi Huang and Yu-Hsien Ting “A Chronic Disease Diet Recommendation System Based on Domain Ontology and Decision Tree” stated that an ontology, decision trees, and Jena to construct the recommendation system. The dietary recommendations results are evaluated by dietitians, and the verification accuracy is 100%. Therefore, this system of dietary recommendations can provide convenient, healthy, dietary recommendations for nutrients for patients with chronic diseases.

III. PROPOSED METHOD AND ALGORITHM

A. Proposed Methodology

People login into the system and directly enter their health-related information and working lifestyle which is directly stored into the database. This health and lifestyle related information acquired through the software is the first-hand material for this system e.g. the height, weight, diseases etc. The data regarding food items and its nutritional value is collected from the dataset provided by USDA agricultural research service food datasets. Generally, the data acquisition module selectively obtains data from the outside web environment, in terms of functionality to provide material and resources for the latter algorithms.

B. Dataset

We have created dataset in that age, weight, height, bmi, breakfast, lunch, dinner all these columns are present. For BMI we have collected the dataset from kaggle. Below is the link (<https://www.kaggle.com/datasets/vasserb/bmidataset>)

date	time	category	breakfast	lunch	dinner	breakfast	dinner	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
12/3/90	1	no veg	1 cup [180] 12-mo chs in chagatti bowl of 1 One small bowl of brown rice 2 whole wheat chapatti, 1 small bowl of [legumes] (mango, chas, macor, or soy)																														
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Fig.2 Dataset Details

C. Pre-processing

In pre-processing we are remove the null values.

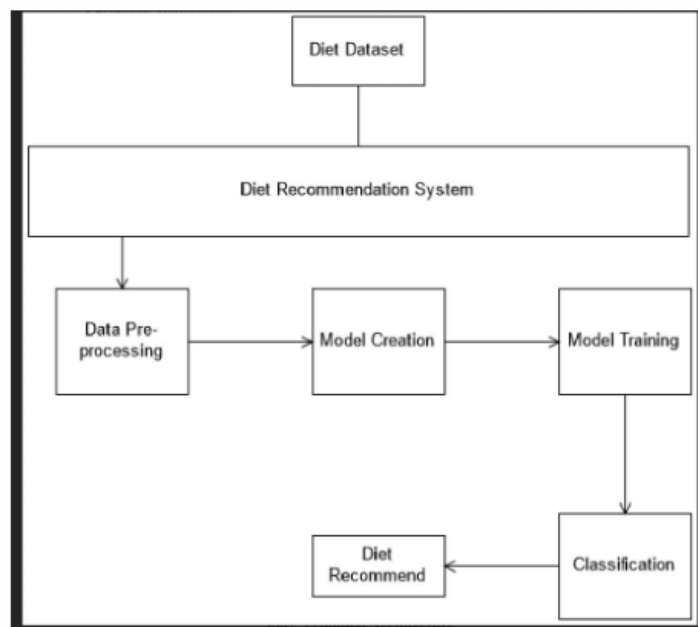


Fig 3. Proposed Architecture

D. Algorithms

1. Linear Regression

Whenever we've gained information with various factors, one vital inquiry is the manner by which the factors are connected. For instance, we could want the connection between individuals' loads and levels, or review time and grades. Relapse is a bunch of procedures for assessing connections, and we'll zero in on them in our framework. In this paper, we'll zero in on finding one of the most straightforward kinds of relationship: direct. This process is unsurprisingly called linear regression, and it has many applications. In this project the the dependent feature is BMI and independent features are weight (kg) and height (m*2). The red line tells the best fit line as shown in fig4.

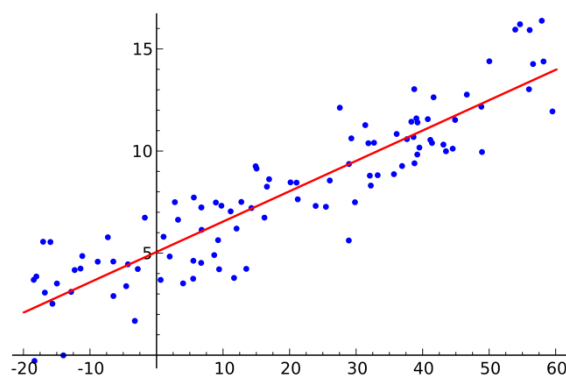


Fig. 4 Linear regression

2. Support Vector machine

By and large the utilization of AI calculation is utilized for the suggestion. In this paper, the help vector machine will recommend the eating regimen. SVM is a managed AI calculation which works in view of the idea of choice planes that characterizes choice limits. A decision boundary separates the objects of one class from the object of another class. Support vectors are the data points which are nearest to the hyper-plane as shown in figure5. Kernel function is used to separate non-linear data by transforming input to a higher dimensional space. Gaussian radial basis function kernel is

used in our proposed method. Given a set of labelled training examples, each belonging to one category. Support Vector Machine builds a model that assigns new examples to one of the category.

SVM cost function is given as:

$$\text{Min}C \sum [y^{(1)} \text{cost}1(\theta^T x^{(i)}) + (1 - y^{(i)}) \text{cost}0(\theta^T x^{(i)})].$$

$$h(x) = \begin{cases} 1, & \text{if } \theta^T x \geq 0 \\ 0, & \text{otherwise} \end{cases} \quad (2)$$

Where

x: Training example (feature vector)

m: Number of training examples

n: number of features

θ : parameter vector

C: constant

y: class label

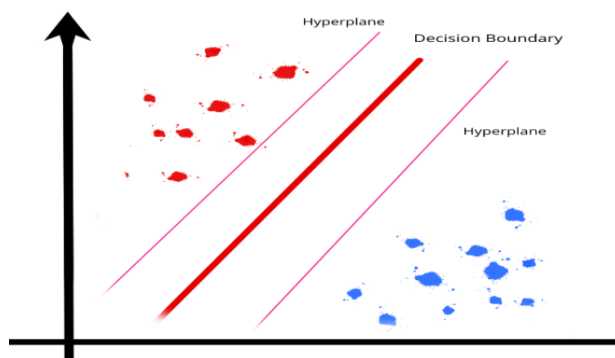


Fig. 5 SVM architecture

IV. RESULTS AND DISCUSSION

Learning model is partially implemented in that we are recommending the diet based on the weight, height, based we are recommending the diet. In this paper we are total three svm classifiers are trained and used for recommending the diet. The linear regression classifier is calculating the bmi. The total 7039 entries are present in the dataset Out of them we have split the dataset into two categories training and testing. For training we have used 6000 entries and 1039 entries for testing. The linear regression model provides the 87.92% accuracy and 91.2% accuracy by support vector machine as shown in table1.

Table1. Comparative Analysis

Training	Testing	Algorithms	Accuracy
6000	1039	Linear Regression	87.92%
6000	1039	Support Vector Machine	91.2%

V. CONCLUSION

We provide a user-friendly application that covers aspects like menu generation along with providing nutritional information. The output will be in the form of Suggested Nutrient Intake Raw Materials, as well as the Menu Generated. In this paper we are using linear regression for generating the bmi taking two features weight and height. The support vector machine classifiers are providing the diet. Total three svm classifiers are trained. Every classifier provides the breakfast, lunch and dinner respectively.



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