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THE FUTURE OF NUTRITION: AN AI –DRIVEN ANALYSIS OF FRUITS

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Abstract

Food plays a major role that provides nutrients. For human beings, food is a critical contributor to physical well-being, a major source of pleasure, worry and stress, a major occupant of waking time and, across the world, the single greatest category of expenditures. A healthy diet has been a concern for many health conventions. We have proposed a system of healthy food consumption. The main objective of the project 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, fibre, protein etc.

Keywords- *Image classification, Convolution Neural Network, Nutrition Estimation, Flask Application*

I. INTRODUCTION

Food is fuel of our body able to perform work physically. 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. It has developed rapidly in the recent years. The main aim of our project is building a model which is used for classifying the fruits. Our AI-Driven analysis of fruits is used to estimate and predict calorie based on deep learning techniques. Its purpose is to maintain a healthy lifestyle by tracking diet and eating healthy items and it is useful to the diabetes, obesity patients and so healthy people, who also helps to maintain nutrition in daily life. AI algorithms may help better understand and predict the nutrition interaction - related data & health outcomes. Our proposed system to predict the overall accuracy.

II. PROJECT OVERVIEW

To know the fundamental concept and techniques of Convolutional Neural Network and Broad understanding of image data. 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 we build we will classify the result and showcase it on the UI.

III. RELATED WORKS

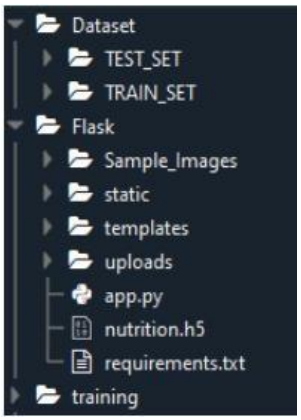
[1] Nowadays, standard intake of healthy food is necessary for keeping a balanced diet to avoid obesity in the human body. In this paper, we present a novel system based on machine learning that automatically performs accurate classification of food images and estimates food attributes. This paper proposes a deep learning model consisting of a convolutional neural network that classifies food into specific categories in the training part of the prototype system. The main purpose of the proposed method

is to improve the accuracy of the pre-training model. The paper designs a prototype system based on the client server model. The client sends an image detection request and processes it on the server side. The prototype system is designed with three main software components, including a pre-trained CNN model training module for classification purposes, a text data training module for attribute estimation models, and a server-side module. We experimented with a variety of food categories, each containing thousands of images, and through machine learning training to achieve higher classification accuracy.

[2] Consuming the proper amount and right type of food have been the concern of many dieticians and healthcare conventions. In addition to physical activity and exercises, maintaining a healthy diet is necessary to avoid obesity and other health-related issues, such as diabetes, stroke, and many cardiovascular diseases. Recent advancements in machine learning applications and technologies have made it possible to develop automatic or semi-automatic dietary assessment solutions, which is a more convenient approach to monitor daily food intake and control eating habits. These solutions aim to address the issues found in the traditional dietary monitoring systems that suffer from imprecision, underreporting, time consumption, and low adherence. In this paper, the recent vision-based approaches and techniques have been widely explored to outline the current approaches and methodologies used for automatic dietary assessment, their performances, feasibility, and unaddressed challenges and issues.

[3] Diet management is a key factor for the prevention and treatment of diet-related chronic diseases. Computer vision systems aim to provide automated food intake assessment using meal images. We propose a method for the recognition of already segmented food items in meal images. The method uses a 6-layer deep convolutional neural network to classify food image patches. For each food item, overlapping patches are extracted and classified and the class with the majority of votes is assigned to it. Experiments on a manually annotated dataset with 573 food items justified the choice of the involved components and proved the effectiveness of the proposed system yielding an overall accuracy of 84.9%

IV. METHODS



A. *Image Dataset*

We have collected pre-trained image dataset of fruits from Kaggle. 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*

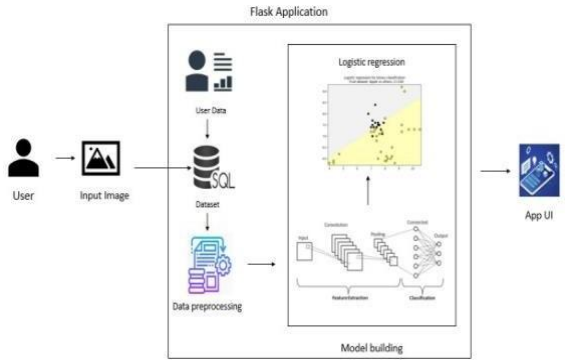
To improve image data that remove unintended distortions or improves certain image features important for further processing. we cannot use the raw images directly so, we apply Image Augmentation technique via keras Image Data generator class and some kind of parameter to process our data class and we 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. 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.

V. SYSTEM DEPLOYMENT

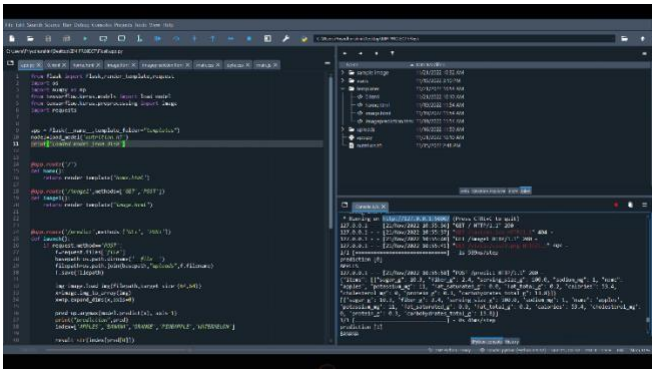
Below the architecture that is used to design our proposed system. It involves the development of our proposed system which all progress met their relevant requirements. As we explained the methodology above



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 project, we will be using a Jupyter Notebook, Spyder and the flask- web frame work used for building web application. 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 upload on the UI, the launch function is executed. It will take the image sin the local system then will convert into required size. Finally, it predicts the results with our trained model and it show the class name and their properties and the application run in the localhost.

VI. RESULT

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



VII. 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 system takes the image of the fruits from the user and classifies the image to measure 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. In the future, we will improve the usability and accuracy of the system.

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