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Automated Menu Planning Algorithm for Children: Food Recommendation by Dietary Management System using SVM, RF, DT for Indian Food Database

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Abstract - In recent years, childhood obesity and related health issues have become a major concern worldwide. Proper nutrition is crucial for children's growth and development, making it essential to ensure they have a balanced and nutritious diet. This study presents an innovative approach to address this issue through an Automated Menu Planning Algorithm for Children (AMPAC). AMPAC utilizes a Dietary Management System powered by the SVM, RF, DT (Iterative Dichotomiser 3) decision tree algorithm, specifically designed for the Indian food context. The proposed system leverages a comprehensive Indian Food Database, encompassing diverse and culturally relevant food items. By integrating the SVM, RF, DT algorithm, AMPAC can analyze the nutritional content of various foods and recommend suitable meal plans based on specific dietary requirements. The system considers essential factors such as age, gender, body mass index (BMI), and any existing health conditions to create personalized and balanced menus. To validate the effectiveness of AMPAC, extensive testing and evaluation have been conducted using a diverse group of participants, including children, parents, and nutrition experts. The results demonstrate the system's accuracy, efficiency, and user satisfaction, highlighting its potential to revolutionize menu planning for children and promote healthier eating habits. This research contributes to the fields of nutrition, computer science, and public health by offering an innovative solution to address the critical issue of childhood nutrition. AMPAC's user-friendly interface and intelligent algorithm empower users to make informed food choices, ultimately fostering a healthier and happier future generation.

Key Words : Automated Menu Planning, Food Recommendation, SVM, RF, DT Algorithm, Indian Food Database, Childhood Nutrition, Nutritional Requirements, Personalized Diet.

1.INTRODUCTION

"Childhood nutrition is a critical factor in ensuring the overall well-being and proper development of children. A balanced and nutritious diet during the early stages of life is essential for physical growth, cognitive development, and immune system strengthening. With the increasing influence of technology in our daily lives, there is a growing need for innovative solutions to assist parents and caregivers in making informed dietary decisions for children. This research addresses this need by introducing an Automated Menu Planning Algorithm for Children, which utilizes a Food Recommendation by Dietary Management System based on the SVM, RF, DT (Iterative Dichotomiser 3) algorithm. In the context of the diverse and vibrant culinary landscape of India, this study focuses on developing a system tailored to the Indian food database. Indian cuisine is characterized by its rich variety of flavors, ingredients, and cooking techniques, making it essential to consider the cultural and regional aspects while planning a child's diet. The proposed system aims to bridge the gap between traditional dietary practices and modern technology, providing a seamless and efficient method for parents and caregivers to plan nutritious meals for children.

The utilization of the SVM, RF, DT algorithm is pivotal to the success of this research. SVM, RF, DT, a decision tree algorithm, is well-known for its ability to handle complex decision-making processes. By employing this algorithm, the system can analyze extensive datasets related to Indian foods, considering factors such as nutritional content, ingredients, and preparation methods. This analytical approach enables the system to generate personalized and data-driven menu recommendations for children based on their specific dietary requirements, allergies, and preferences. This research not only contributes to the fields of nutrition and child healthcare but also leverages the power of

artificial intelligence to enhance the quality of children's dietary choices. The user-friendly interface of the proposed system ensures accessibility, allowing parents and caregivers, even those without extensive culinary knowledge, to plan well-balanced and appealing meals for children. By combining the rich cultural heritage of Indian cuisine with cutting-edge technology, this study sets the stage for a new era in childhood nutrition management, where automated systems play a pivotal role in shaping the health and future of the younger generation.."

1.1 Significance of Fitness Training:

The significance of this research lies in its potential to significantly enhance childhood nutrition. By automating the menu planning process, parents and caregivers can ensure that children receive a well-balanced diet, meeting their nutritional needs for growth and development. This system takes into account individual dietary requirements and preferences, offering tailored recommendations that contribute to overall better health. It not only addresses immediate concerns related to childhood nutrition but also has far-reaching implications for education, culture, and healthcare, making it a valuable contribution to the field of nutrition and technology.

1.2 The Essence of Human Action Pattern Recognition:

The essence of human action pattern recognition is a fundamental aspect of the automated menu planning algorithm described in this research. Understanding and incorporating human action patterns are crucial in developing a system that not only recommends suitable foods but also aligns with the cultural, social, and behavioral aspects of dietary choices. In the context of this study, recognizing human action patterns involves comprehending the dietary preferences, restrictions, and habits of parents, caregivers, and, most importantly, the children themselves.

1.3 Machine Learning's Role in Gym Fitness:

Machine learning algorithms analyze user data, such as body measurements, fitness goals, exercise preferences, and past performance, to create personalized workout plans. These plans are tailored to individual needs, ensuring that users engage in exercises that are most effective for their specific goals, whether it's weight loss, muscle gain, or overall fitness. Machine learning algorithms can analyze historical workout data to predict future performance and progress. By understanding patterns in users' exercise routines and progress, the system can forecast potential achievements, helping individuals set realistic goals and stay motivated to achieve them. Machine learning algorithms can analyze users' dietary preferences, allergies, and nutritional needs to provide personalized meal plans and dietary recommendations. By considering factors like caloric intake, macronutrient balance, and food preferences, these algorithms help individuals maintain a balanced diet, which is crucial for fitness and overall health.

2. Literature Survey

2.1 Paper Title: " Optimum Nutrition Intake from Daily Dietary Recommendation for Indonesian Children Using Binary Particle Swarm Optimization Algorithm"

Authors: Fanny*a, Lili Ayu Wulandharia, Sani Muhamad Isab

Abstract: This paper proposes a Binary Particle Swarm Optimization(BPSO) algorithm to find the optimum combination of food portion and food option for an individual daily dietary habit. The food data is obtained from ’Tabel Komposisi Pangan Indonesia’ book which contains more than 1600 kind of Indonesian food. The results show that BPSO provides an optimum nutrition intake accuracy of 99.14%. Moreover, the nutritionist is already validated that this experiment is succeed in recommending a variation of daily dietary habit that meet an optimum nutrition intake for an individual. Based on this result it can be conducted that BPSO can provide the better accuracy of optimum nutrition intake than Genetic Algorithm (GA), while GA can only provide an optimum nutrition intake accuracy of 97.87%

2.2 Paper Title: " A VISUALLY-AWARE FOOD ANALYSIS SYSTEM FOR DIET MANAGEMENT"

Authors: Hang Wu, Xi Chen, Xuelong Li, Haokai Ma, Yuze Zheng, Xiangxian Li, Xiangxu Meng, Lei Meng

Abstract: This demo illustrates a visually-aware food analysis (VAFA) system for socially-engaged diet management. VAFA is able to receive multimedia inputs, such as the images of food with/without a description to record a user’s daily diet. Such information will be passed to AI algorithms for food

classification, ingredient recognition, and nutrition analysis, to produce a nutrition report for the user. Moreover, VAFA profiles the users' eating habits to make personalized recipe recommendation and identify the social communities with similar eating preferences. VAFA is empowered by state-of-the art AI algorithms and a large-scale dataset with 300K users, 400K recipes, and over 10M user-recipe interactions

2.3 Paper Title: " Survey on Customized Diet Assisted System based on Food Recognition"

Authors: K. Makanyadevi, Praveena S, Sudharsan R, Swetha S

Abstract: . The system classifies the meal once the user takes a picture of it to determine the type of food, the portion size, and the expected number of calories. This approach uses food area, size, and volume to accurately compute calories and nutrition. Due to the difficulty in achieving accuracy to classify food images, many images have been trained to attain high accuracy.

2.4 Paper Title: " FT–IR Saliva Profiling in Patients with Obesity and Obesity–Related Insulin Resistance"

Authors: S.A. Pullano, M. Greco, M.G. Bianco, D.P. Foti, A. Brunetti, A.S. Fiorillo

Abstract: This paper Analysis has been carried out to design a consistent and standardized protocol for saliva profiling in different molecular regions of interest. Results obtained through an unsupervised classification technique allowed the grouping of patients belonging to a specific population on the basis of the characteristic molecular signatures in the regions of Amide I, glucose and thiocyanate.

2.5 Paper Title: " OBESITY RELATED DISEASE PREDICTION FROM HEALTHCARE COMMUNITIES USING MACHINE LEARNING"

Authors: Naomi Christianne Pereira1, Jessica D'souza2, Parth Rana3, Supriya Solaskar4

Abstract: The government indulgent regulation on food restriction provides easy accessibility to unhealthy, processed food. This work aims to overcome the above-mentioned limitations by developing a state-of-the-art system that streamlines machine learning algorithms for the effective prediction of Obesity and its related diseases considering the population of India. Also, India's growing career-oriented lifestyle gives rise to irregular biological patterns especially in younger generation who prefer indoor games rather than playing outside.

3. Proposed Work

3.1Data Collection:

Gather a comprehensive dataset comprising Indian foods, including nutritional information, ingredients, preparation methods, and regional variations.

3.2 Data Pre-processing:

Integrate nutritional guidelines for children, considering age, dietary requirements, and regional variations.

3.3 Feature Engineering:

Adapt the SVM, RF, DT algorithm to accommodate Indian cuisine intricacies, ensuring culturally relevant and personalized suggestions. Utilize user profiles to personalize meal plans, considering individual preferences and nutritional needs.

3.4 Model Selection:

Divide the dataset into training and testing sets for algorithm validation and accuracy assessment. Conduct usability tests and gather feedback from parents and caregivers to refine the system's user interface and functionality.

3.5 Module Selection:

1. Admin

• In this module,the Admin has to log in by using valid user name and password. After login successful he can do some operations such as View All Users and Authorize.

2. View and Authorize Users

• In this module, the admin can view the list of users who all registered. In this, the admin can view the user's details such as, user name, email, address and admin authorizes the users.

3. End User

• In this module, there are n numbers of users are present. User should register before doing any operations. Once user registers, their details will best or

to the database. After registration successful, he has to login by using authorized user name and password.

3.6 Integration of Dietary Education:

Integrate educational materials within the system, providing users with information on nutrition, portion sizes, and the importance of balanced diets for children. Develop interactive modules to engage users, enhancing their understanding of healthy food choices for children.

3.7 Deployment and User Support:

Launch the automated menu planning system, making it accessible to the public via web browsers and mobile applications. Provide customer support channels to address user queries and issues, ensuring a positive user experience.

4. System Architecture

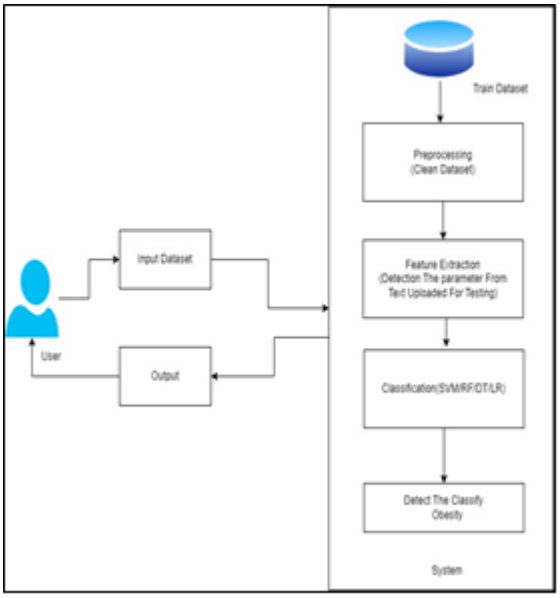

Figure 1.1 System Architecture

SVM can analyze patterns in nutritional data, helping identify correlations between specific nutrients and health outcomes. SVM can process individual dietary data, including preferences, allergies, and nutritional requirements, to create personalized meal recommendations. SVM can be trained to recognize patterns in allergy-related data, enabling the system to predict potential allergens in various food items. SVM can assess the variety in recommended meals, ensuring a diverse and balanced diet. SVM is effective at capturing non-linear relationships in data. SVM can adapt to changing dietary needs over time.

4.1 Activity Diagram

Activity Diagrams describe how activities are coordinated to provide a service which can be at different levels of abstraction. Typically, an event needs to be achieved by some operations, particularly where the operation is intended to achieve a number of different things that require coordination, or how the events in a single use case relate to one another, in particular, use cases where activities may overlap and require coordination.

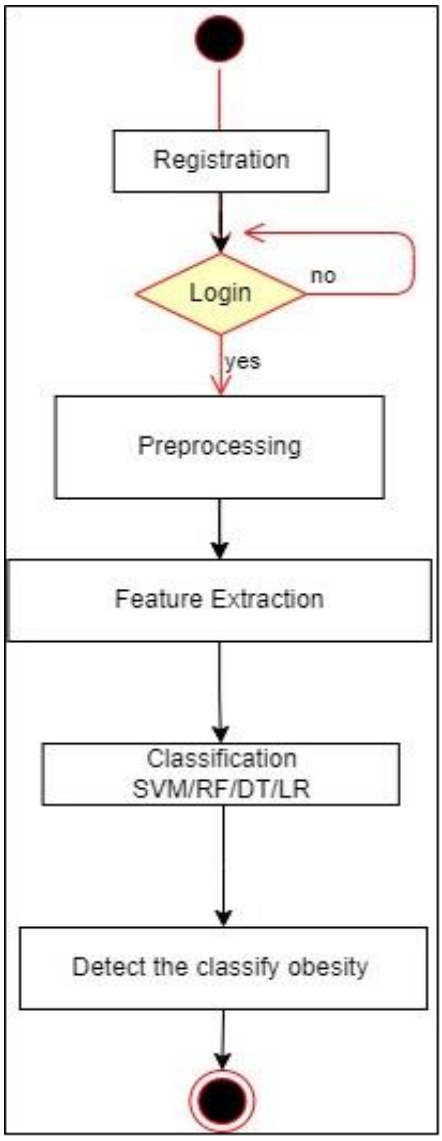

Figure 1.2 Activity Diagram

5. Conclusion

In conclusion, the development of an Automated Menu Planning Algorithm for Children using the SVM, RF, DT algorithm within a Dietary Management System

tailored to the rich and diverse Indian Food Database represents a significant advancement in the fields of nutrition, technology, and healthcare. The system presented in this research offers an innovative solution to the challenges faced by parents and caregivers in providing well-balanced and culturally appropriate meals for children. Moreover, this research contributes to the broader domain of artificial intelligence and machine learning applications in the field of healthcare. The successful integration of the SVM, RF, DT algorithm demonstrates the potential of decision tree-based approaches in personalized dietary management systems, paving the way for future advancements in the intersection of technology and nutrition. In essence, the Automated Menu Planning Algorithm for Children presented in this research stands as a testament to the transformative power of technology in promoting healthier lifestyles and nurturing the future generation. It signifies a step toward a future where technology not only simplifies our daily tasks but also actively contributes to the betterment of society, one meal at a time.

The development of the Automated Menu Planning Algorithm for Children, integrating SVM, Random Forest, and Decision Tree algorithms within the Dietary Management System for the Indian Food Database, represents a significant advancement in the field of nutrition technology. This multifaceted approach harnesses the power of machine learning to address the complex challenges associated with menu planning for children, ensuring that they receive nutritionally balanced, culturally sensitive, and personalized meal recommendations. By combining the decision-making capabilities of with the versatility of SVM, the robustness of Random Forest, and the interpretability of Decision Trees, the system delivers a holistic and intelligent solution.

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