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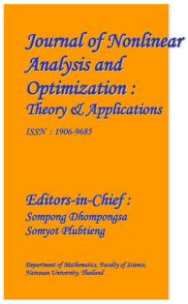

FINDING OF VITAMIN DEFICIENCY AND FOOD RECOMMENDATION SYSTEM USING MULTIPLE CLASSIFIER ALGORITHMS

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ABSTRACT

The World Health Organization (WHO) has shown that a lack of or uneven intake of food contributes to roughly 9% of heart attack fatalities, 11% of ischemic heart disease deaths, and 14% of gastrointestinal cancer deaths globally. More than a billion individuals are anemic due to iron deficiency (anaemia), 0.25 billion children have vitamin deficiencies ranging from vitamin A to vitamin K inadequacy, and 0.7 billion are iodine deficient, making a total of roughly 0.25 billion people anaemic. Diet recommendations are the primary goal of this study. The recommender system has to cope with a significant amount of data from the dataset in order to find relevant recommendations.

In this project own data set is prepared based on various high and low values of vitamins from (vitamin a , b,c,d,e,k) and features are divided from normal and abnormal conditions of vitamins and labels are divided in to o and 1 as normal and abnormal. Another dataset is prepared based on combination of various vitamins and their deficiency and food to be recommended based on which vitamin is deficient.

In this project multiple classifier algorithms are used (knn, decision tree, random forest, logistic regression, voting classifier) ensembled algorithm is used to combine multiple algorithms and train a new algorithm. Accuracy of each algorithm is calculated and best algorithm is used for prediction purpose.

Prediction is shown using flask web application which will detect deficiency of vitamin and recommend type of food to be taken on various combinations.

1. INTRODUCTION

When it comes to health issues, today's human beings are dealing with anything from a lack of physical fitness to mental issues. Numerous studies show that poor eating is a key contributor to a wide range of health problems and illnesses. The Globe Health Organization (WHO) found that malnutrition is responsible for 9 percent of all heart attacks, 11 percent of all deaths from ischemic heart disease, and 14 percent of all deaths from gastrointestinal cancer in the world. Vitamin A insufficiency affects 0.25 billion children, anaemia affects 0.2 billion individuals, and iodine deficiency affects 0.7 billion people worldwide. The main objective of this work to recommend a diet to different individual. As a result, the recommender system has to deal with a lot of data, but it does so by focusing on the information that is most relevant to the user, depending on the information they offer and other variables. Users and objects are matched based on physical characteristics (age and gender, height and weight, body fat percentage), preferences, and other factors (weight loss or weight gain). The information gathering phase, the learning phase, and the recommendation phase make up the three main parts of the recommendation process. Information concerning a certain issue is gathered initially, then potential solutions to that problem are grouped together. After the collection of information Learning Phase comes in which various conclusions are made out of that information which is gathered and in last phase i.e., Recommendation Phase an output is given in which various recommendations are made. In our project the output of recommendation is based on user's physical aspects, preference and their Body mass Index (BMI).

Balanced nutrition is important aspect of healthy lifestyle for peoples. Along with balanced diet, a regular physical exercise is crucial for healthy life. Now a day’s nutrition and health are often overlooked. The majority people suffering with diabetes, heart disease, cancer, stroke etc. The diseases are almost directly related to unhealthy eating habits. As a result, our bodies need nutrients in order to function

properly, and food provides these nutrients. A healthy, balanced diet will usually include vitamins, minerals, protein, healthy fats, proteins, carbohydrates, and fiber. A healthy food pyramid is combination of plant foods, moderate amount of animal products. Vegetables, grains, fruits, oils and sweets, dairy, meat, and legumes are all included in this category. If you're deficient in calcium, protein, or vitamins, it's likely that you don't know why you're deficient or how to fix it with a healthy diet. With the advantage of technology, the people can leave a healthier lifestyle. In this project to build a system that will aim to recommend appropriate nutrition intake to its users based on body mass index (BMI) and grocery data preferences. BMI calculate weight status categories which includes underweight, healthy weight, overweight, obese. Grocery data includes seasonal food, user's intreated food, plant foods and animal products.

2. LITERATURE SURVEY

It was suggested by Raciel Yeraz Toledo that nutritional data and user preferences be taken into account while creating a meal recommendation system. Based on the user's selections, the meal plan was created. Nutritional information and preferences for users are both managed by this application. Vijay Jaiswal suggests employing data mining technologies to track a person's intake of nutrients, eating patterns, and calories burnt. Hidden trends and client eating habits may be discovered from a variety of data sources with this application. Random Tree and Decision Tree methods are employed in this tool to analyse various datasets. H. Jiang proposed a system to calculate the daily calorie demand. The Knapsack algorithm is used for recommended diet combinations of users. Different from other diabetic diet recommendation systems, this system can rank the recommended diet combinations using TOPSIS algorithm according to user's food nutrition. Jung-Hyun Lee proposed a customized diet recommendation service managing heart diseases. This service provides customers customised general information, family history of diseases, seasonal food intakes. Rung-Ching Chen construct a recipe ontology that defines some common diseases healing with verity of food recommendations and an inference engine for customer health condition and a recipe ontology can be used for proper recipe recommendations on food

priorities. FidelsonTanzil uses ABC algorithm to extract information from database according to user's requirements. Kmean and SOM algorithms are used on datasets. Mohd Afisi projected ABC algorithm in Data Mining and tested compared to six traditional classification algorithms successfully and ABC proved as a suitable algorithm for recommendation. Xiaoyan Gao proposed the food recommendation problem on user choice recipe recommendation factors. By using a neural network-based solution on Ordered diet Recommendation.

It was the goal of the authors INGMAR WEBER and PALAKORN ACHANANUPARP [1] to acquire insights from machine-learned - diet success prediction to aid individuals who are attempting to remain fit and healthy by keeping track of their food consumption. To explore the features of a failed diet, researchers analysed more than 4,000 long-term MyFitnessPal users' food diaries. Concisely, researchers used "quantified self" data to construct a machine learning model that could predict whether or not a person will go over or under their daily caloric requirements on a regular basis. According to the study's findings, classification performance was adequate, and a token-based model performed better than a category-based model.

To find trends and business strategies concealed in their customer and online data, Nandish Shah and Ishani Shah [2] proposed a healthy eating system based on web data mining to monitor eating habits and suggest foods that promote health and avoid foods that elevate sickness risk. Researchers employed a variety of data mining methods to glean information on people's eating habits. These algorithms included classification, clustering, association rules, and more. Fat, energy, and vitamin percentages in the dish were determined by analysing each kind of food. They next processed the composition data using the classification mining algorithm to determine whether or not the diet was healthful. As a consequence, each individual was given a tailored set of suggestions.

The authors AINE P. HEARTY AND MICHAEL J. GIBNEY [3] illustrated how data mining methods may be used to assess a coding system at the meal level. Sustained data mining approaches were used to

predict a component of nutritional quality using food- and meal-based codes, respectively, in the study. The NorthSouth Ireland Food Consumption Survey 1997–1999 was utilised by the writers in their research. There was the creation of a healthy eating index (HEI) score. Artificial neural networks (ANNs) and decision trees were used to predict HEI quintiles based on meal pairings. As a consequence, the ANN performed marginally better than the decision tree when it came to predicting HEI. The decision tree, on the other hand, performed better than the ANN in terms of accuracy when using the meal coding scheme. Fitness Advisor System was developed by CHRISTY SAMUEL RAJU, SANCHIT V CHAVAN, KARAN PITHARDIA, SHRADDHA SANKHE, and SACHIN GAVHANE [4]. It was the writers' idea to create a desktop programme called "Fitness Advisor" that could diagnose a person's weight-related health issues and provide personalised advice and information based on that. It was determined that parameters such as age, gender and health status were taken into account as well as a variety of other variables inside the system. The authors employed a mix of clustering, association, and classification algorithms to offer the best possible expert advice to the user's situation. The authors employed the Apriori method to generate association rules. The system's ultimate result was dietary and exercise recommendations from professionals.

3. PROBLEM STATEMENT

Based on user preferences, a content-based meal recommendation system is suggested that recommends food dishes. Users' favoured recipes are broken down into ingredients and given ratings based on previous users' ratings. Recommendation: Recipes that use the same ingredient are preferred. The writers do not take into account the nutritional aspects of the diet and the overall balance. Additionally, the user's preferences may not vary on a daily basis, increasing the likelihood of a same suggestion. Android-based meal recommendation systems leverage tags and latent factors [2]. Based on the user's tags and ratings, the algorithm offers a customised recipe to the user. Feature vectors and matrix factorization were employed in the suggested system's method. User preferences are taken into account when tagging

suggestions so that they are more likely to be accurate in their predictions. However, the writers fail to take nutrition into account in order to tailor the user's diet to his or her specific requirements.

DISADVANTAGES OF EXISTING SYSTEM:

There are a variety of diet suggestion systems out there, but the ones I've included above are focused on particular disorders or diet plan balance. Food recommendations for certain conditions are made based on a lack of understanding of the severity of a patient's illness, which may have serious consequences for patients. Similar to food recommendations for a balanced diet, nutrition variables are overlooked, which are critical to making food recommendations and ensuring that the diet is properly balanced.

4. PROPOSED SYSTEM

The System works in a Machine Learning Environment, we use multiple machine learning algorithms to check accuracy of vitamin deficiency and food recommendation and best model is used for prediction in flask web application. When user enters vitamin values algorithm will predict deficiency is vitamin and recommend food.

ADVANTAGES OF PROPOSED SYSTEM

Automates process of vitamin deficiency detection and food recommendation. Previous datasets are used to training and testing. Accuracy of model is improved compare to existing methods.

5. IMPLEMENTATION

5.1DATASET:

In this project se are using vitamin dataset and food recommendation dataset which is prepared based on min and max vitamin values from the test results and features are min and max values of vitamin a, b, c,d,e,k values and labels are deficiency and non- deficiency.

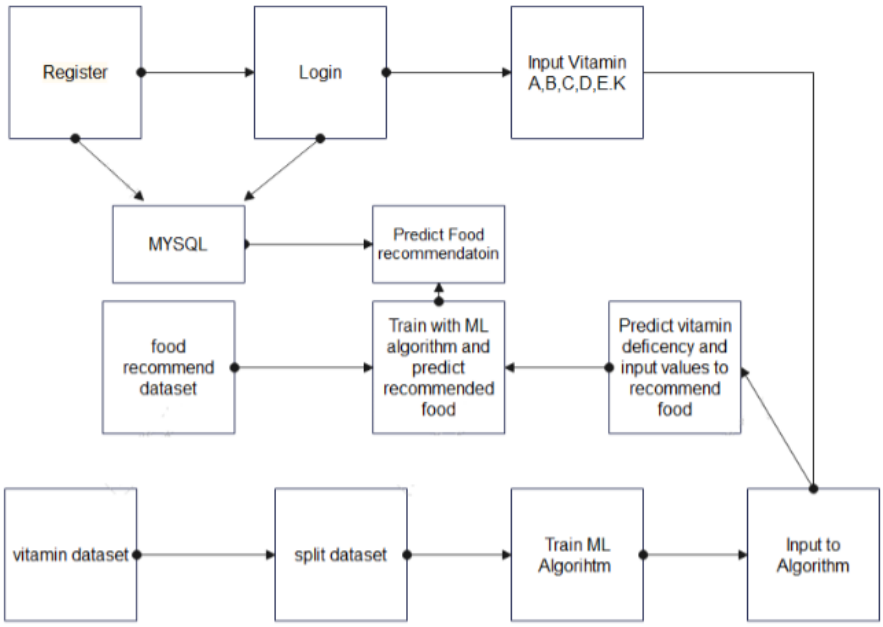
5.1 PRE-PROCESSING:

Xtrain and ytrain variables are used to hold the data set's features and labels, respectively. Feature extraction and label generation are performed using a typical scalar function.

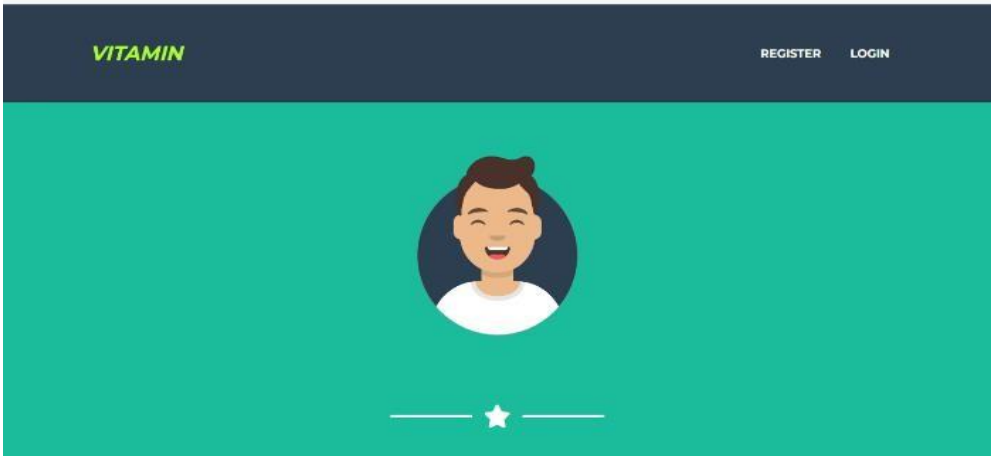
5.2METHODOLOGY

Figure 1 shows how data is separated into distinct sets and subsequently trained for different models, as can be seen from above. 80 percent of the dataset was used for training and the remaining 20 percent was used for pre-training (20 percent). Pre-train (80%) and pre-test (the remaining 20%) comprised the pre-training set (20 percent) As a result, training and validation sets have been created from the original training set (20 percent). This train set is also separated into a train and a test set (each accounting for 80% of the total) (20 percent). As a result, I've created two sets of test data: one for train validation and the other for performance testing. In order to discover the best models for the dataset, the pretrain set was employed. I used a pretest set and selected the four top models. The mean absolute errors used to measure their performance were used to compare them. • Using the top four models as a starting point, hyperparameters were fine-tuned until the optimal parameter was found.

6. SYSTEM ARCHITECTURE



7.RESULTS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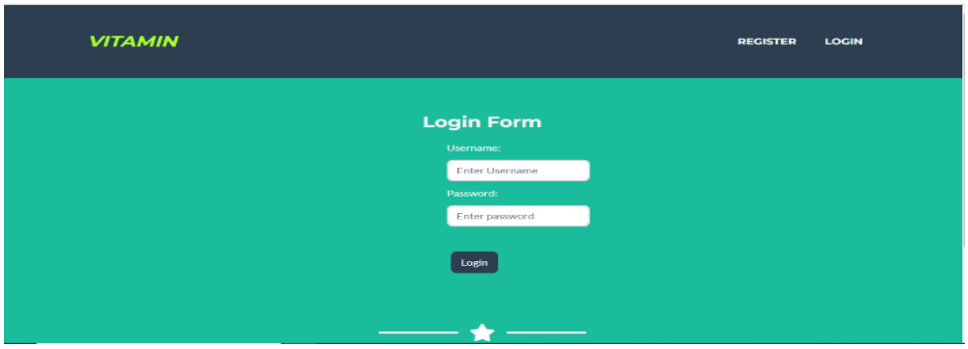
VITAMIN
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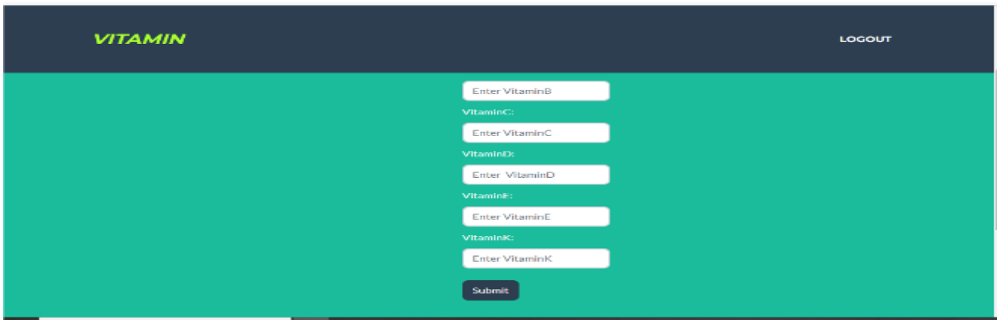
Login


VITAMIN
LOGOUT
vitamin A is in Range
vitamin B Difficienty
vitamin C is in Range
vitamin D is in Range
vitamin E Difficienty
vitamin K Difficienty
RECOMMENDATION== ('cereals and vegetables and millets and Dryfruits',)


VITAMIN
LOGOUT
Enter VitaminB
VitaminC:
Enter VitaminC
VitaminD:
Enter VitaminD
VitaminE:
Enter VitaminE
VitaminK:
Enter VitaminK
Submit

Accuracy:

```
              precision    recall  f1-score   support

           0       1.00      0.90      0.95        21
           1       0.82      1.00      0.90         9

    accuracy                           0.93        30
   macro avg       0.91      0.95      0.93        30
weighted avg       0.95      0.93      0.94        30

[[19  2]
 [ 0  9]]
Accuracy of Support Vector Machine 93.33333333333333 %
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8.CONCLUSION

We have created a website which recommend the food items and predicts vitamin deficiency in which we have implemented prediction by taking input as vitamins and their deficiency. The first step in training the algorithm is to create a database of dietary products based on a certain vitamin deficit. The prediction of various food recommendation depending upon which are essential for the for type of vitamin deficient. A Random Forest classifier is used to forecast the best-fitting foods for a given diet once the clustering is completed. Our diet recommendation system allows users to basically get the desired healthy diet on the bases of vitamin deficiency.

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