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Nutrition Recommendation System for Sports Persons using Random Forest Algorithm

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***Abstract*— Recommendation systems gained traction in all spheres of human endeavor. When looking for any kind of product—from videos and movies to reading materials and news—everyone looks for recommendations. Their influence on food and dish recommendations is likewise growing daily. Food suggestions for groups are more difficult than for individuals because individual preferences need to be considered. Good meals should also be suggested by the system because poor diets might lead to illnesses. Sportsmen and women require a healthy diet. Current platforms such as Fuelary, Fitness Pal, Nutritics, First Beat Sports, Metfit, Precision Nutrition, Athlete Analyzer, and Nutrient Pro assist athletes in tracking their objectives and activity levels. The development of a nutrition advice system for athletes' health and wellbeing is the aim of this system. It is impossible for anyone to follow their daily lifespan without eating a healthy diet. Sportspeople in particular who lack energy and are not physically strong are unable to practice or train. It gives them the knowledge they need to select the best meal for their body based on their dietary needs. In the suggested approach, machine learning techniques are used to list their diet based on their requirements. A person can choose the food groups they eat from, and meal recommendations will be displayed along with sports practice hours and nutritional needs. Two algorithms, the Random Forest method and the K Means algorithm, are used in this system to generate recommendations, and they yield accuracy rates of 86% and 78%, respectively. Compared to K Means, Random Forest forecasts food wisely.**

Keywords—Recommendation Systems, K-Means algorithm, Random Forest Algorithm, Nutrition.

I. INTRODUCTION

People love food, and everyone needs nutritious food to stay healthy. Today, the food list is growing. Some are natural, some artificial, and they're reengineered daily, making healthy meal selection harder. People tend to seek out unhealthy junk food, which is delectable but bad for their health. Even though this is a fact, no one can accept it because no one is able to manage the type of meals. Most of the diseases occurring today are directly related to unhealthy food habits. Any healthy meal will include balanced consumption of elements such as vitamins, minerals, fats, carbohydrates, calcium, protein and fiber. Most people are unaware of the causes of lack or excess of above-mentioned critical elements, and how to normalize them through a balanced diet. Therefore, specific measures should be taken to consume balanced diet food and to live a good and healthy lifestyle. People have become more health conscious in recent days. A healthy diet is based on factor like age, gender, genetic diseases, pre-existing diseases etc. With the advancement in technology, these food or nutrition recommendations can be given as personalized ones based on specific user [1]. It aids in identifying which ones to consume and providing users with the necessary information to make choices. Websites with a lot of medical and food data make it hard for users to obtain useful information, which society demands. A healthcare recommender system is needed to discover the right diet.

Technology like a dietary and nutritional recommendation system helps consumers make healthy eating and health decisions. The system in [2] analyzes preferences, dietary constraints, health goals, and food nutrition using powerful algorithms and data analysis. The system customizes recommendations based on nutritional databases, user input, and expert advice. A conceptual framework of a recommendation system that seeks to support monitoring of Type 2 Diabetes disease to facilitate better disease management [3]. All things considered, nutrition and food recommendation systems provide invaluable support to people who want to eat healthily. These systems let users take charge of their diet and well-being by utilizing technology which eventually improves their health and quality of life. This technological advancement can be provided to sports people who indulge in high intense regular physical activities and need a dedicated fitness enthusiast. Proper nutrition plays a vital role in enhancing sportsperson performance and supporting the overall health and well-being of sports persons. The unique demands placed on the body during exercise necessitate specific dietary considerations to fuel performance, repair tissues, and promote optimal recovery. A system is in need to understand and follow appropriate nutrition recommendations to optimize their training needs, enhance recovery, and maximize their potential.

Nutrition recommendations for sports persons focus on providing adequate energy, macronutrients (carbohydrates, proteins, and fats), micronutrients (vitamins and minerals), hydration, and timing of meals to meet the body's requirements and support sport person goals. A balanced

d. Details of Nutrients such as proteins, fat, and carbohydrates are displayed by the recommendation system.

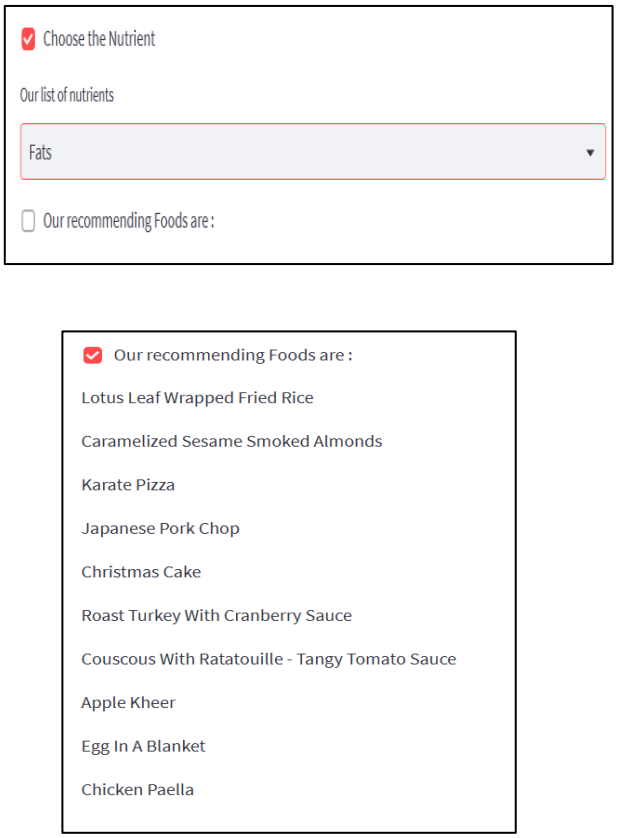

Fig. 4: Front End Web Development

IV. RESULTS

The nutrition recommendation system is useful tool for the sports person, this proposed nutrition recommendation system for sports persons is designed in a way to provide nutrient recommendations to the user based on their food preferences, practicing hours, sports, and nutrient requirements. The nutrients is provided to the user based on their practicing hours which is unique and novelty of this project. Based on the hours of practicing hours along with amount of nutrients in the food is displayed. In this system two algorithms K- means algorithm and Random Forest algorithm are implemented which provides personalized suggestions with accuracy of 78% and 86% respectively. The incorporation of the Random Forest algorithm into nutrition recommendation systems suggests a potentially fruitful path for raising the level of precision and efficiency of dietary advising.

This website will be very useful for sports people, it recommends food based on their sports and working hours, it also includes a new characteristic of choosing the nutrition on their convenience. It provides the food according to their percentage of how much amount of iron, potassium, calcium, vitamins that a person should intake. The website provides good and healthy food along with the percentage of how much amount of protein, calcium, vitamins sports persons need to take.

V. CONCLUSION AND FUTURE SCOPE

A nutrition recommendation system for sports persons that collects user information such as food preferences, practicing hours, nutrients, and sports can be an effective way to provide tailored recommendations for optimal performance. The system can be designed to operate through a website without requiring users to create login credentials or a backend infrastructure. By analyzing the user data, the system can provide recommendations on suitable foods and dietary plans that meet the specific needs of the individual athlete. Random Forest's interpretability helps build more effective dietary programs and interventions by revealing the correlations between dietary variables and health markers. The incorporation of Random Forest algorithm provides insights and opportunities for optimizing nutrition recommendation systems, empowering consumers to make healthier food choices and improve health. This type of system has the potential to improve the health and performance of athletes by ensuring they are consuming the necessary nutrients and fuel to perform at their best.

Integration of the system with wearable devices to monitor the health and activity of the sportsperson and recommedntions to elderly persons can be done in future to enhance it

REFERENCES

[1] Jain, A., Singhal, A. “Personalized Food Recommendation—State of Art and Review” (2022) Lecture Notes in Networks and Systems, vol 356.
[2] Mughees Ahmad, Aman Ullah Khan, and Muhammad Sajid “A Diet Recommendation System for Persons with Special Dietary Requirements” (2023) Journal of Computing & Biomedical Informatics, vol. 5, no. 01, pp. 153–164.
[3] Godinho, J., Batista, S., Martinho, D., Conceição, L. “A Recommendation System of Nutrition and Physical Activity for Patients with Type 2 Diabetes Mellitus” (2020) Intelligent Data Engineering and Automated Learning, Lecture Notes in Computer Science, vol 12490.
[4] Kudang Boro Seminar ” An Intelligent Food Recommendation System for Dine-in Customers with Non-Communicable Diseases History” (2024) Jurnal Keteknikan Pertanian, vol. 12 No. 1.
[5] Al-Chalabi, H.H., Jasim, M.N. “Food Recommendation System Based on Data Clustering Techniques and User Nutrition Records” (2023) Communications in Computer and Information Science, vol 1764.
[6] Butti.Gouthami, Malige Gangappa ”Nutrition Diet Recommendation System Using User’s Interest” (2020) International Journal of Advanced Research in Engineering and Technology, Vol 11, Issue 12.
[7] G. Agapito et al., "DIETOS: A recommender system for adaptive diet monitoring and personalized food suggestion" (2016) International Conference on Wireless and Mobile Computing, Networking and Communications.
[8] W. Min, S. Jiang and R. Jain "Food Recommendation: Framework, Existing Solutions, and Challenges" (2020) IEEE Transactions on Multimedia, vol. 22, no. 10, pp. 2659-2671.
[9] Kotciuba, Igor & Ermakov, Evgenii & Shikov, Alexey ”Decision support system for individual athlete’s diet based on optimization modeling’ development” (2020) E3S Web of Conferences.
[10]Rehman, Faisal & Khalid, Osman & Haq, Nuhman & Khan, Atta ur Rehman & Bilal, Kashif & Madani, Sajjad ”Diet-Right: A Smart Food Recommendation System” (2017) KSII Transactions on Internet and Information Systems.
[11]Theodore Armand, Tagne Poupi, Kintoh Allen Nfor, Jung-In Kim, and Hee-Cheol Kim "Applications of Artificial Intelligence, Machine Learning, and Deep Learning in Nutrition: A Systematic Review" (2024) Nutrients, Vol 16, no. 7.
[12]Naik, Pratiksha ”Intelligent Food Recommendation System Using Machine Learning” (2020) International Journal of Innovative Science and Research Technology, vol 5, pp 616-619.
[13]Abhari S, Safdari R, Azadbakht L, Lankarani KB, Niakan Kalhori SR, Honarvar B, Abhari K, Ayyoubzadeh SM, Karbasi Z, Zakerabasali S, Jalilpiran Y ”A Systematic Review of Nutrition Recommendation Systems: With Focus on Technical Aspects” (2019) Journal of biomedical physics & engineering, vol 9, No 6, pp 591–602.

[14] Mustafa, Norashikin & Abd Rahman, Abdul Hadi & S Sani, Nor & Mohamad, Mohd & Zakaria, Ahmad & Ahmad, Azimah & Hafizah, Noor & Abd, Ruzita & Bee, Poh & Shanita, Nik "iDietScore™: Meal Recommender System for Athletes and Active Individuals" (2020) International Journal of Advanced Computer Science and Applications, vol 11, No 12.
[15] M. Donciu, M. Ionita, M. Dascalu and S. Trausan-Matu "The Runner -- Recommender System of Workout and Nutrition for Runners" (2011) International Symposium on Symbolic and Numeric Algorithms for Scientific Computing, pp. 230-238.
[16] Keerthana Ramaraj, Valliammal Narayan, Thookanayakanpalayam Thyagarajan Dhivyaprabha, Parthasarathy Subashini "A healthy nutrition suggestion model for indian women sports players & active youth using long short-term memory" (2023) Internet Technology Letters.
[17] Yang, Yang, and Yuanji Zhao. "Personalized Sports Health Recommendation System Assisted by Q-Learning Algorithm" (2024) International Journal of Human–Computer Interaction, pp1–13.
[18] Novokshanova and D. Nikityuk, "Biomedical, Legal and Technological Aspects of Nutrition for Athletes" (2024) Technology in Sports - Recent Advances, New Perspectives and Application, IntechOpen.