https://doi.org/10.48047/AFJBS.6.14.2024.11491-11496

African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper Open Access

ANALYSIS OF FRUITS NUTRITION BASED ON AI

Surya A[1] and Subha I[2]

[1] Assistant Professor,Department of ECE, Anjalai Ammal Mahalingam Engineering College , Thiruvarur District, Tamil nadu, India. E-mail address: a.surya@aamec.edu.in

[2]Associate Professor,Department of ECE, Anjalai Ammal Mahalingam Engineering College , Thiruvarur District, Tamil nadu, India. E-mail address: subhaindrachit@gmail.com

Volume 6, Issue 14, Aug 2024

Received: 15 June 2024

Accepted: 25 July 2024

Published: 15 Aug 2024

doi: 10.48047/AFJBS.6.14.2024.11491-11496

ABSTRACT

Food is fuel of our body able to perform work physically. Nowadays, People want to maintain their healthy diet and away from the obesity, so it increases the need of the nutrition analyzer tools enable to easily extract the nutrient content. A healthy diet has been a concern for many health conventions. We have proposed a system of healthy food consumption. The main objective is to build a model used to classify fruit images based on different characteristics like texture, shape, color etc. Using AI Driven Analysis of fruits to determine their nutritional content. The Model analyses the image using CNN and detect the nutrition such as calorie, sugar, fiber, protein etc. Recent developments in smart phones application have made it possible to develop an efficient and more convenient solution of automatic dietary assessment. These tools enable more opportunities to help people understand the daily eating habits, exploring nutrition patterns and maintain a healthy diet.

Keywords: Image classification,Convolution Neural Network, Nutrition tion, Flask Application.

INTRODUCTION

Food has the power to influence body metabolism and organ healthy directly, if food is the reason, nutrition is the result. Nowadays, People want to maintain their healthy diet and away from the obesity, so it increases the need of the nutrition analyzer tools enable to easily extract the nutrient content [1].It has developed rapidly in the recent years .The main a im is building a model which is used for classifying the fruits. AI-Driven analysis of fruits is used to estimate and predict calorie based on deep learning techniques.

OVERVIEW

To know the fundamental concept and techniques of Convolutional Neural Network and broad understanding of image data[4]. To pre-process/ clean the data using different data pre-processing techniques. Build a web application using the Flask framework. The user interacts with the UI (User Interface) and gives the image as input, then the input image is then passed to our flask application, and finally with the help of the model which build classify the result and showcase it on the UI.

. RELATEDWORKS

This paper proposes a nutrition analysis based on deep learning model using convolutional neural network algorithm[3] that analyses the food into specific categories in the training part of the prototype system. The purpose is to improve the accuracy of the predetermined trained model. The prototype of this system based on the client server model. The client request and processes image detection. The prototype is designed with three main software components, including a classification of pre-trained CNN model attribute estimation models of training module, and a server-side module. We analyses and trained with a lot of variety of food categories through convolutional neural network model, to achieve high accuracy.The deep convolutional neural network consists of six layers to classify food image patches. For each item of food, patches with overlapping are feature extracted and classified.

METHODS

A. Image Dataset

We have collected pre-trained image dataset of fruits from Kaggle[5] .The Images belongs to two classes training and testing data of fruit i.e. the train and test datasets are used for fit the model and evaluate the model of image dataset. Dataset contain 3000 images augmented image of fruit for training data contain 2400 images and 800 images of testing data. For Better accuracy, we train more images on training data than the testing data. In this way, we can easily evaluate the performance of our model. We import the dataset into Google colab through the drive.

B.Loading and pre-processing the data

To improve image data that remove unintended distortion s or improves certain image features important for further processing(4). We cannot use the raw images directly so, we apply

Image Augmentation technique via keras Image Data generator class and some kind of parameter to process our data class and we use flow from directory function such as directory, target size, batch size, color, and class mode.

C. Model Building

We will import Necessary libraries. To build the model using Deep learning Convolution neural network (CNN) which contains an input layer along with the convolution, max-pooling, and output. We will initialize the sequential model using adding method[6]. The Input shape (64,64,3) and adding a two-convolution layer with depth of 32, filter size 3x3 by a maxpooling layer, pool size 2x2 and the activation function as ReLU and flatten layer which flattens the input. The final step is compilation, once it done, we move on the training phase, the keras need a loss function during model compilation process; this model optimizes the input weights by comparing the prediction. Here we use adam optimizer. Metrics used to evaluate the performance of our model. Train our model with our image dataset for 5 epochs and specify the batch size. The model saves with .h5 extension which contains the multidimensional arrays of scientific data and load the saved model for predict the image output.

SYSTEM DEPLOYMENT

The architecture that is used to design our proposed system as shown in the figure 1. It involves the development of our proposed system which all progress met their relevant requirements [5]. As we explained the methodology above using image processing and model building in the trained dataset. We install the software package of anaconda Navigator, Anaconda python distribution, python 2.7 and python 3.6 version in the window 10 and we create an environment to install keras and tensorflow whish used for implement in python language. For this, we will be using a Jupyter Notebook, Spyder and the flask- web frame work used for building web application[7]. Creating the flask Application and loading our model by using the load model method. Create a HTML pages and build the python codes. Our model is routed on the HTML pages created earlier. Here, we integrate Rapid API key which is used to test the fruit item and will result the nutrition content present in the fruit item. Now images are uploading on the UI, the launch function is executed. It will take the image sin the local system then will convert into required size [5]. Finally, it predicts the results with our trained model and it shows the class name and their properties and the application run in the local host [7].

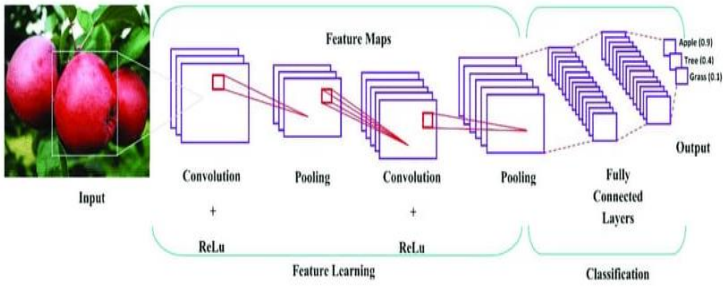

Figure 1: CNN based System Model

Result and Discussion

For each Fruits item, pre-processes and classified using CNN, it proved the effectiveness of performance metrics and accuracy of our proposed system.

.

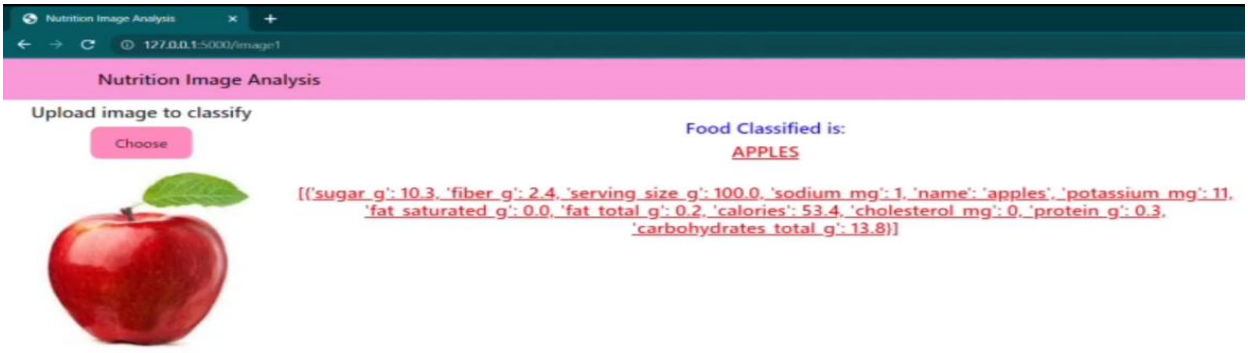

Figure 2: Analysis result of Apple Fruit

The above figure 2 result shows the analysis of apple fruit that contains nutrients as follows sugar -10.3 g ,fiber-2.4 g,sodium-1 ,potassium 11 mg ,fat 0.2 g ,cholesterol-0 mg,protein-0.3 g and carbohydrate-13.8gm.This result helps to know the nutritient content of apple and suggest the fruit for proper dietry system. It also helps to maintain healthy lifestyle.

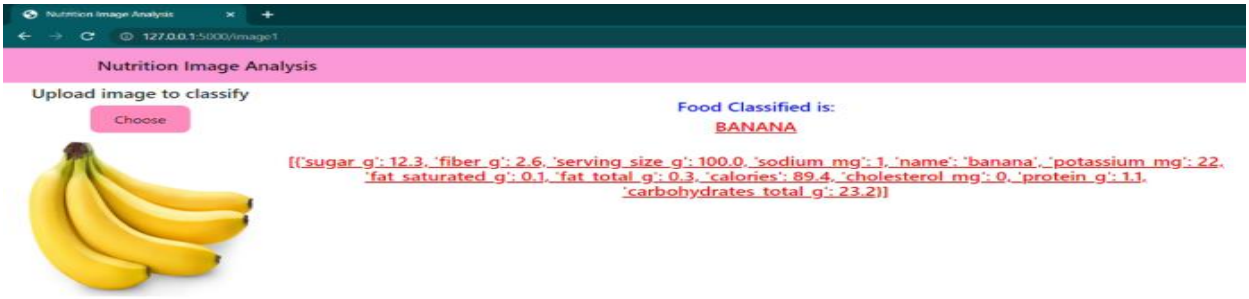

Figure 2: Analysis result of Banana Fruit

The above figure 3 result shows the analysis of banana fruit that contains nutrients as follows sugar -12.3 g ,fiber-2.6 g,sodium-1 ,potassium-22 mg ,fat 0.3 g ,cholesterol-0 mg, protein-1.1 g and carbohydrate-22.2gm. This result helps to know the nutritient content of apple and suggest the fruit for proper dietry system.it also helps to suggest fruit for all type of people to maintain their health inproper manner.

CONCLUSION

We create a practical deep learning algorithm based on AI Driven Analysis of Fruits. In this technique, a deep learning algorithm–based food image recognition system employs the services. We are improving the performance of the algorithm (in terms of detection accuracy). In the future, we will integrate our system into a real-world mobile device to enhance the cloud computing system. This prototype system imports the image of the fruits from the user end and classifies and analyse the attributes of the fruit items using the estimation model. The results are enhanced via image preprocessing, model building, and flask application. This classification method extracts accurate values (11).

REFERENCES

1. Zhidongshen, Adan Shehzad, sichen, Hui sun, jin Liu: Machine Learning Based Approach on Food Recognition and Nutrition Estimation. 2019 International Conference on Identification, Information and Knowledge in the Internet of Things(IIKI2019).https://www.sciencedirect.com/science/article/pii/S001048252100766..
2. YingWang,JianboWu,HuiDeng and Xianghui Zeng: Food Image Recognition and Food Safety Detection Method Based on Deep Learning. https://doi.org/10.1155/2021/1268453.

3. Chang Liu, Yu Cao, Senior Member, IEEE,YanLuo, Member, IEEE, Guanling Chen, Member, IEEE, Vinod Vokkarane, Senior Member, IEEE, Yunsheng Ma, SongqingChen,Member,IEEE,PengHouHou:ANewDeepLearningbasedFoodRecognitonSystemforDietaryAssessment on An Edge ComputingService Infrastructure.http://ieeexplore.ieee.org/xplore.
4. Dr.SubarnaShakya: Analysis of Artificial intelligence based Image Classification Techniques Journal of Innovative Image Processing(JIIP)(2020)Vol.02/No.01,Pages:44-54,DOI:https://doi.org/10.36548/jiip.2020.1.00544ISSN:2582-4252(online).
5. Ms. Dhanashri R. Nevarekar, Ms. Pallavi V. Patil, MS.Pooja S. Patil, MS. Aishwarya A. Tippe: Estimation of FoodNutrition using Machine Learning. International Journal of Research in Engineering and Science (IJRES) ISSN(Online):2320364, ISSN(Print):23209356,www.ijres.org Volume 10 Issue 6 ǁ2022 ǁPP.1561-1564, www.ijres.org1561.
6. ChaitanyaAa,JayashreeShettya,PriyamvadaChiplunkara:FoodImageClassificationandData Extraction Using Convolutional Neural Network and Webcrawlers.[online] www.sciencedirect. Com Procedia ComputerScience218(2023) 143–1521877-0509©2023.
7. KalliopiVDalakleidi,MarinaPapadelli,IoannisKapolos,KonstantinosPapadimitriou:ApplyingImage-BasedFood-Recognition systems on Dietary Assessment: A Systematic *Review Advances in Nutrition,* Volume13, Issue6, November 2022, Pages 2590-2619 https://doi.org/10.1093/ advances/nmac078.
8. Yanfei Li, Xianying Feng, Yandong Liu &XingchangHan: Apple quality identification and classification by image processing based on convolutional neural networks.Scientific Reports volume11,article number:16618(2021).
9. MdTohidulIslam,B.M.NafizKarimSiddique,SagidurRahman,TaskeedJabid: Food Image Classification with Convolutional Neural Network. https://ieeexplore.ieee.org/xpl/conhome/8533558/proceeding in 2018 International Conference on Intelligent Informatics and Biomedical Sciences(ICIIBMS).
10. VBalajiKasyap; N.JayaPandian: Food Calorie Estimation using ConvolutionalNeuralNetwork.Published in 2021 3rd International Conference on Signal Processing and Communication(ICPSC).