

# **AI POWERED NUTRICIAN ANALYZER FOR FITNESS ENTHUSIASTS**

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**DOMAIN :ARTIFICIAL INTELLIGENCE**

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### **PAPER 1: Artificial intelligence in nutrition research perspectives on current and future application**

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Artificial intelligence (AI) is a rapidly evolving area that offers unparalleled opportunities of progress latest applications of AI in nutrition research and identify gaps to address to potentialize this emerging field. AI algorithms may help better understand and predict the complex and non-linear interactions between nutrition-related data and health outcomes, particularly when large amounts of data need to be structured and integrated, such as in metabolomics. AI-based approaches, including image recognition, may also improve dietary assessment by maximizing efficiency and addressing systematic and random errors associated with self-reported measurements of dietary intakes. Finally, AI applications can extract, structure and analyse large amounts of data from social media platforms to better understand dietary behaviours and perceptions among the population. In summary, AI-based approaches will likely improve and advance nutrition research as well as help explore new

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applications. However, further research is needed to identify areas where AI does deliver added value compared with traditional approaches, and other areas where AI is simply not likely to advance the field. **Novelty:** Artificial intelligence offers unparalleled opportunities of progress and applications in nutrition. There remain gaps to address to potentialize this emerging field.

**Keywords:** algorithms; algorithms; artificial intelligence; dietary assessment; intelligence artificial; machine learning; metabolomics; nutrition; prediction; prediction; social media.

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## PAPER 2: Use of artificial intelligence in precision nutrition and fitness

**AUTHOR:** Giuliano Roberto da silva

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 applying 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, iPhone, 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

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patients; AI-based nutrition and fitness support systems and apps and some challenges and future perspectives.

## **Keywords**

Precision medicine

Nutritional surveillance

Nutrition assessment

Nutrition therapy

Physical fitness

Artificial intelligence

**PAPER 3:** Use of artificial intelligence in Alzheimer's disease detection

**AUTHOR:** Abdelhamid Subasi

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Alzheimer's disease (AD) is one of the most prevalent dementia types affecting the elderly population. On-time detection of the AD is valuable to find new approaches for the AD treatment. Artificial intelligence (AI) is an effective technique for AD detection as these methods are employed as a computer-aided diagnosis (CAD) system in clinical practices and play a crucial role in identifying variations in the brain images to detect AD. This chapter reviews and summarizes the recent investigations, advances and some related challenges in AI techniques employed for medical image processing and image analysis in AD detection. Several studies have discovered and employed different techniques, including AI techniques for CAD of AD detection. The main concentration lies in getting a reliable, but simple and fast model for automatic AD detection. The approaches to identify AD are based on the application of AI techniques. In this chapter, the concentration will be on AI techniques for AD detection from brain images. Furthermore, some of the image processing, feature extraction, and machine learning methods which were applied to AD detection is overviewed. Then the chapter will be concluded with a summary of the current state of the art, a critical discussion of new directions and open challenges for future research.

## Keywords

Alzheimer's disease detection

Artificial intelligence

Ensemble machine learning methods

Deep neural networks

Convolutional neural networks

## Paper 4: Artificial intelligence and glaucoma

**AUTHOR:** Rababs.

In years, research in artificial intelligence (AI) has experienced an unprecedented surge in the field of ophthalmology, in particular glaucoma. The diagnosis and follow-up of glaucoma is complex and relies on a body of clinical evidence and ancillary tests. This large amount of information from structural and functional testing of the optic nerve and macula makes glaucoma a particularly appropriate field for the application of AI. In this paper, we will

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review work using AI in the field of glaucoma, whether for screening, diagnosis or detection of progression. Many AI strategies have shown promising results for glaucoma detection using fundus photography, optical coherence tomography, or automated perimetry. The combination of these imaging modalities increases the performance of AI algorithms, with results comparable to those of humans. We will discuss potential applications as well as obstacles and limitations to the deployment and validation of such models. While there is no doubt that AI has the potential to revolutionize glaucoma management and screening, research in the coming years will need to address unavoidable questions regarding the clinical significance of such results and the explicability of the predictions.

**Keywords:** Apprentice automatous; Apprentice profonde; Artificial intelligence; Deep learning; Glaucoma; Glaucoma; Intelligence artificial; Machine-learning.

## PAPER 5: ARTIFICIAL INTELLIGENCE IN MEDICAL PRACTICE: REGULATIVE ISSUES AND PERSPECTIVES

**AUTHOR:** Vitali M Peskov, Andrii o Hark Usha.

One of the first broad definitions of AI sounded like "Artificial Intelligence is the study of ideas which enable computers to do the things that make people seem intelligent ... The central goals of Artificial Intelligence are to make computers more useful and to understand the principles which make intelligence possible." There are two approaches to name this technology - "Artificial intelligence" and "Augmented Intelligence." We prefer to use a more common category of "Artificial intelligence" rather than "Augmented Intelligence" because the last one, from our point of view, leaves much space for "human supervision" meaning, and that will limit the sense of AI while it will undoubtedly develop in future. AI in current

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practice is interpreted in three forms, they are: AI as a simple electronic tool without any level of autonomy (like electronic assistant, "calculator"), AI as an entity with some level of autonomy, but under human control, and AI as an entity with broad autonomy, substituting human's activity wholly or partly, and we have to admit that the first one cannot be considered as AI at all in current conditions of science development. Description of AI often tends to operate with big technological products like DeepMind (by Google), Watson Health (by IBM), Healthcare's Edison (by General Electric), but in fact, a lot of smaller technologies also use AI in the healthcare field - smartphone applications, wearable health devices and other examples of the Internet of Things. At the current stage of development AI in medical practice is existing in three technical forms: software, hardware, and mixed forms using three main scientific-statistical approaches - flowchart method, database method, and decision-making method. All of them are useable, but they are differently suiting for AI implementation. The main issues of AI implementation in healthcare are connected with the nature of technology in itself, complexities of legal support in terms of safety and efficiency, privacy, ethical and liability concerns.

**Keywords:** AI; Artificial Intelligence; Healthcare; Medical devices; Software.