International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 7, Special Issue of ICRTET-2023, pp 136-139, June-2023

International Conference of Recent Trends in Engineering & Technology (ICRTET-2023)

Recipe Detection of Image Using Deep Learning

[1]Dhawal Tank, [2]Sanyam Gandhi, [3]Sanket Ghorpade, [4]Pradeep Paymode, [5]Prof. Rashmi Kulkarni

[1,2,3,4,5]Department of Information Technology Engineering, Siddhant College of Engineering, Pune, Maharashtra, India

Abstract **- Food is necessary for human existence, and people are always trying out new, tasty dishes. People frequently select food products from grocery stores that they don't even know the names of or that they don't immediately recognise. It's crucial to understand which elements may be combined to create delicious cuisine recipes. For a beginner chef, picking the proper recipe from a list of items is really challenging. Even for specialists, it may be a challenge. Machine learning is constantly being used in our daily lives. One such instance is object recognition using image processing. Even though there are many different food items involved in this procedure, traditional methods will result in a higher risk of error. ingredients. Deep learning and machine learning techniques can be used to overcome these issues. In this research, we constructed a model for identifying food ingredients and created an algorithm for recipe recommendation based on identified ingredients. We created a unique dataset with 9856 photos divided into 32 types of food items. We used a Convolution Neural Network (CNN) model to recognise food items, and machine learning to generate recipes. We had a 94% accuracy rate, which is extremely helpful.**

Keywords: Deep Learning, CNN, Indian Food, Picture recognition; MAX pooling; Convolution filters; Convolution layer; Convolutional Neural Networks.

1. Problem Statement

The server will house the Indian Food Classification application. As a consequence, a user or visitor can utilize image processing to look for recipes in the application. A user or visitor can use image processing to look for recipes in the application.

2. Introduction

People nowadays are more careful of their food and nutrition in order to avoid either approaching or present ailments. Because people rely on smart technology, the availability of an application that automatically monitors an individual's nutrition is beneficial in a variety of ways. It raises people's awareness of their eating habits and diet. Throughout the last two decades, research has concentrated on automatically recognising food and nutritional information from photographs acquired with computer vision and machine learning algorithms. It is crucial to accurately estimate food's caloric content in order to analyse dietary consumption. The majority of individuals overeats and don't exercise enough. Today's busy and stressed-out society makes it simple to neglect to maintain track of their food intake. This simply highlights how crucial it is to classify foods correctly.

Lately, the number of intelligent applications for smartphones, including Android and iPhone models, has greatly expanded. They have the power to balance consumers' eating patterns and alert them to harmful meals. Smartphones' processing capability has risen as a result of developments in the many technologies that are employed in them. They have the computational ability to analyse real-time multi-media data, but standard mobile devices cannot. As a result, photos are sent to high-processing servers, increasing transmission costs and delays. Given that modern cellphones can also handle high-quality photographs, the development of real-time apps that take photos and rapidly train machine learning models is the main goal of research on classifying foods. To prevent illnesses like diabetes, high blood pressure, and other issues, preventive is key.

Self-reporting and manually recorded equipment are used in several of the current dietary evaluation techniques. The problem with these methods of evaluation is that participants often underestimate and underreport their food intake, which leads to bias in the participant's judgement of their calorie intake. Improvements to the existing techniques are needed in order to boost accuracy and lower bias. A mobile cloud computing system, which utilises tools like cellphones to collect nutritional and calorie data, is one such potential option. The next stage is to automatically analyse the calorie and diet data using cloud computing power for an impartial evaluation. Users must still manually enter the data, though. Many attempts have been undertaken in the last several years to conduct research and create visual-based dietary and calorie information analysis. The effective extraction of information from food photographs, however, is still a difficult problem.

Convolutional neural networks have been used in this article to attempt to categorise food photos for further diet monitoring applications (CNNs). The CNNs have been used for the purpose of classifying foods since they can handle enormous amounts of data and can estimate the attributes

© 2023-2017 IRJIET All Rights Reserved

ISSN (online): 2581-3048
Volume 7, Special Issue of ICRTET-2023, pp 136-139, June-2023
International Conference of Recent Trends in Engineering & Technology (ICRTET-2023)

automatically. The working database for this strategy has been chosen as the common Food-101 dataset.

The remainder of the essay is divided into the following sections. In Part II, the relevant studies in the topic of food categorization are included together with pros and cons. The suggested approach, including the database used, is explained in Part III, along with a description of the CNN. The findings and observations are discussed in Section IV. The work is finally concluded in section V with some future directions.

In this project, an effort was made to categorise photos of Indian cuisine into their various classes using transfer learning. Image classification using deep learning approaches, such Convolution neural networks, is getting a lot of interest due to its effectiveness in learning and categorising complex traits. A comparison of the models' accuracy and validation loss was conducted.

3. Libraries

Tensorflow

The Brain Team and Google worked together to develop this collection. It is an open-source high-level computing library. Moreover, it may be found in machine learning and deep learning algorithms. Tensor operations are often used in it. Researches use this python module to perform complex physics and mathematics problems. Due to its flexible design, computation may be distributed across a variety of platform (CPUs, GPUs, and TPUs), including PCs, server cluster, mobile devices, and edge devices.

Keras

In order to develop and deploy ML arrangements at a high iteration velocity, Keras offers fundamental reflections and building components. Tensor Flow's scaling and cross-platform features are widely applied. Layers and models serve as Keras' main data structures. All of the layers in the CNN model are constructed using Keras. When the class vector is converted into a binary class matrix during data processing, it helps with the overall model's building.

OpenCV

OpenCV, an open-source computer vision and machine learning library, is used to recognise and understand faces, objects, group account developments, follow moderate modules, follow eye movements, track camera activities, remove red eyes from pictures taken with the streak, find nearly identical pictures from a picture information database, see the scene and set up markers to overlay it with enhanced reality, and so on. The recommended method takes use of these OpenCV features for the resizing and variety modification of information images.

4. Related Work

The food detection system begins its work by classifying different types of food. The photos were then divided into segments to create a feature vector that included context-based characteristics for size, shape, texture, and colour (normalised RGB). In light of this, a reduced feature vector containing components for texture, pixel intensity, and colour were created is used to divide foods into their 19 different classifications. By using food replicas, the performance is good, but genuine photographs perform less effectively. The differences in image size during capture may be to blame for the performance decline. This led to the extraction and experimentation of scale invariant feature transform (OpenCV) features on handmade dishes, fast food, and fruits. This results in higher performance with fewer classes, even if each class's pictures are more numerous.

The phrase "bag of features," which is taken from "bag of words," is becoming more popular these days. It is heavily impacted by how natural language is processed. It ignores the sequence in which words appear in order to catch frequently occurring terms. Similar to how words have common visual patterns that aid in classifying foods, photos do too. The complexity difficulties brought up by direct image matching algorithms are lessened by this procedure. Based on this, several work using the BoF techniques are discovered.

In their project, they have relied on Convolutional Neural Networks (CNNs). Here, they have made use of it. Convolution layer having the capacity to create its own convolution kernel to convolve with the input layer to create tensor outputs. The CNN model is trained by using the Max-pooling function, which is used to extract features from the data. The dataset contains information from overall South Indian cuisine, and some of the training and test images have some degree of ambiguity.

5. Methodology

CNNs are specialised neural networks that are used to identify videos and images. CNNs are short for "Convolutional Neural Networks." CNN is mostly used to identify photos and videos. CNN is mostly used for image analysis tasks like segmentation and image recognition. There are four different types of layers in convolutional neural networks:

1) Convolutional Layer: In a traditional neural network, each input neuron is connected to the previous hidden layer. In CNN, just a small percentage of the input layer

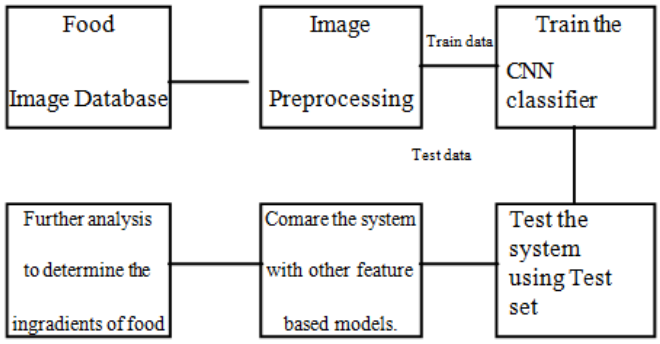
© 2023-2017 IRJIET All Rights Reserved

International Research Journal of Innovations in Engineering and Technology (IRJIET)
ISSN (online): 2581-3048
Volume 7, Special Issue of ICRTET-2023, pp 136-139, June-2023
International Conference of Recent Trends in Engineering & Technology (ICRTET-2023)

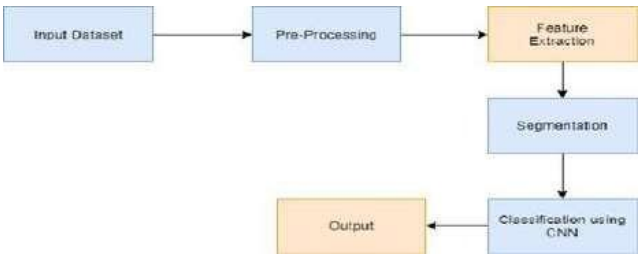
neurons are interconnected to the neurons in the hidden layer.

2) Pooling Layer: Convolutional neural networks (CNNs) frequently use the max pooling method to down sample feature maps. The feature maps' spatial dimensionality is minimized while maintaining the most important data. A feature map's pool size window is relocated across the input during max pooling, and the highest value in each window is chosen to create a new, smaller feature map. By doing so, overfitting is prevented and the number of parameters needed for the network is reduced. Also, it makes the CNN more resistant to little fluctuations in the input pictures. In many cutting-edge models for image classification, object identification, and segmentation tasks, max pooling is frequently used with convolution and activation layers in CNNs.
3) The dimensionality of the feature map. Ingredients and the preparation process are included in the CNN's covert layer.

6. Working



The recommended system for identifying food items from image.



Connection between the newest prediction layer and the previous layer.

7. Objective

To classify Indian food. Food recipes need to be based. A food recipe is created by classifying food photos (such as panner tikka, dum-biryani, alumutter, etc.) using the CNN algorithm. The old means of user input, such as the mouse, keyboard, and touch-pens, are no longer sufficient in light of the current computing industry's fast improvements.

8. Implementation of CNN

1. Convolution: The function Convolution2D is applied (input size (299, 299, 3). By convolutionally combining. Input data, this layer generates feature maps.

2. MaxPool: The function MaxPooling2D is performed. The pooling function minimises computing complexity and variation in the data. Although average pooling collects features gradually, max pooling extracts the most crucial characteristics, such as edges.

3. Concat: This layer's function is to combine numerous input blobs into a single output blob. It accepts a list of identically shaped tensors as input and outputs a single tensor that is the concatenation of all inputs.

4. Dropout: By prohibiting complex co-adaptations on training data, dropout is a regularisation approach that reduces overfitting in neural networks. It is an extremely effective method for using neural networks to average models. In a neural network, falling out units both hidden and visible are referred to as "dropouts." Our dropout scale is set at 0.4.

5. Completely connected layers connect each neuron in one layer with each neuron in the other layer. In theory, it is equivalent to the conventional multi-layer perceptron neural network (MLP).

6. Softmax: When used as an output function, the Softmax function behaves almost exactly like a Max layer and can be trained using gradient descent. As compared to other values, an exponential function will improve the probability that the preceding layer's maximum value will occur. Moreover, the total output will always equal 1.0.

9. Result

© 2023-2017 IRJIET All Rights Reserved

International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 7, Special Issue of ICRTET-2023, pp 136-139, June-2023

International Conference of Recent Trends in Engineering & Technology (ICRTET-2023)

10. Application

This method may be used to decrease the number of bytes while also increasing storage use.

11. Future Scope

The first input in this system is a machine-provided picture dataset, which is followed by pre-processing. Reducing noise in the data and resizing and rescaling the picture dataset are the goals of the pre-processing stage. The following step is to extract features, such as edges, size, and other data, from the dataset. Segmentation comes after feature extraction as the following step. By segmenting a picture, we break it up into several sections.

Further developments include enhancing the classification task by removing noise from the dataset. Because a larger dataset increases accuracy by learning more features and reduces the loss rate, it is possible to do the same study on a larger dataset with more classes and photographs in each class. The model's weights may be used to build a web or mobile application for image classification and further calorie extraction from the meal that is classified.

12. Conclusion

In this new system, the Convolutional Neural Network, the food pictures are classified into their relevant classifications using a Deep Learning approach. The dataset was trained using the CNN technique and the Indian food dataset. The Indian food picture classification system automatically analyses nutritional and calorie information in addition to classifying the type of food and recipe being utilised.

REFERENCES

[1] David J. Attokaren, Ian G. Fernandes, A. Sriram, Y.V. Srinivasa Murthy, and Shashidhar G. Koolagudi, “Food Classification from Images Using Convolutional Neural Networks”, 2017.

[2] Heng Zhao, Kim-Hui Yap, Alex C. Kot , Lingyu Duan , Ngai-Man Cheung, “Few-shot and Many- shot Fusion Learning in Mobile Visual Food Recognition”, 2018.

[3] McKinney, W., Python for data analysis: Data wrangling with Pandas, NumPy, and IPython. 2012: "O'Reilly Media, Inc."

Citation of this Article:

Dhawal Tank, Sanyam Gandhi, Sanket Ghorpade, Pradeep Paymode, Prof. Rashmi Kulkarni, “Recipe Detection of Image Using Deep Learning” in proceeding of International Conference of Recent Trends in Engineering & Technology ICRTET - 2023, Organized by SCOE, Sudumbare, Pune, India, Published in IRJIET, Volume 7, Special issue of ICRTET-2023, pp 136-139, June 2023.

****

© 2023-2017 IRJIET All Rights Reserved