Behavior-Aware Closed-Loop AI Framework for Adaptive Personalized Nutrition Management

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Abstract

The growing load in the lifestyle-related diseases has resulted in an urgent need of smart systems that facilitate long-term and personalized nutrition. The current paper proposes a behavior-sensitive closed-loop AI architecture of adaptive dieting advice, which combines personalized meal suggestions with instant feedback of following the diet. The suggested Smart Nutrition Advisor creates personal user profiles based on demographic, physiological, and lifestyle data, so the individual nutrition planning can be focused on the goals of weight management, nutritional balance, sports and physical activity, and mental health. The framework is known to use a substitution-conscious adherence model in contrast to the more traditional diet systems, which offer fixed suggestions, and explains user deviations by approximating their caloric and nutritional effect. Based on a continuous loop of computing the score of the health grade, a dynamic health score is generated which is used to adjust future recommendations in accordance with the behavioral trends. In order to increase user engagement, the system will represent the progress through interactive avatar interface, which will promote the continued participation. According to experimental evaluation, the adaptive framework enhances dietary awareness, consistency in adherence and user motivation as compared to fixed planning techniques. The architecture has shown a user-centric and scalable intelligent nutrition support model, which has the potential to be used in preventative healthcare and digital wellness ecosystems.

Keywords

Artificial Intelligence, Personalized Nutrition, Adaptive Diet Recommendation, Behavioral Adherence Modeling, Closed-Loop Health Systems, Calorie Analytics, Lifestyle Optimization.