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Web portal for Diet Recommendation System

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Abstract: **Various health issues and diseases are caused due to inadequate and inappropriate intake of food. Due to degradation in the concise information about healthy diet, people have to rely on medicines instead of taking preventive measures in food intake. As there is large diversity in food components and variety of dietary sources available, it makes it more challenging to perform real-time selection of diet patterns that must fulfill one's nutrition needs. Particularly, selection of proper diet is critical for patients suffering from various diseases. In this paper, we highlight the issue of selection of proper diet that must fulfill nutrition requirements of an individual. To address this issue, we present a content based food recommendation system, for dietary recommendations based on users inputs and their lifestyle. The model uses Naïve Bayes algorithm to generate optimal food list and recommends suitable foods according to the diversity in inputs of users. Diet Recommendation System can play a vital role in controlling various diseases. The experimental results show that compared to single node execution, the convergence time of parallel execution on cloud is approximately 12 times lower. Moreover, adequate accuracy is attainable by increasing the number of inputs to system.**

Keywords: **Information Retrieval, Recommendation Systems, Content- Based Approach, Expert Systems, Web Crawling, Feature Similarity, Naïve Bayes.**

I. INTRODUCTION

Menu construction is an important task for schools, hospitals, nursing homes, etc , since such institutions need to plan menus within certain constraints such as available material, equipment, and financial means. There is also a personal need for professional menu construction by clients or patients who should eat according to a planned diet, due to certain reasons such as medical conditions, or desire to become or stay healthy.

Numerous IT systems and approaches are available today for dietetic applications, and, primarily, for menu construction and dietary analysis. There are several approaches based on linear programming, genetic algorithms, rule-based or case-based expert systems. A lot of commercial menu planning systems exist, and are available.

Recommendation systems are a type of information filtering that presents lists of items which are likely of user interest. Amazon, Last.fm, Netflix, Pandora are the most popular recommender systems all over the world. Simply they compare user interest acquired from his/her profile with some reference characteristics and predict the rating that the user would give. Those characteristics may be from the item information (content-based approach) or the user's social profile (collaborative filtering approach). We focus on the question "What should I eat?" in the scope of this paper. Our system uses content-based recommendation technique for producing food recommendations. It is based on similarity of foods. Basically, our system constructs user profiles from the previously rated features and food profiles from the ingredients of the food, then it recommends the most appropriate foods according to the preferences of the users.

II. LITERATURE REVIEW

A. Traditional Methods

- In the traditional systems the Data collection survey is conducted to create web portal. Using Case based reasoning and portlet container the data is displayed on web portal[1].
- RDR(Ripple Down Rules) a way of approaching knowledge acquisition proves to be hectic in latter cases[2].

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- Knowledge acquisition means transfer of human knowledge to computer system. Two important factors for knowledge acquisition in this paper are the developer and the diet provider[4].
- Knowledge Representation is done using RDR tree[3].
- Basic web pages are created in HTML5 and CSS3. The user interface is not efficient for the new users. The statistics and other information is not provided on user module[5].
- User acceptance testing is simplified process and detailed testing are not performed.

B. Disadvantages of traditional methods

- The High data congestion was the main issue in traditional systems. Lack of authentication was creating the data theft and low level security services.
- The notification services was not efficient. Email service was not available in traditional portals. Unified control was not given in systems also cloud services not available in system.
- Case based reasoning gives inappropriate results and hence resulting in ambiguous Diet Plan.

III. BASIC METHODOLOGY APPLIED

The Diet Recommendation System will contain 3 basic modules and a database supporting system. According to previous study, this module should be easy to understand and implement.

Fig 1: Architectural Diagram.

A. Dietitian module:

- This module is most important module in the web portal. This module will contain the easy interface for a dietitian. This module will access the database for the user information. The user information will be asked at the initial time of registration. Dietitian can create an account on the system and can use only some specific applications available on the portal. User need to ask permission of the time of registration.
- Dietitian will be provided with email service of upcoming mails other basic information. Every upcoming event will be notified to a user by Dietitian with the consent of Admin.
- Dietitian can review their progress, failures of the user/patient from the easy interface. An easy solution for long process will be provided.
- Dietitian can publish an article accordingly to support variable types of user's which will be visible to every user despite of not being under the respected dietitian.

B. User module

- This module is user specific module and will give inputs like age, height, weight and lifestyle and depending on this diet will be generated.

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- This module will be examined by Admin and would be propelled it to the Dietitian for generating the Diets.
- The user have the authority to accept and reject the diet generated by the Dietitian.

C. Admin module

- This module is admin module and using it we can modify and alter the contents of the user and dietitian. Basically we can change any of portal details using this module. This module will contain information about all users present in the system.
- This module is used by the Admin to generate notifications of upcoming events. Admin can review the users progress ratio and can compare with initial health plan. This module will provide the statistics of user performance. Using this auto generated statistics, Admin can guide the students for better performance.
- This module will handle the data of almost thousands of users and reduce the paper work of the Receptionist to generate data regarding the patients. Admin can check the performance with last year or previous data to understand the requirement of users.

D. Database

- This module is controlled by admin of web portal. This module is used to handle the raw data. This module is not provided with a user interface. This module is only used by the programmers to manage the data load of the system.
- This module is working with hardware of the system. It mainly focused on the real or virtual database in the system. Cloud storage will also be handled by the module. It will access all queries from user modules and process the queries to generate the results. Statistics of all other modules are provided by this module.

IV. KNOWLEDGE ACQUISITION AND REPRESENTATION

The type of the user profile derived by a content-based recommender depends on the learning method employed. Decision trees, neural nets, and vector-based representations can be all used. In this paper we have used decision vector based representations constructed with the help of user ratings. At this step, our system uses explicit data collection. Specifically, after each recommendation, user can explicitly state whether the recommendation is satisfying or not. The next recommendations will be mostly based on this user feedback. The data collected will be shared with the Dietitian's for better diet plan further.

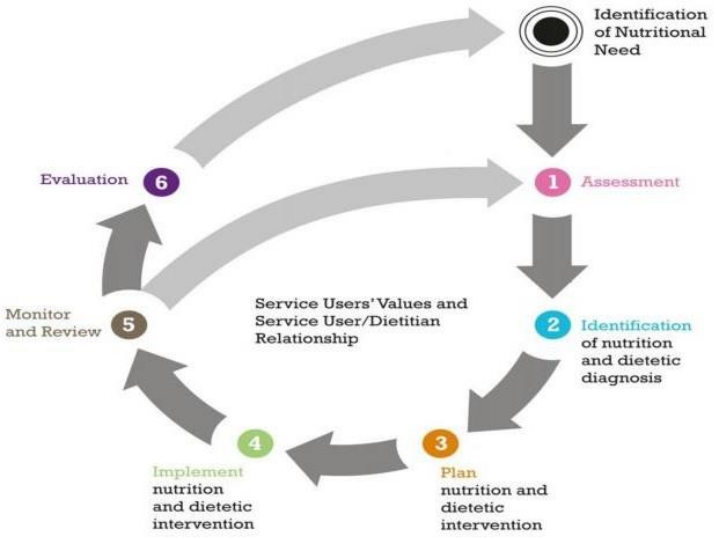

Fig 2: Knowledge Representation

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V. MATHEMATICAL MODEL

Let Assume S be the system which execute Diet Recommendation System

S={s,e,X,Y,T,F_{main},NDD,DD,Success,Failure}

- **S(System)** = Is our proposed system which includes following tuple.
- **s (initial state at time T)** = GUI of search engine. The GUI provides empty fields to enter a query/input for user.
- **X (input to system)** :- Input Query. The user has to first enter the query. The query can be about diet plan or change in the diet plan or may be something else with respect to diet.
- **Y (output of system)** :- List of foods items he/she need to follow for the diet plan
- **T (No. of steps to be performed)** :- **2**. These are the total number of steps required to process a query and generates results.
- **fmain(main algorithm)** :- It contains Process P. Process P contains Input ,Output and subordinates functions. It shows how the query will be processed into different modules and how the results are generated. Basically, A Naïve Bayes classifier.
- **DD (deterministic data)**:- It contains Database data. Here we have considered MySQL, it contains number of queries. Such queries are used for showing results. Hence, MySQL is our DD.
- **NDD (non-deterministic data)**:- No. of input queries. In our system, user can enter numbers of queries so that we cannot judge how many queries user enters into single session. Hence, Number of Input queries are our NDD.
- **Memory shared**: - MySQL database will store information like User Authentication, Performing Operations like regular check up using some set of questions. Since it is the only memory shared in our system, we have included it in the system.
- **CPUcount**: - 1. In our system, we require 1 CPU for server.
- **Success** = successfully recommended best system as per user's interest
- **Failure** = If something went wrong with the system.

Subordinate functions:

Lets Assume S be the system which execute Diet Recommendation System

S={s,e,X,Y,F_{main},NDD,DD,Success,Failure}

Where

s=Start State

e=End State

X={Set Of Inputs}

= {x1,x2}

Where x1= User Registration Data

x2= About Lifestyle.

Y={Set of Outputs}

= {y1}

Where y1= User able to follow the diet plan.

F_{main} = {Set of procedure}

= {f1,f2}

Where

f1= Take x1,x2 Input

f2= Give y1 Output

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State Transition Diagram:

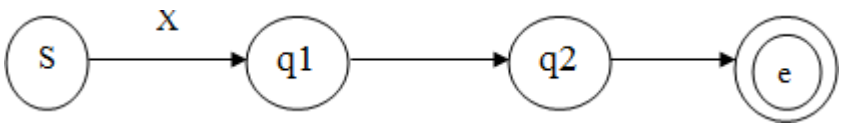

Fig: State Transition Diagram

Where,

s=input state

x=query

q1= User Registration Data, Lifestyle details for user (related to health) after login.

q2= User able to follow the diet plan.

Explanation

- The q1 state accept the ambiguous query ‘x’ from the state ‘s’ which is our initial state.
- The q2 state is meant for User Registration Data, details about user lifestyle after login which stores the query x which is accept in state q1.

VI. CONCLUSION AND OBSERVATION

After studying the underlying drawbacks of the existing system using Ripple down Rules the system is able to generate diet for user using general inputs but is unable to give optimized unique diet for each user. Hence the proposed system is using Naïve Bayes algorithm to determine unique diet plan for user using basic inputs along with lifestyle of user. This proposed system is not restricted towards to age and generates the diet plan which will not be categorically restricted.

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