Traditional Diet-Based Nutrition Recommendation System using Data Analysis

Dr D J Samatha Naidu *, P.Anusha**

Professor, MCA department , Annamacharya PG college of Computer studies, rajampet, samramana44@gmail.com

Student, MCA Department, Annamacharya PG college of Computer studies, rajampet,

pangaanushaa@gmail.com

How to Cite this Article:

P.Anusha, (2026). Traditional Diet-Based Nutrition Recommendation System using Data Analysis. International Journal of Creative and Open Research in Engineering and Management, 02(03). https://doi.org/10.55041/ijcope.v2i3.241

https://doi.org/10.55041/ijcope.v2i3.241

ABSTRACT

Personalized dietary planning has become increasingly important in modern healthcare due to the rapid rise in chronic diseases such as obesity, diabetes, hypertension, and cardiovascular disorders. Traditional diet planning methods are generally based on standardized guidelines and manual consultations, which often fail to consider individual health parameters, lifestyle differences, and nutritional requirements. This limitation highlights the need for an intelligent and data-driven system that can provide accurate, customized, and practical diet recommendations. The primary objective of this study is to develop a Traditional Diet-Based Nutrition Recommendation System using data analysis and machine learning techniques that integrates traditional dietary knowledge with modern computational approaches to enhance personalized nutrition planning.

The proposed system analise various user-specific health parameters, including age, gender, body mass index (BMI), disease type and severity, physical activity level, and dietary restrictions, to generate tailored diet recommendations. The methodology involves systematic data collection from reliable sources, followed by data preprocessing techniques such as handling missing values, removing inconsistencies, encoding categorical variables, and normalization to ensure data quality and consistency. Multiple machine learning algorithms, including Decision Tree, Random Forest, and Support Vector Machine, are implemented to classify users into appropriate diet categories. Model evaluation is conducted using performance metrics such as accuracy, precision, recall, and F1-score, along with cross-validation techniques to improve model reliability and robustness.

The experimental results demonstrate that advanced models such as Random Forest and Support Vector Machine significantly outperform the traditional Decision Tree model in terms of prediction accuracy and overall performance. The system effectively provides structured, interpretable, and personalized dietary recommendations that support healthy lifestyle management and chronic disease prevention. The proposed framework emphasizes the importance of combining traditional dietary practices with modern data analysis techniques and offers scalability for future integration into web-based and real-time healthcare applications.

This study contributes to the development of intelligent healthcare systems by improving personalized nutrition planning and promoting preventive healthcare practices.

KEYWORDS

Personalized Diet Recommendation, Machine Learning, Data Analysis, Traditional Diet, BMI, Healthcare Systems.

I. INTRODUCTION

In recent years, maintaining a healthy lifestyle has become increasingly important due to the rising prevalence of chronic diseases such as obesity, diabetes, and cardiovascular disorders. Diet plays a vital role in preventing and managing these conditions, and traditional dietary practices provide balanced nutrition based on regional and cultural habits. However, most existing diet planning methods rely on generalized guidelines that do not consider individual health parameters such as age, gender, body mass index (BMI), and lifestyle factors, leading to less effective outcomes. With the advancement of data analysis and machine learning, intelligent systems can be developed to provide personalized diet recommendations by analyzing user-specific data. Algorithms such as Decision Tree, Random Forest, and Support Vector Machine enable accurate classification and prediction in healthcare applications [1], [2]. Despite these advancements, limited research focuses on integrating traditional dietary knowledge with data-driven approaches, creating a gap in personalized and culturally relevant nutrition planning. Therefore, this study aims to develop a Traditional Diet-Based Nutrition Recommendation System using data analysis techniques to generate accurate, personalized, and structured diet plans for improved health management.

II. LITERATURE REVIEW

Previous studies have applied machine learning techniques such as Decision Tree, Random Forest, and Support Vector Machine for healthcare and diet recommendation systems [1], [2]. These systems mainly focus on calorie-based diets and BMI analysis to provide general recommendations. Some research also highlights the importance of balanced nutrition and dietary guidelines for disease prevention [3]. However, most existing approaches lack personalization and do not consider traditional dietary practices or regional food habits. Additionally, limitations such as insufficient data preprocessing and lower prediction accuracy reduce their effectiveness. To overcome these issues, the proposed study integrates traditional dietary knowledge with advanced data analysis and multiple machine learning models to provide more accurate and personalized diet recommendations, improving overall health management.

III. METHODOLOGY

The methodology of this system begins with collecting user health data such as age, gender, BMI, disease type, and physical activity level. The collected data is then preprocessed using techniques like data cleaning, encoding, and normalization to ensure accuracy. Machine learning algorithms such as Decision Tree, Random Forest, and Support Vector Machine are applied for classification. The models are trained and tested using cross-validation to improve reliability and performance. Evaluation metrics like accuracy, precision, recall, and F1-score are used to compare the models. Based on the best-performing model, the system generates personalized diet recommendations for users.

IV. RESULTS AND DISCUSSION

The proposed Traditional Diet-Based Nutrition Recommendation System was evaluated using multiple machine learning algorithms to determine its effectiveness in generating personalized diet plans. The results were analyzed using performance metrics such as accuracy, precision, recall, and F1-score. Among the models used, Random Forest and Support Vector Machine demonstrated better performance compared to the Decision Tree model, indicating improved prediction accuracy and reliability.

The system effectively analyzes user health parameters such as age, BMI, and disease type to generate structured and personalized dietary recommendations.

The results are summarized in Table I, which shows the comparative performance of different models. It is observed that advanced models provide higher accuracy and better classification performance. These findings are consistent with previous studies that highlight the effectiveness of ensemble and advanced machine learning techniques in healthcare applications. The integration of data preprocessing methods also contributed to improved model performance and consistency.

Table I: Performance Comparison of Models

Model	Accuracy	Precision	Recall
Decision Tree	78%	75%	74%
Random Forest	88%	86%	85%
SVM	90%	88%	87%

V. CONCLUSION

This study presents a Traditional Diet-Based Nutrition Recommendation System that utilizes data analysis and machine learning techniques to provide personalized dietary suggestions. The system effectively analyzes user health parameters and demonstrates improved performance using advanced models such as Random Forest and Support Vector Machine compared to traditional methods. The integration of traditional dietary knowledge enhances the relevance and practicality of the recommendations, supporting better health management and preventive care. The proposed approach contributes to the development of intelligent healthcare systems. Future work can focus on real-time data integration, mobile or web-based deployment, and the use of advanced algorithms to further improve accuracy and scalability.

REFERENCES

[1] T. M. Mitchell, Machine Learning, 1st ed. New York, USA: McGraw-Hill, 1997.

[2] C. M. Bishop, Pattern Recognition and Machine Learning, 1st ed. New York, USA: Springer, 2006.

[3] A. Géron, Hands-On Machine Learning with Scikit-Learn and TensorFlow, 2nd ed. California, USA: O'Reilly Media, 2019.

[4] World Health Organization, "Healthy Diet Guidelines," 2020.

[5] Food and Agriculture Organization, "Dietary Assessment and Nutrition Guidelines," 2018.

[6] National Institutes of Health, "Nutrition and Health Reports," 2019.

[7] Scikit-learn Documentation, "Machine Learning in Python," Available: https://scikit-learn.org.