JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Diet Recommendation System Using Machine Learning

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Abstract : The human body needs nutrients, vitamins and minerals to prevent disease. When the body does not receive adequate nutrients, nutritional deficiencies can arise and cause a number of different health issues. Nutritional issues including dietary excesses or deficits in certain nutrients can lead to chronic illnesses such as diabetes, hypertension, and cardiovascular disease. Deficiencies can affect the heart and cause damage to muscles and neurons. You must therefore eat a healthy diet. A balanced diet provides your body with the nutrition it needs to operate correctly. This project provides the foundation for providing users with suitable nutrition plans. It is a disease-based nutritional guidance system that makes dietary recommendations based on the needs of the product by utilizing information about the user's health. Our approach has the potential to be a helpful tool for both improving nutrition and helping people maintain and improve their health condition. This research work is carried out using Machine learning.

I. RESEARCH METHODOLOGY

People are becoming more conscious of their lifestyle and well-being in the present period. However, following a balanced diet and consistent exercise alone is not enough; it's also important to avoid bad food choices. Maintaining a healthy lifestyle mostly depends on adopting a well-balanced diet that is appropriate for one's age, body weight, and height. In combination with exercise, a healthy diet helps people reach and maintain their ideal weight, reduces their chance of developing long-term conditions like cancer and cardiovascular disease, and enhances their general well-being.

The choices from the options we make about what we are consuming in our diet have a profound impact on our physical well-being and health. In an era of increasing awareness of the importance of a healthy diet, diet recommendation systems have emerged as a promising tool to provide personalized dietary guidance. These systems combine the power of technology, data science, and artificial intelligence to offer individuals tailored advice on their food choices, meal planning, and nutritional needs.

The significance of diet recommendation systems lies not only in their ability to guide individuals towards healthier eating habits but also in their potential to address specific dietary restrictions and health conditions. With the exponential growth of dietary data sources, such as food databases, nutritional information, and user-generated data, these systems can analyse a vast array of dietary preferences and requirements to provide recommendations that are highly personalized.

Personalized dietary guidance is a departure from the one-size-fits-all approach that has traditionally been the norm. It takes into account individual factors such as age, gender, activity level, dietary preferences, and even genetic predispositions. By doing so, diet recommendation systems have the potential to improve the dietary choices of individuals and, in turn, contribute to the prevention and management of diet-related diseases. It is a disease-based nutritional advice system that uses user health data to generate dietary recommendations depending on the demands of the product. Our method may prove to be a useful tool for enhancing nutrition and assisting individuals in maintaining or enhancing their health. Machine learning is used in this project.

The goal of this review article is to give a thorough examination of the current state of diet advice systems. We will explore these systems' underlying algorithms, the range of applications they support, the data sources they use, and the difficulties they encounter. We will also look at how diet advice systems might affect general wellbeing and public health.

1. Literature Review

1.1. Common Health issues

Dahiwade et al. suggested an ML-based method for common disease prediction [9]. The UCI ML library was used to import the symptoms dataset, which contained symptoms of several common disorders. The system used CNN and KNN as classification algorithms to forecast several diseases. Further information on the lifestyle of the tested patient was also added to the recommended treatment, which improved the recommendation and helped assess the level of risk related to the expected sickness. Dahiwade et al. [9] examined the KNN and CNN algorithms' accuracy and processing times.

1.2. Diseases related to the kidney

In order to identify chronic kidney disease (CKD), Serek et al. [7] created a comparison analysis of classifier performance using the Kidney Function Test (KFT) dataset. In this work, the performance of the KNN, NB, and RF classifiers is assessed using the F-measure, accuracy, and precision. The analysis revealed that NB produced better precision whereas RF received greater accuracy and F-measure scores.

1.3. Diseases related to Heart

The aim of Marimuthu et al. [8] was to predict heart diseases by using supervised machine learning techniques. The authors arranged the data elements according to gender, age, target, slope, gender, and chest pain [6]. The following four useful machine learning techniques were applied: DT, KNN, LR, and NB. After analysis, it was found that the LR algorithm provided the highest accuracy of 86.89%, outperforming the other algorithms in terms of efficiency.

1.4. Parkinson's Disease

Chen et al. [4] provided a helpful approach for diagnosing Parkinson's disease (PD) that makes use of fuzzy k-nearest neighbour (FKNN). The primary points of comparison for the study were the suggested FKNN-based and SVM-based methods. Principal Component Analysis (PCA) was used to group the most distinct features for creating the optimal FKNN model. The dataset, which contained a variety of biological voice measures, was retrieved from the UCI depository.

II. An Overview on Machine Learning

The process of building analytical models is automated by a data analysis technique known as machine learning. The underlying premise of this branch of artificial intelligence is that robots can learn from data, identify patterns, and form opinions with minimal assistance from humans. The Scikit-learn, or Sklearn, library for Python machine learning is the most dependable and useful. It provides a variety of useful tools for statistical modelling and machine learning, including dimensional reduction, regression, clustering, and classification, through a standardized Python interface. This library is primarily written in Python and is based on NumPy, SciPy, and Matplotlib.

The architecture of disease-based diet prediction system includes the listed following fields:

User Input: We are using the disease list provided by the user of the diet advice system as input. Obtain info Here, the user will enter information regarding their symptoms.

Data Acquisition and Processing: The input for processing is given in this area. First, the data is acquired, and then it is processed. These two processes are known as data acquisition and processing.

Input Symptoms of the Body: Body symptoms are collected and analysed in this field, so that the algorithm may utilize this data to anticipate a potential diet based on the input.

Dataset_Disease (symptoms, functions): Within this domain, there exists a pre-established dataset of illnesses, encompassing both symptoms and functions associated with the condition.

Training_Data (): The system is being trained in this field. The SVM (support vector machine) algorithm is used to train our diet advice system. Here, we are solving a regression-related problem with the SVM algorithm.

Prev_Disease (Dataset_Disease): A dataset of diseases is provided in this field as a parameter, and processing is carried out using this dataset.

Predicting_Multi Linear_Regression (symptoms, function): In this stage, the process of prediction is carried out with the help of the MLR algorithm. In MLR algorithm, multiple independent variables are used for the disease prediction.

Possible_Diet (calorie, function): In this stage calorie and functions are passed as a parameter and potential diet is computed based on these inputs.

Processing of Data: This sector consists of the above-mentioned data processing arenas and is the most important part of our disease prediction system. It comprises of all the essential fields for processing the data.

Output: After acquisition of data and data processing, final output diet is generated as result.

III. RESULTS AND DISCUSSION

3.1 Results of Descriptive Technology used

Diet recommendation systems represent a promising intersection of technology, data science, and healthcare that aims to transform the way individuals approach their dietary choices. This review has shed light on the key aspects of diet recommendation systems, encompassing data sources, recommendation algorithms, applications, user interfaces, challenges, and their potential impact on public health.

The importance of data in powering diet recommendation systems cannot be overstated. These systems draw from diverse sources, including comprehensive food databases, nutritional information, and user-generated data, while also capitalizing on wearable devices and IoT sensors to provide real-time, personalized insights. Users can receive personalized dietary advice thanks to machine learning algorithms including content-based filtering, collaborative filtering, and sophisticated neural networks. The adaptability of these algorithms to individual preferences and dietary restrictions holds great promise for promoting healthier food eating habits.

Diet recommendation systems find applications in various arenas, from personalized meal planning and recipe suggestions to weight management and dietary restriction support. They are particularly valuable for individuals managing health conditions, as they can provide condition-specific dietary recommendations. These systems have the potential to revolutionize the way we address diet-related diseases and conditions by offering precise, data-driven advice.

User interfaces and engagement strategies are pivotal in ensuring that individuals receive and act upon these recommendations effectively. Mobile apps, web platforms, and voice assistants provide accessible and user-friendly interfaces. Gamification and behavioural nudging strategies enhance user engagement and adherence to dietary guidance, making it more likely that individuals will make healthier food choices.

However, diet recommendation systems face several challenges and limitations, including privacy concerns related to dietary data, the need to respect cultural and individual dietary preferences, and ethical considerations that arise from potential biases in recommendations. Addressing these challenges is crucial for the continued development and adoption of these systems.

In conclusion, dietary advising in the future is expected to be greatly influenced by diet recommendation systems. Leveraging the power of AI and data science, these systems offer individuals the tools they need to make healthier food choices, tailored to their specific needs and preferences. As the field continues to evolve, further research and innovation will be essential to address challenges, mitigate biases, and maximize the potential for positive public health outcomes.

IV. Figures and Tables

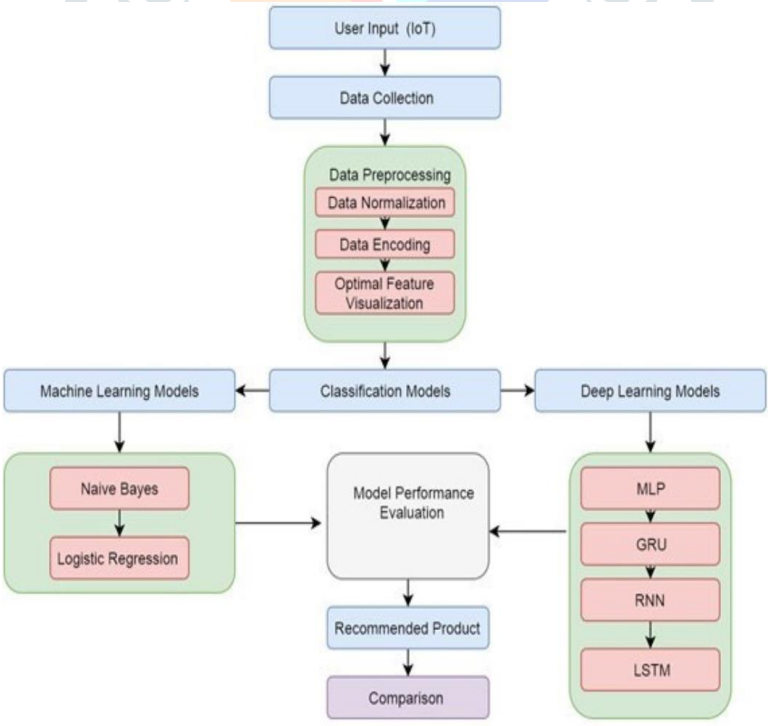

Fig.1 Flowchart Diagram of the Project

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