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FOOD RECOGNITION USING DEEP CONVOLUTIONAL NEURAL NETWORK

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Abstract -Food monitoring and nutritional analysis assumes a main part in health-related issues; it is getting more essential in our everyday lives. In this paper, we apply a convolutional neural network (CNN) to the task of detecting and recognizing food pictures and to estimate nutrition in the food. Considering the wide variety of food, image recognition of food items is extremely troublesome. Food-101 dataset are used for train and test the model, we are using 101 different classes of food images in order to improve accuracy of model. The proposed model provides more than 80% of accuracy.

Key Words: *convolutional neural network (CNN), food recognition, deep learning, convolution layers, nutrition information*

1.INTRODUCTION

In an era of mobility, individuals become more conscious about their diet and stay away from coming or existing infections. Accurate assessment of dietary calorie estimation is essential for proper analysis of dietary intake. The importance of these individual structures lies in the proper classification of food. Over the past two decades, research has focused on computer vision and artificial intelligence programs to capture images from food and its health data. An automated vision-based traditional meal assessment system based on image analysis starts with four basic steps: food detection, food type classification, Estimating quantity or weight, and finally food information. the development of image processing and object detection, machine learning and deep learning methods and their application to convolutional neural networks (CNN) has improved the accuracy of image recognition. In recent years, CNN has been widely used in food recognition applications, improving traditional machine learning methods.

1.1 Objectives

The main objective of this is to recognize and detecting food.

1.To implement suitable Preprocessing of Image.

2.To Implement suitable method for Feature extraction

3.To design and implement suitable method for classification of food using CNN.

1.2 CNN architecture

The convolutional neural network consists of the input layer, the invisible layer, and the output layer. In the convolutional neural network, the middle layer is called the invisible layer.

- Convolutional layers

On CNN, the input takes the form of a tensor: (number of inputs) x (input height) x (input width) x (input channel). After going through the spiral layer, the image is summarized in a feature map called the Activation Map. The form is as follows. (Number of entries) x (height of feature map) x (width of feature map) x (feature map channel). Within the spiral layer.

- Pooling layers

Convolutional networks may include convolutional layers as well as general and global layers. The next layer of a single neuron is a set of neurons that combine the results of the data with the size of the group layer.

- Fully connected layer

The fully connected layer connects one layer of each neuron to another neuronal layer. This is similar to the old-style multilayer perceptron (MLP) neural net. Flat Medium classifies images through fully linked layers.

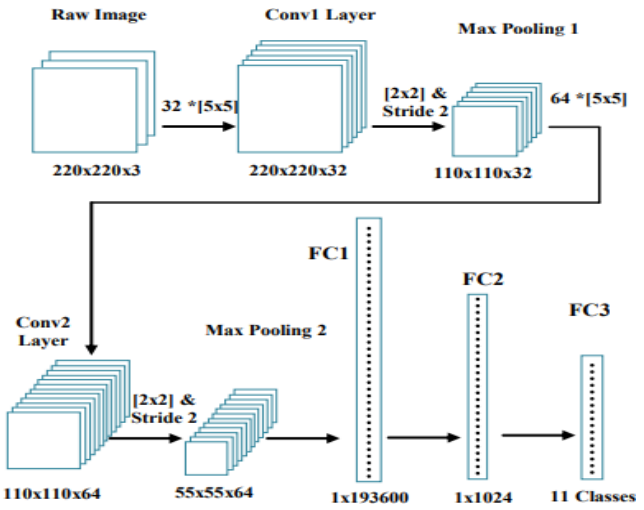


Fig1: Basic CNN Layer Structure

2. SYSTEM DESIGN

convolution neural networks (CNN) are used to differentiate the food images based on their features. Food datasets are utilized to prepare and assess CNN models. Keras is used to implement trained model.

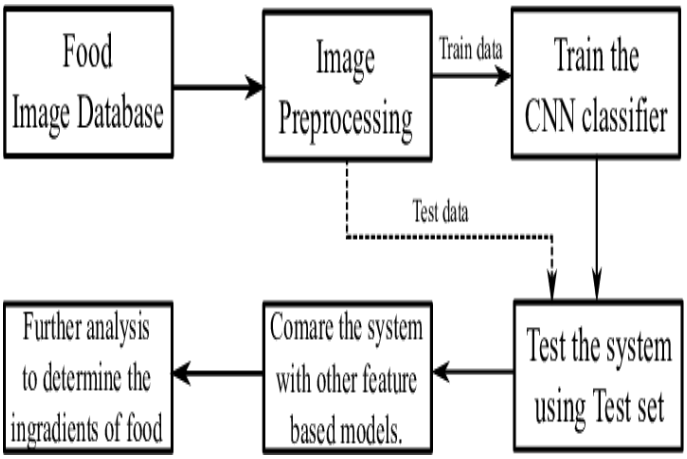


Fig 2: Block Diagram of System Design

2.1 Dataset: Here we provide a food-101 dataset it contains 101 different classes of food images. we are using 101000 images to train the model. Images were taken from publicly available Internet resources, The image consists of a single foodstuff to improve the appearance, rotation, color, and accuracy of complexity recognition.

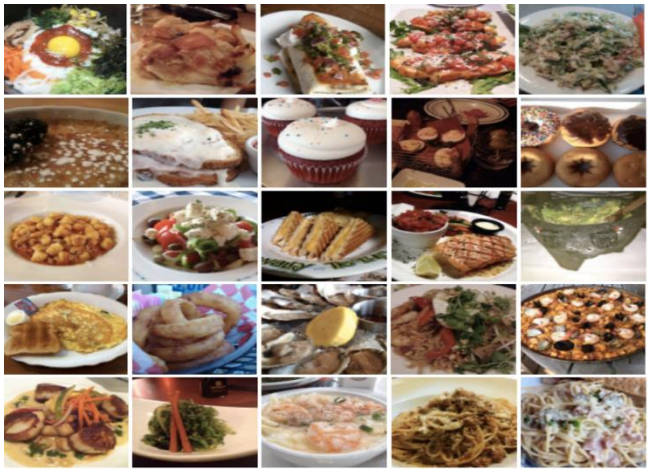


Fig 3: Proposed Dataset Food Categories

2.2 Pre-processing

First step involves preparing food dataset. The datasets in the form of images taken from food-101 dataset. They have 101000 images belongs to 101 classes.

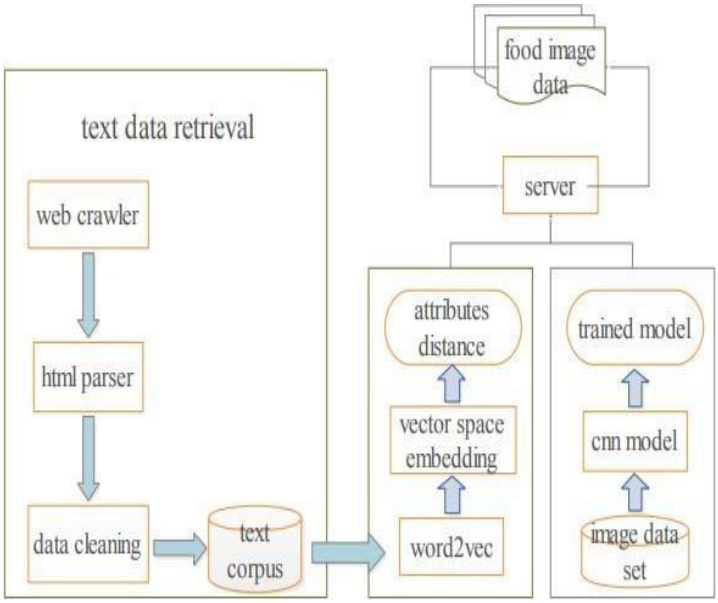
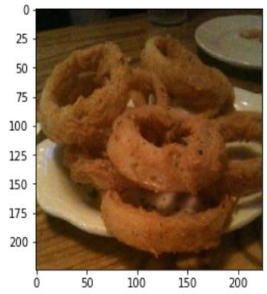


Fig 4: Block Diagram of Proposed System

The next step is a pre-trained CNN model and a perfect training. After the successful training and learning phase of the system, the classification phase begins. Classification is also done by users.

2.2 RESULTS

We embarked our study by implementing the CNN architecture. We modify the parameters such as choosing deeper CNN architecture, division of dataset into training and testing, and the number of epochs to train the model.

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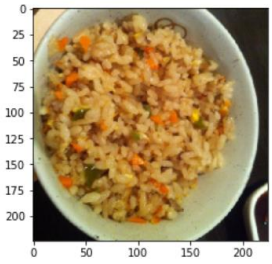
correct answer is:  onion_rings

CNN thinks its: onion_rings

Nutrition information in the dish is carbohydrate=44g  fat= 25g  calories= 411
```



```
correct answer is:  fried_rice

CNN thinks its: fried_rice

Nutrition information in the dish is carbohydrate=31g  fat= 2g  calories= 163
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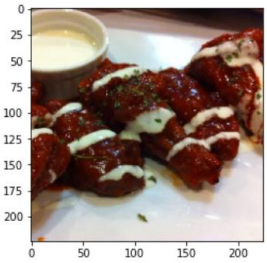

```
correct answer is:  chicken_wings

CNN thinks its: gnocchi

Nutrition information in the dish is carbohydrate=52g  fat= 1.5g  calories= 250
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The proposed classification and characteristic extraction method achieve a high degree of accuracy of 80%. We also describe possible and future improvements to improve system usability and accuracy.

3. CONCLUSION

In this we have implemented convolution neural network to identifying food images and nutrition information. we have presented dataset from food-101 for classifying images. we can classify different images among 101 classes of image which were trained. then identify nutrition information for each image for each training and testing we got about 80% of accuracy. For the future work have to recognize nutrition according to the quantity of each food item.

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