Food Image Classification and Nutrition Detection Using CNN

KIMAYA SAWANT[1], RINAL LOKHANDE[2], AARATI SURVASE[3], SRUSHTI PAWAR[4], PROF. PRAJWALI KORDE[5]

[1, 2, 3, 4, 5] *Dept. of Information Technology Engineering, JSPM's BSIOTR, Wagholi, Savitribai Phule Pune University, Pune, Maharashtra, India*

Abstract- ***Deep learning and the availability of greater datasets and computational resources have made classification more straightforward. In recent years, the convolutional neural network has become the most commonly used and popular image categorization approach. In this paper, various transfer learning approaches are used to classify images from an Indian cuisine dataset. Food plays a significant role in human life because it supplies us with a variety of nutrients, so it is crucial for everyone to keep track of their eating habits. As a result, food classification is a must for a better way of living. Pretrained models are employed in this project instead of typical ways of developing a model from the ground up, which saves computing time and money while also producing superior results. Dataset for Indian cuisine.***

Indexed Terms- Indian Food, Machine Learning, Food Image Classification

I. PROBLEM STATEMENT

The Indian Food Classification application will be hosted on the server. As a result, a user or visitor can utilise image processingr to search the programme for recipes user or visitor can utilize image processing to search the programme for recipes.

II. INTRODUCTION

Tenants' data is stored and processed at remote service providers in SaaS, which is based on the single instance multi-tenancy method. Meanwhile, cloud tenants can customise numerous duplications for data security and pay per use. However, service providers may be untrustworthy, and they may tamper with, delete, or alter data belonging to tenants. Plain-text data duplication, on the other hand, is prone to service provider conspiracies; because all copies seem the same, an untrustworthy service provider may retain only one data copy rather than the specified number to deceive renters. For the aforementioned issues, tenants must guarantee that the service provider processes their data duplication accurately and that it is not tampered with or partially erased. At the same time, because tenants are no longer in possession of their properties, according to statistics, 95% of people do not adhere to any nutritional plans since they are too restrictive and prevent people from eating their regular foods. The importance of food classification has grown as people of all ages want to keep track of their food consumption, patients want to keep track of their health through food owing to various dietary restrictions, and mostly young want to keep track of their calorie and nutrition intake to stay active. Image-based dietary and calorie extraction has been a difficult task for the past few years, and there has been a lot of research into it.

Using transfer learning, an effort was made to classify Indian cuisine photographs into their various classes in this study. Because of its efficiency in learning and categorising complicated characteristics, image classification using deep learning techniques such as Convolution neural networks is gaining a lot of attention. In terms of accuracy and validation loss, a comparison was done between the models.

- Tenserflow

Google collaborated with the Brain Team to create this collection. It's a high-level calculation library that's open-source. It's also found in deep learning and machine learning algorithms. There are a lot of tensor operations in it. This Python module is also used by researchers to solve complicated computations in mathematics and physics.

Its adaptable architecture enables computing to be deployed over a wide range of platforms (CPUs, GPUs, TPUs), from PCs to server clusters to mobile and edge devices.

Stateful dataflow graphs are used to represent TensorFlow calculations. TensorFlow gets its name from the computations that these neural networks execute on multidimensional data arrays known as tensors. Jeff Dean revealed during the Google I/O Conference in June 2016 that there were 1,500 GitHub repositories mentioning TensorFlow, of which only 5 were from Google

- Keras

Keras provides fundamental reflections and building units for the creation and delivery of ML arrangements at a high iteration velocity. It fully utilizes Tensor Flow's scalability and cross platform capabilities. Keras' primary data structures are layers and models [19]. Keras is used to implement all of the layers in the CNN model. It aids in the compilation of the overall model in conjunction with the conversion of the class vector to the binary class matrix in the data processing.

- OpenCV

OpenCV, an open-source computer vision and Machine Learning library, is used to distinguish and perceive faces, objects, group account developments, follow moderate modules, follow eye movements, track camera activities, remove red eyes from pictures taken with the streak, track down nearly identical pictures from a picture information database, see the scene and set up markers to overlay it with upgraded reality, and so on. In the resizing and variety transformation of information photos, the suggested technique makes use of these OpenCV features.

III. RELATED WORK

Introduction For food recognition, research was conducted on all current methodologies and comparisons were made [1], with the findings being recorded. In the last several years, there has been a lot of progress in the field of food image identification.

Viswanath C, et al. suggested a method to categorise Indian cuisine photos using a Google Inception-V3 based Convolutional neural networks (CNNs) model in their work [4]. They've utilised it here.

Convolution layer capable of generating its own convolution kernel for convolving with the input layer to yield tensor outputs. The Max-pooling function is used to extract features from data and aid in the training of the CNN model. The dataset includes data from real-time South Indian food, with some of the training and testing photos containing some ambiguity.

IV. METHODOLOGY

CNN (Convolutional Neural Networks) - CNNs are specialised neural networks that are used to recognise images and videos. CNN is mostly utilized recognise images and videos. CNN is mostly utilised in image analysis tasks such as image recognition and segmentation. Convolutional Neural Networks have four sorts of layers:

1) Convolutional Layer: Each input neuron in a conventional neural network is connected to the next hidden layer. Only a small portion of the input layer neurons are connected to the hidden layer neurons in CNN.
2) Pooling Layer: The pooling layer reduces
3) the feature map's dimensionality. Within the CNN's hidden layer, ingredients, and recipe procedure.

V. WORKING

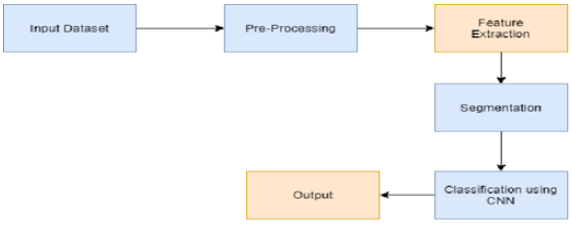

Figure 1. System Architecture

VI. OBJECTIVE

To categorise Indian cuisine. Food Recipes must be predicated. Using the CNN algorithm to categorise Food images (panner tikka, dum-biryani, alumutter, etc.) are used to generate a Food Recipe. With today's rapid advancements in computing, traditional user

input methods such as mouse, keyboard, and touch-pens are no longer enough.

VII. RESULT

VIII. APPLICATION

This technique is used to increase storage usage and can also be used to reduce the amount of bytes.

IX. FUTURE SCOPE

In this system, the first input is an image dataset provided by the machine, followed by pre-processing. The purpose of the pre-processing phase is to eliminate noise from the data, rescale, and resize the image dataset. The next step is to extract features from the dataset, such as edges, size, and so on. The next stage after feature extraction is segmentation. We divide an image into many pieces via segmentation.

In terms of future improvements, the classification task can be enhanced by reducing noise from the dataset. The same research may be done on a larger dataset with more classes and photos in each class, because a larger dataset improves accuracy by learning more features and lowers the loss rate. The model's weights can be preserved and utilised to create a web or mobile app for image classification and additional calorie extraction from the classified meal.

CONCLUSION

A Deep learning technique is employed to classify the food photos into their appropriate classes in this suggested system, the Convolutional Neural Network. The Indian cuisine dataset and the CNN method were used to train the dataset. The Indian food image categorization system classifies the type of food and recipe is being used, as well as automatically analysing dietary and calorie data.

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