



## Nutrino - AI Smart Recipe Generator and Personal Nutritionist

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### ABSTRACT:

The rising interest in customized health and wellness solutions is likely to lead to new applications within artificial intelligence. Nutrino, an intelligent generator of recipes and a personalized nutritionist using AI, envisions changing dietary planning through delivering personal meal suggestions that let one know his or her preferences, health goals, and restrictions on dietary intake. Utilizing the most advanced machine learning algorithms in combination with vast nutritional databases creates recipes that ultimately improve flavor as well as content. Furthermore, it tracks user progression and adjusts recommendations in real time, ensuring continued health improvements. This review article discusses the core technologies of Nutrino, the challenges involved with personalized nutrition, and its ability to enhance user engagement while nudging users toward healthier lifestyles.

Keywords: AI-powered, Smart recipe generator, Tailored meal recommendations.

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### Introduction:

Against the backdrop of the impactful role that health and nutrition play in quality life improvement, meal planning using AI has received significant attention lately. Traditional cooking typically does not have personalization; hence, it becomes quite challenging to achieve personal objectives for healthy dieting and food preferences. Nutrino is such an intelligent recipe generator and personal nutrition coach powered by AI that assumes this gap by coupling machine learning capabilities with the phenomenon of nutritional science principles. Of course, the program offers personalized meal recommendations that account for a range of needs from specific health conditions to dietary restrictions and personal preferences in taste. The review discusses the technological underpinning and functionality of Nutrino as well as its potential in changing eating habits and advocating for more healthy lifestyles with innovative, adaptive solutions.

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### Objective And Scope:

Broadly, the overall aim of this review paper is to understand how artificial intelligence can be used in customizing dietary planning using applications such as Nutrino, an AI-driven smart recipe generator and individual nutrition advisor. Thus, this study seeks to extensively review the core technologies-explored machine learning algorithms and nutritional databases-that serve as the enablers of Nutrino to provide customized meal recommendations. This review aims to direct an assessment toward the capacity of Nutrino to deliver on various demands related to diet-the health-relevant goals, restrictions, and individual preferences-through healthier lifestyles. In addition, it outlines challenges and limitations in implementing AI-driven nutrition solutions and points out avenues for further research and innovation.

### Scope:

- Examination of AI technologies applied to personalized nutrition.
- Analysis of Nutrino's functionalities, such as recipe generation and user progress tracking.
- Comparison of Nutrino with traditional dietary planning methods.
- Evaluation of Nutrino's ability to meet diverse dietary needs and preferences.
- Identification of future research directions for enhancing AI-driven nutritional tools.

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## Literature Review

[1] Realizing an Efficient IoMT-Assisted Patient Diet Recommendation System Through Machine Learning Model ( Iwendi, Celestine, et al.)

A few recent studies into the application of artificial intelligence in personalized nutrition and recipe generation worth mentioning. Iwendi et al. (2020) present an IoMT-assisted diet recommendation system employed with highly complex machine learning models, like LSTM and RNN, to analyze nutritional needs against health conditions, preferences, and demographic features. High precision and recall were achieved in the prediction of appropriate diets by the model presented and the authors clearly illustrated how effective AI can be in recommending choices according to individual requirements by simply taking advantage of cloud-based frameworks.

[2] A Reinforcement Learning-Based Approach for Personalized Recipe Generation ( Fujita, Atsushi, et al.) Designed in 2021,

Fujita et al. proposed an encoder-decoder framework-based reinforcement learning-based recipe generation model. Their approach bettered ingredient matching and accuracy as such due to incorporating coverage loss and further evaluating another novel evaluation metric to discuss the output repetition problem and insufficient ingredient reflection in generated recipes. Significant improvements over traditional models have been found in this study, underlining that advanced algorithms are needed in AI-Driven Culinary Applications

[3] The Artificial Intelligence (AI)-Based Chatbot for Personalized Nutrition and Health (Oh et al). (2021)

Examined the role of AI chatbots contributing to healthy lifestyle behavior, among dietary behavior in particular. This study involved adaptation of personalized real-time dietary advice, advised through conversational AI that balanced natural language processing with user feedback as a basis for adapting recommendations. This study demonstrated the feasibility and acceptability of such chatbots for large-scale interventions in lifestyles.

[4] AI-Based Recipe Generator and Cooking Assistant (Tejaswini, T., and R. Prathyusha Reddy)

In addition, Tejaswini and Reddy (2024) presented an AI-based recipe generator that was developed to cooking assistants who enrich the culinary experience of users. The system featured a machine learning approach in developing an entirely customized recipe based on dietary needs, ingredient availability, or nutritional requirements. Features such as real-time guidance, automatic substitution, and giving feed meant one was able to be flexible and varied in use of AI in culinary scenarios.

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## Problem Statement

The idea behind “Nutrino - AI Smart Recipe Generator and Personal Nutritionist” is driven by the complexity of meeting specific dietary requirements and preferences in modern times. Involving traditional meal planning approaches often fails to reflect medical conditions, dietary requirements, personal taste preferences, and ingredient availability, thus leaving the user overwhelmed and above all unsatisfied by the result proposed to him. Moreover, while there are now easily accessible online recipe repositories and universal nutrition sources, they lack the personalization flexibility to provide ‘fairly practical’ significant advice. The omission of this ability clarifies the need for a more advanced system that does not only generate recipes tailored to individual’s and personal preferences but also offers responsive nutritional counselling, tracks the progress of users, and adjusts over time as goals change. Nutrino attempts to address this issue by using artificial intelligence to make the principles of nutrition science correlate closely with real-life meal planning, making it easier for a user to make healthy dieting decisions.

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## Proposed Methodology

### *System Overview*

The system to be considered is Nutrino - AI Smart Recipe Generator and Personal Nutritionist. This system promises personalized nutrition and meal planning with a perfect dose of artificial intelligence. It starts gathering individualized input from users in the form of diet preferences, diseases, fitness goals, ingredient availability, penchant for taste, among others, while considering additional inputs like age, weight, level of activities, medical history, and more. This data set is constructed with developing the high user profile as the basis for the personalized recommendations. Post-gathering this data, it undergoes preprocessing where standardization and encoding are performed to ensure uniformity. The machine learning algorithms are then applied by the system to scan through the data and look out for some patterns so it can create an individual recipe along with dietary suggestions. Nutrino employs an artificial intelligence-driven methodology that adjusts to fluctuations in user preferences and objectives, thereby guaranteeing that the recommendations stay pertinent and dynamic, which ultimately enables users to make knowledgeable and healthier dietary selections.



Fig. Overview of Nutrino: AI Smart Recipe Generator and Personal Nutritionist

### *System Architecture*

Structurally, the objectives of Nutrino - AI Smart Recipe Generator and Personal Nutritionist are to provide personalized dietary and fitness guidance in an interactive and dynamic structure. A user accesses the system first through a web interface wherein he enters his requirements, such as ingredients, limitation on diet, and fitness goals. USER INPUT Requirements or requirements entered by the user are classified according to his specifications into either type requiring recipe formulation or exercise suggestion or both. For recipes, the system will be using external APIs on recipes for meal choice personalization; for workout, it will also use APIs on exercises to derive workout recommendations. The system provides results of the chosen recipe or workout plan, which can be picked by a user. Once chosen, the system outlines what is required in that choice for preparation and can provide videos for workout recommendations or nutritional value of ingredients used in preparation. Individuals have the capability to store their selections within their profiles and offer feedback, which the system utilizes for ongoing learning and enhancement. This cyclical method guarantees that the platform remains adaptive, thereby augmenting the precision and pertinence of its recommendations as time progresses.

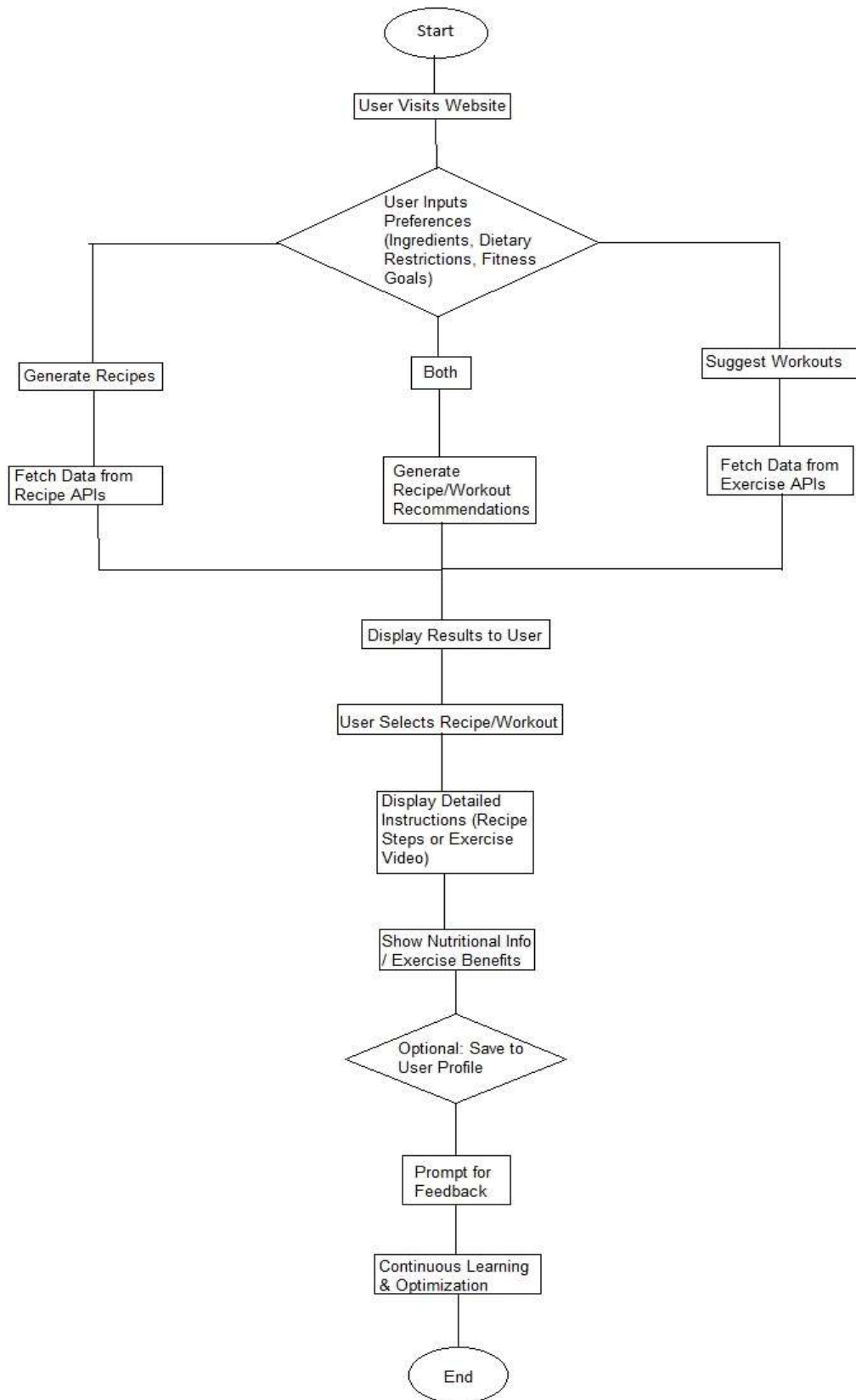


Fig 2. Flowchart of Nutrino: AI Smart Recipe Generator and Personal Nutritionist

**Hardware And Software Details**

Name	Description
Processor	Multi-core (e.g., Intel Xeon, AMD EPYC).
RAM	16 GB (expandable to 32 GB).
Storage	SSD (1 TB or more).
GPU	High-performance (e.g., NVIDIA Tesla, A100).
Languages	Python (ML), Node.js/Django (server-side).
Frameworks	TensorFlow/PyTorch (AI), Flask/FastAPI (APIs).
Database	PostgreSQL/MongoDB.
Web	HTML, CSS, JavaScript, ReactJS/AngularJS.
APIs	SPOONACULAR api, Edamam api and youtubeDB api
Feedback	Survey tools like Google Forms.

**Conclusion**

Overall, "Nutrino - AI Smart Recipe Generator and Personal Nutritionist" is an attempt toward reshaping the ways in which people interact with nutrition and fitness using advanced artificial intelligence technologies. The system therefore responds to the ever-expanding need for easy accessibility and personalized methods that enable healthier living by integrating bespoke recipe creation with individualized exercise suggestions. User-based design, inclusion of APIs from other sites, and learning ability ensure adaptability across diverse dietary needs, desired health goals, and feedback. But what it shows more importantly is how nutrition science can close that gap with practical meal planning in addition to demonstrating the power of AI and its transformative potential in enhancing health and wellness practices within everyday lives.

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