Literature Survey

AI-powered Nutrition Analyzer for Fitness Enthusiasts

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1. **Title : Use of artificial intelligence in precision nutrition and fitness**

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Use of artificial intelligence in precision nutrition and fitness - ScienceDirect Abstract: The food pattern is one of the modifiable factors for improving lifestyle and disease prevention. It is known that changes in diet have an effect on the evolution of chronic noncommunicable diseases (CNCD) of high prevalence, such as obesity, depression, anxiety, type 2 diabetes, and cardiovascular diseases. In order to prevent the CNCD, changing eating habits is strongly recommended. In addition, physical fitness, through systematized physical activities or that increase daily caloric expenditure, also contributes to the prevention of CNCD. Precision medicine, or precise health, is an approach for disease treatment and prevention that considers individual variability in genes, environment, and lifestyle. The application of precision medicine has been broadly improved by the recent development of the large-scale biologic database, powerful methods for characterizing patients, and the use of high and smart technology. It is important to consider the computational tools for analyzing large data sets and, in this way, health-care providers will depend on electronic clinical decision support to quickly make appropriate treatment decisions. Computer systems that have a certain degree of intelligence and human/expert independence to infer about the preexisting data, in order to support the decision, could be useful, since the data generated require rapid and reliable analysis from a large number of variables. Among the available computational tools, artificial intelligence (AI) has gained more and more attention recently, since it is able to learn and model linear and nonlinear relationships between variables by constructing an input-output mapping such that hidden and extremely useful information for decision-making is revealed and interpreted. Although AI is not yet widely used in the areas of nutrition and fitness, it was found that the current technology available

(information technology, several sensors, the use of nanotechnology and the advent of computers, IPhones, and smartphones) is favorable to the application of AI, since a large amount of data is collected by these technologies and, therefore, AI could be very useful in their mining. This chapter provides a discussion about the importance of nutrition and fitness for health and well-being; what is precision medicine, AI, precision nutrition, and precision fitness; how AI could help with precision nutrition and precision fitness; decision-making algorithm for nutritional meal planning/dietary menu planning; AI-based diet and supplements; AI used in genetic tests for precision nutrition and fitness; AI approach to nutritional meal planning for cancer, cardiovascular diseases, obesity, T2D patients; AI-based nutrition and fitness support systems and apps and some challenges and future perspectives.

2. **Diet and Nutrition Expert System for Meal Management and Nutrition Counseling.**

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"Your body is your temple"

As people across the globe are becoming more health conscious, eating more healthy food and avoiding junk food, a system that can measure calories and nutrition in every day meals can be very useful for maintaining one's health. Food calorie and nutrition measurement system is very beneficial for dieticians and patients to measure and manage their daily food intake. We also know that it's difficult to find an affordable nutritionist or a dietician across the street; therefore, we have proposed a system .DIET AND NUTRITION EXPERT SYSTEM. The proposed system is a responsive android application which contains the knowledge and data regarding the fitness of a person and nutrition content values. This application consists of the user interface which will be publicly displayed on the application i.e. the basic information regarding the fitness and nutrition values such as how to maintain good health by adapting healthy eating habits which includes the intake of calories, proteins and carbohydrates etc. in proper proportion. A dietician consults a person based on his schedule, body type, height and weight. The system too asks all this data from the user and processes it. It asks about how many hours the user works, his height, weight, age etc. The system stores and processes this data and then calculates the nutrient value needed to fill up users' needs.

3. Pre-Exercise Nutrition: The Role of Macronutrients, Modified Starches and Supplements on Metabolism and Endurance Performance

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Endurance athletes rarely compete in the fasted state, as this may compromise fuel stores. Thus, the timing and composition of the pre-exercise meal is a significant consideration for optimizing metabolism and subsequent endurance performance. Carbohydrate feedings prior to endurance exercise are common and have generally been shown to enhance performance, despite increasing insulin levels and reducing fat oxidation. These metabolic effects may be attenuated by consuming low glycemic index carbohydrates and/or modified starches before exercise. High fat meals seem to have beneficial metabolic effects (e.g., increasing fat oxidation and possibly sparing muscle glycogen). However, these effects do not necessarily translate into enhanced performance. Relatively little research has examined the effects of a pre-exercise high protein meal on subsequent performance, but there is some evidence to suggest enhanced pre-exercise glycogen synthesis and benefits to metabolism during exercise. Finally, various supplements (i.e., caffeine and beetroot juice) also warrant possible inclusion into pre-race nutrition for endurance athletes. Ultimately, further research is needed to optimize pre-exercise nutritional strategies for endurance performance.

S.NO	PAPER	AUTHOR	YEAR	DESCRIPTION
1	Application of Motion Sensor Based on Neural Network in Basketball Technology and Physical Fitness Evaluation System	Bin Yuan, M. M.Kamruzzaman and Shaonan Shan	2021	Mobile sensors and intelligent systems to evaluate the physical fitness by 1000-meter running, 1-mile running, 20-meter round-trip running, and 12-minute long distance running
2	Relationship Between Health Status and Physical Fitness of College Students From South China: An Empirical Study by Data Mining Approach	Weihua Bai and Teng Zhou	2020	Armed with the trained model, we mine and highlight the relationship between the motor competence related physical fitness and the medical health status of the college students.
3	Physical Workout Classification Using Wrist Accelerometer Data by Deep Convolutional Neural Networks	Jaehyun Park and Jaeyong Chung	2019	The purpose of this study is to maximize accuracy by applying deep learning to the classification of body movements.The results of this experiment are applicable not only to the classification of fitness activities but also to the classification of different motions in numerous sporting events.
4	Fitness Monitoring System Based on Internet of Things and Big Data Analysis	Jing Lu	2021	Efficient physical fitness monitoring can effectively reduce the risks of disease and relieve the medical burden. This paper analyzes the shortcomings of traditional clustering routing protocols, and proposes a new Internet of Things (IoT) clustering routing algorithm using Particle Swarm Optimization (PSO).