LITERATURE SURVEY

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Project Name	**Project - AI-Powered Nutrition Analyzer for Fitness Enthusiasts**
Maximum Marks	**4 Marks**

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ABSTRACT:

Artificial intelligence (AI) as a branch of computer science, the purpose of which is to imitate thought processes, learning abilities and knowledge management, finds more and more applications in experimental and clinical medicine. In recent decades, there has been an expansion of AI applications in biomedical sciences. The possibilities of artificial intelligence in the field of medical diagnostics, risk prediction and support of therapeutic techniques are growing rapidly. The aim of the article is to analyze the current use of AI in nutrients science research. The literature review was conducted in PubMed. A total of 399 records published between 1987 and 2020 were obtained, of which, after analyzing the titles and abstracts, 261 were rejected. In the next stages, the remaining records were analyzed using the full-text versions and, finally, 55 papers were selected. These papers were divided into three areas: AI in biomedical nutrients research (20 studies), AI in clinical nutrients research (22 studies) and AI in nutritional epidemiology (13 studies). It was found that theartificial neural network (ANN) methodology was dominant in the group of research on food composition study and production of nutrients. However, machine learning (ML) algorithms were widely used in studies on the influence of nutrients on the functioning of the human body in health and disease and in studies on the gut microbiota. Deep learning (DL) algorithms prevailed in a group of research works on clinical nutrients intake. The development of dietary systems using AI technology may lead to the creation of a global network that will be able to both actively support and monitor the personalized supply of nutrients.

INTRODUCTION:

The term “artificial intelligence” was first proposed in 1955 by the American computer scientist John McCarthy (1927–2011) in the proposal of a research project, which was carried out the following year at Dartmouth College in Hanover, New Hampshire Artificial intelligence (AI) as a branch of computer science, the purpose of which is to imitate thought processes, learning abilities and knowledge management, finds more and more applications in experimental and clinical medicine. In recent decades, there has been an expansion of AI applications in medicine and biomedical sciences. The possibilities of artificial intelligence in the field of medical diagnostics, risk prediction and support of therapeutic techniques are growing rapidly. Thanks to the use of AI in ophthalmological

Artificial Neural Networks (ANNs):

ANNs are mathematical models designed to process and calculate input signals through rows of processing elements, called artificial neurons, connected to each other by artificial synapses. An ANN reveals its particular usefulness in the case of the need for modelling datasets with non-linear dependencies. In solving biomedical problems, raw data can be both literature and experimental data. In the last two decades, ANNs have been used, among others, to create an experimental decision algorithm model open to improvement, aimed at evaluating the results of biochemical tests confronted with both reference values and clinical data. The usefulness of ANNs has been proven in body composition analyses, which have clearly non-linear characteristics. Using ANN modelling, significant benefits can be obtained in clinical dietetics. It is worth noting that the fuzzy logic methodology (FLM) can be combined with neural networks. The idea of this area of AI is to strive for greater accuracy, dimensionality and simplification of the structure. There is a possibility to create fuzzy neural networks and convert FLM-based models into neural networks.

Medical Research:

AI can be used to analyse and identify patterns in large and complex datasets faster and more precisely than has previously been possible. It can also be used to search the scientific literature for relevant studies, and to combine different kinds of data; for example, to aid drug discovery. The Institute of Cancer Research can SAR database combines genetic and clinical data from patients with information from scientific research, and uses AI to make predictions about new targets for cancer drugs. Researchers have developed an AI ‘robot scientist’ called Eve which is designed to make the process of drug discovery faster and more economical.AI systems used in healthcare could also be valuable for medical research by helping to match suitable patients to clinical studies.

AI in Clinical Nutrients Intake:

In order to monitor eating behaviours, a rapid automatic bite detection algorithm (RABID) that extracts and processes skeletal features from videos was constructed. used it to analyse the eating behaviours of n = 59 patients (three types of dishes, 45 meals), the results of which showed an agreement between algorithmic and human annotations. In the area of AI applications in the improvement of dietary solutions, two articles describing prototype solutions should be mentioned. Khan and Hoffmann proposed a menu construction using an incremental knowledge acquisition system (MIKAS). This system asks the expert to provide an explanation for each of their actions, in order to include the explanation in its knowledge base, so MIKAS could in the future automatically perform them. Fuzzy arithmetic has been used to create "Nutri-Educ"—software for proper balancing of meals, according to the energy needs of the patient. Heuristic search algorithms are used to find a set of actions, acceptable from a nutritional point of view, that will transform the initial meal into a well-balanced one.

AI in Food Composition Study:

The use of AI techniques in studying the composition of food products and testing their originality dates back to the 1990s. Dettmar et al. used the ANN technique to identify the region of origin of fruit from a set of 16 variables characterizing samples of orange juice.The effectiveness of the applied calculation technique was 92.5%. Yang et al. used the isobaric tag for a relative and absolute quantification proteomic approach to analyze differentially expressed whey proteins in the human and bovine colostrum and mature milk to understand the different whey proteomes. It may provide useful information for the development of nutrient food for infants and dairy products

CONCLUSION:

In this paper, we aimed to develop a practical deep learning based on Ai-powered nutrition analyser for fitness enthusiasts. Despite the fact that AI technologies are dynamically developing, the problem in nutrients research is not currently obtaining more and more advanced algorithms, but the application of those that have already been developed and are standardly used in other fields of knowledge, and even in other areas of biomedicine. An important challenge for nutrients research is also their integration with research on the use of medical robotics. Perhaps the development and application of AI in nutrients research requires modification of both mentality and professional competences, as is already postulated in relation to the food industry.

References:

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