AI-powered Nutrition Analyzer for Fitness Enthusiasts

Abstract

The awareness of good lifestyle is increasing among people these days. People tend to follow various diets and exercises. But consulting a dietician is something that everyone cannot afford. Also, consulting a dietician could be time-consuming. This research proposes an expert system method to recommend a personalized diet plan. The main purpose of the project is to build a model which is used for classifying the fruit depends on the different characteristics like colour, shape, texture etc. Here the user can capture the images of different fruits and then the image will be sent the trained model. The model analyses the image and detect the nutrition based on the fruits like (Sugar, Fiber, Protein, Calories, etc.). It classifies an object with higher degree of accuracy by fine tuning the parameters of the network. The main motto is to reduce the training time and computing complexity of the network by adding a sub layer after each convolution layer.

LITERATURE SURVEY

Artificial Intelligence in Nutrients Science Research: A Review Jarosław Sak and Magdalena Suchodolska

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 the artificial neural network (ANN) methodology was dominant in the group of research on food com- position study and production of nutrients. However, machine learning 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 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.

Existing problem /approaches

A number of studies have been conducted on image categorization. Veggie Vision was an initial attempt to develop a produce recognition system for use in supermarkets. The system could analyze color, texture and density, and thus was able to obtain more information. Density was calculated by dividing weight with the area of the fruit. The reported accuracy was approximately 95% when color and texture features were combined. Fariaetal presented a framework for classifier fusion for the automatic recognition of produce in supermarkets. They combined low-cost classifiers trained for specific classes of interest to enhance the recognition rate. Chowdhury et al. recognized 10 different vegetables using color histogram and statistical texture features. They obtained a classification accuracy of up to 96.55% using neural network as a classifier. Dubey proposed a framework for recognizing and classifying images of 15 different types produce. The approach involves segmenting an image to extract the region of interest, and then calculating the features from that segmented region, which is further used in training and classification by a multi-class support vector machine. Moreover, they proposed an improved sum and difference histogram (ISADH) texture feature for this kind of problem. Fruit detection greatly affects the robot's harvesting efficiency because it is an unstructured environment with changing lighting conditions. Bulanonetal. enhanced the portion occupied by fruit in images using a red chromaticity coefficient and adopted a circle detection method for classifying individual fruits. Jimenez et al. developed a method that can identify spherical fruits in the natural environment in which difficult situations are present: occlusions, shadows, bright areas, and overlapping fruits. Range and attenuation data are sensed by a laser range-finder sensor, and the 3-D position of the fruit with radius and reflectance are obtained after the recognition steps.

REFERENCES

1. McCarthy, J.; Minsky, M.; Rochester, N.; Shannon, C.E. A Proposal for the Dartmouth Summer Research Project on Artificial

Intelligence. 1955. Available online: http://raysolomonoff.com/dartmouth/boxa/dart564props.pdf (accessed on 6 November 2020).

2. Nilsson, N.J. The Quest for Artificial Intelligence; Cambridge University Press: Cambrige, UK; New York, NY, USA, 2010.

3. Ting, D.S.W.; Pasquale, L.R.; Peng, L.; Campbell, J.P.; Lee, A.Y.; Raman, R.; Tan, G.S.W.; Schmetterer, L.; Keane, P.A.; Wong, T.Y.

Artificial intelligence and deep learning in ophthalmology. Br. J. Ophthalmol. 2018, 103, 167–175. [CrossRef]

4. Yasaka, K.; Abe, O. Deep learning and artificial intelligence in radiology: Current applications and future directions. PLoS Med.

2018, 15, e1002707. [CrossRef] [PubMed]

5. Johnson, K.W.; Torres Soto, J.; Glicksberg, B.S.; Shameer, K.; Miotto, R.; Ali, M.; Ashley, E.; Dudley, J.T. Artificial intelligence in

cardiology. J. Am. Coll. Cardiol. 2018, 71, 2668–2679. [CrossRef] [PubMed]

6. Hessler, G.; Baringhaus, K.-H. Artificial intelligence in drug design. Molecules 2018, 23, 2520. [CrossRef] [PubMed]

7. Heydarian, H.; Adam, M.T.P.; Burrows, T.; Collins, C.E.; Rollo, M.E. Assessing eating behaviour using upper limb mounted

motion sensors: A systematic review. Nutrients 2019, 11, 1168. [CrossRef] [PubMed]

8. Demirci, F.; Akan, P.; Kume, T.; Sisman, A.R.; Erbayraktar, Z.; Sevinc, S. Artificial neural network approach in laboratory test

reporting: Learning algorithms. Am. J. Clin. Pathol. 2016, 146, 227–237. [CrossRef]

9. Valletta, E.; Kuˇcera, L.; Prokeš, L.; Amato, F.; Pivetta, T.; Hampl, A.; Havel, J.; Va ˇnhara, P. Multivariate calibration approach for

quantitative determination of cell-line cross contamination by intact cell mass spectrometry and artificial neural networks. PLoS

ONE 2016, 11, e0147414. [CrossRef]

10. Agatonovic-Kustrin, S.; Beresford, R. Basic concepts of artificial neural network (ANN) modeling and its application in pharma-

ceutical research. J. Pharm. Biomed. Anal. 2000, 22, 717–727. [CrossRef]

11. Gallucci, M.; Pallucca, C.; Di Battista, M.E.; Fougère, B.; Grossi, E.; Fougèreand, B. Artificial neural networks help to better

understand the interplay between cognition, mediterranean diet, and physical performance: Clues from TRELONG study. J.

Alzheimer's Dis. 2019, 71, 1321–1330. [CrossRef] [PubMed]

12. Romeshwar Sookrah, Jaysree Devee Dhowtal and Soulakshmee Devi Nagowah, "A DASH Diet Recommendation System for Hypertensive Patients Using Machine Learning",2019 7th International Conference on Information and Communication Technology.

13. Gergely Kov´asznai, "Developing an expert system for diet recommendation", 2011 6th IEEE International Symposium on Applied Computational Intelligence and Informatics.