AI-POWERED NUTRITION ANALYZER FOR FITNESS ENTHUSIASTS

TEAM MEMBERS : Athira DR(Leader)

Aysha Farzeena M

Ashmi M

Abina T

FROM ECE DEPARTMENT "ARUNACHALA COLLEGE OF ENGINEERING FOR WOMEN"

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 the artificial 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.

Keywords: artificial intelligence; artificial neural networks; machine learning; 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 [1,2]. 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 [3], radiological and cardiac diagnostics, measurable clinical benefits have been obtained. AI was used in research on new pharmaceuticals .The development of AI also provides new opportunities for research on nutrients and medical sensing technolog.

ARTIFICIAL NEURAL NETWORKS:

ANNs as a currently widely used modeling technique in the field of AI were inspired by the structure of natural neurons of the human brain. 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. There are three types of layers forming ANNs. The input layer captures the raw data and passes them to the hidden layer. In this second layer, the learning process takes place. The results of the analysis are collected in the output layer and the output data are created. A neural network may consist of hundreds of single units. An ANN is a parameterized system that has weights as adjustable parameters. Due to the need for estimation of these parameters, ANNs require large training sets. ANNs acquire knowledge by detecting patterns and relationships between data, i.e., through experience, not as a result of programming. An ANN reveals its particular usefulness in the case of the need for modeling 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 [8]. This technique was also used in evaluation of cell culture cross-contamination levels based on mass spectrometric fingerprints of intact mammalian cells [9]. The particular usefulness of ANNs has been proven in pharmaceutical analyses [10]. An interesting application of ANNs is the prediction of the relationship between the Mediterranean dietary pattern, clinical characteristics and cognitive functions [11]. The usefulness of ANNs has been proven in body composition analyses, which have clearly non-linear characteristics [12]. Using ANN modeling, 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.

AI IN FOOD COMPOSITION AND 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 [23]. 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 [24]. Moreira et al. used topological maps of the Kohonen neural network in the assessment of the procedure for sample preparation of cashew nuts [25]. Shen et al. used laser-induced breakdown spectroscopy (LIBS), least squares support vector machines (LS-SVM) and LASSO models for the detection of six nutritive elements in Panax notoginseng (traditionalChinese medicine) samples from eight producing areas [26]. Rasouli et al. applied the whole space genetic algorithm-radial basis function network (wsGA-RBFN) method to determine the content of microminerals of Fe^{2+}, Zn^{2+}, Co^{2+} and Cu^{2+} in various pharmaceutical products and vegetable samples (tomato, lettuce, white and red cabbages) [27]. This group of studies also includes the research of Soltani et al. who used three different quantitative structure bitter taste relationship (QSBR) models (artificial neural network, multiple linear regression and support vector machine) to predict the bitterness of 229 peptides.

OBJECTIVE:

To build a model which is used for classifying the food depends on the different characteristics like colour ,shape,texture etc. Here the user can capture the images of different fruits and then image will be send to the trained model.then the model analyses the image and detect whether it is consumable or not ,does it contain inappropriate calories or fat.

ENERGY REQUIREMENTS AND ITS EVALUATION:

Amount of Nutrition needed for an individual depends upon his or her age body weight physiological structures height and all these are required to calculate the energy

RDA recommends the energy requirements must be assessed in in term of its energy expenditure rather than in terms of energy intake

Total energy expenditure = predicted body mass ratio * physical activity level

Physical activity ratio values for activities performed in a day can be aggregated over that period to yield the physical activity level(P.A.L)

NUTRITION CONSIDERATION:

Carbohydrates: 45–65% of calories. Protein: 10–35% of calories. Fat: 20–35% of calories.

2–3 hours per day of intense exercise performed 5–6 times per week, the ISSN suggests consuming 5–8 grams per kilogram (g/kg) of body weight, or 250–1,200 g, of carbohydrates per day for athletes who weigh 50–150 kg. For example, the dietary reference intakeTrusted Source for adult females is 46 g, and for adult males — 56 g. That is why it may be beneficial for athletes to consume nearer to 92 g and 112 g of protein, respectively.

ALGORITHM:

Step 1: Download the dataset

Step 2: Import the image Data Generator.

Step 3: Configure Image Data Generator Class.

Step 4: Apply the Data Generator functionality to tain set and test set

Step 5: Import the Model building libraries.

Step 6: Initializing the Model.

Step 7: Adding CNN layers.

Step 8: Adding the dense layers

Step 9: Configure the learning process.

Step 10: Train the model.

Step 11: Save the Model.

Step 12: Test the Model.

Step 13: Create HTML page.

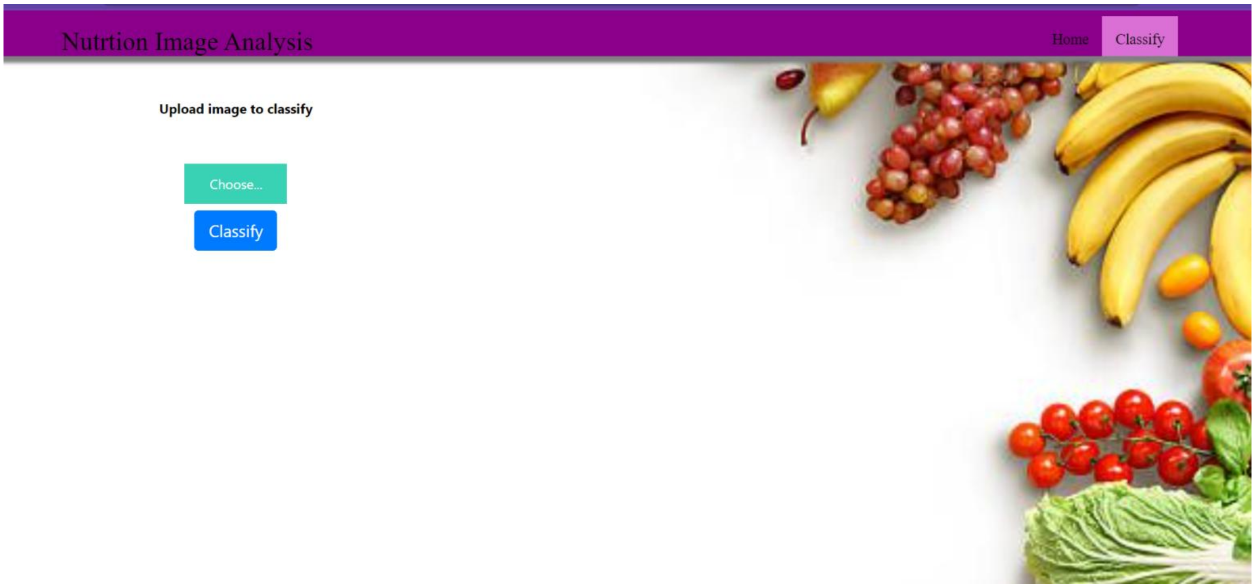
Step 14: Build python code.

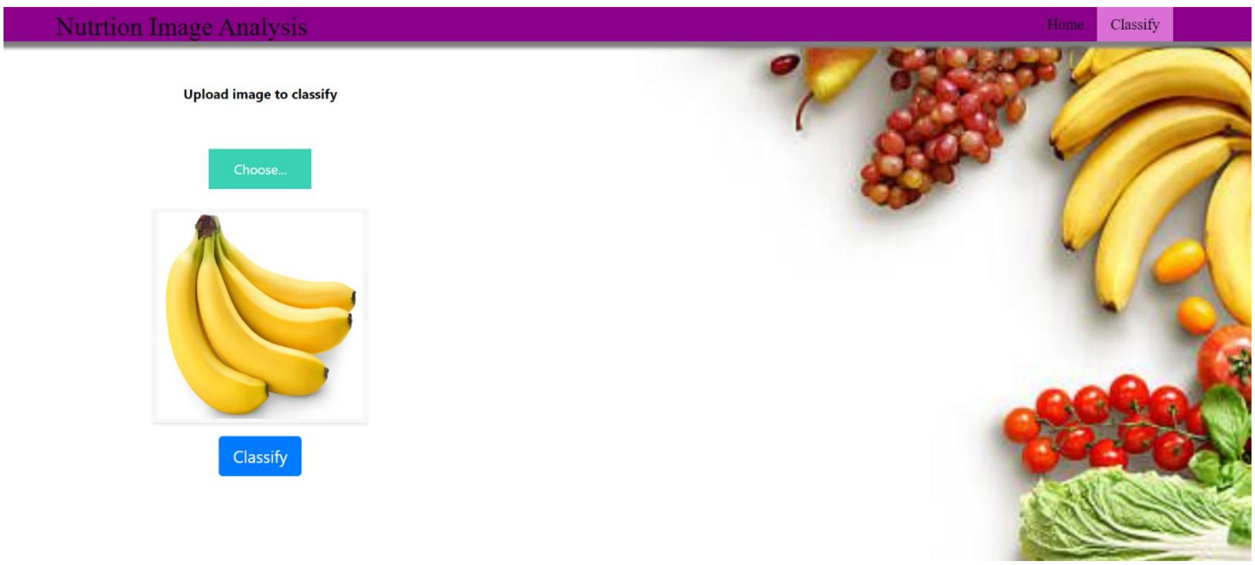
Step 15: Configure our Flask Application and Loading our Model by using Load_model Method.

Step 16: Routing to the HTML page.

Step 17: Run the Application.

OUTCOME:


Nutrtion Image Analysis
Home
Classify
Upload image to classify
Choose...
Classify


Nutrtion Image Analysis
Home
Classify
Upload image to classify
Choose...
Classify

CONCLUSION:

As the AI power nutrition analysis and fitness in the CSS is one of the growing field in the AI industry this project will help people all of well the globe to be healthy and it helps them to maintain their physique and allow them to stay healthy forever.

This AI powered nutrition analysis and fitness model will get the data set and the details from the users biodata and it generates schedule that plans and exercise.

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