Indian Food Detection

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December 22, 2021

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Abstract

Machine learning, Computer vision and image processing is very fascinating aspect of Computer Science world. It has many challenges on its path which makes it very interesting to work on. We have to do a project of computer vision in which we have to make a model to classify different images that's why we made a model to classify Indian Food. We tried different pre-existing models such as Alexnet, Resnet and Imagenet but all of them were not giving us the required accuracy of the input value. So that's why we used convolutional Neural Network to achieve our goal. We used a data set of 10 classes in much there was total 7000 plus images of different Indian food. By using CN-Model, we achieved an accuracy of 0.87.Total layers we uses were 3 and the activation function which we use was RELU.

Contents

1 Introduction

Nowadays, machine learning models are being use on a large scale by machines and software products. These models help machines to take decisions on the base of data. We also have to make a model in the prospective of Computer vision, which can classify the different images. So we made a model to classify the Indian food such as pizza, Burger etc. We used the data set from a open source website and then build a model to train that data and then we test that data.

2 Goals

Our main aim was to select a project for Computer Vision and Image Processing. First our aim was to learn something practical from that project. Therefore, we selected the Indian Food Detection as a project. This product can be used in real life.

3 Applications

Indian Food Detection can be used practically as real time applications. Many other industries are trying to get greater accuracy in it to reduce their human work load. Following are the few major application:

- We can keep record of the food in big restaurants that how much food is being out from a place and which food is ordered .
- We can use this mechanism to automatically count the calories of a person by noticing his food.

4 Methodology

4.1 Tools

We used **Google Colab** for this project, as it is provided by Google. And it's a cloud service. Moreover, Google Colab provides us a GPU for complex calculations. We used this because this platform provide high processing power for big data sets.

4.2 Dataset

The dataset, we used in our project, is downloaded from www.kaggle.com, containing 10 different classes of food like ..... Dataset contains more than seven thousands pictures. The Validation split in dataset is 0.1. There were other classes as well in the data set but we filtered out the 10 classes because some foods were overlapping.

4.3 Classifiers

We used different types of classifiers. We trained different models on our data-set and tested them on data. But all of them were not giving us the right answer, except the convolutional neural network. So we used Concoluctional Neural

4.3.1 Convolutional Neural Network

A convolutional neural network (CNN) is a type of artificial neural network used in image recognition and processing that is specifically de-

signed to process pixel data. Examples of CNN in computer vision are face recognition, image classification etc. It is similar to the basic neural network. CNN also have learnable parameter like neural network i.e, weights, biases

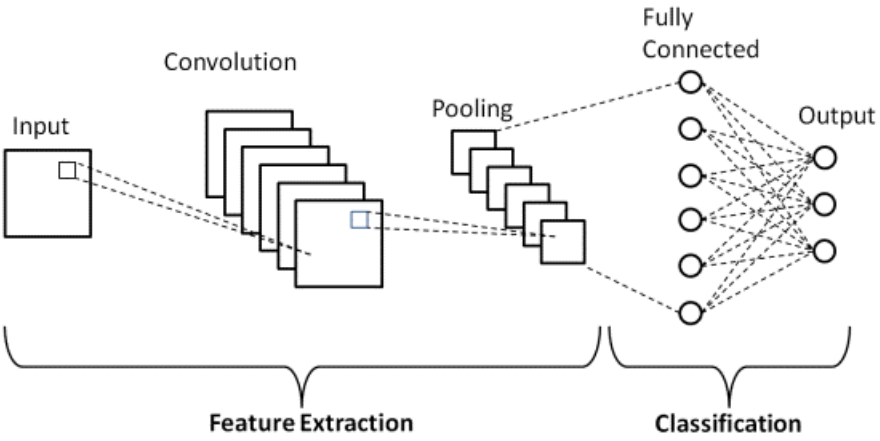

Figure 1: Convolutional Neural Network

4.3.2 AlexNet Architecture

The architecture consists of eight layers, five convolutional layers and three fully-connected layers. But this isn't what makes AlexNet special, these are some features used that are new approaches to convolutional neural networks like ReLU Nonlinearity, Multiple GPUs and Overlapping Pooling.

4.3.3 ImageNet Convolutional Neural Network

The ImageNet CNN architecture shown in the figure is the convolution architecture used by AlexNet for image classification. AlexNet is a pre-

trained CNN. It is an ImageNet classifier with deep convolutional neural networks.

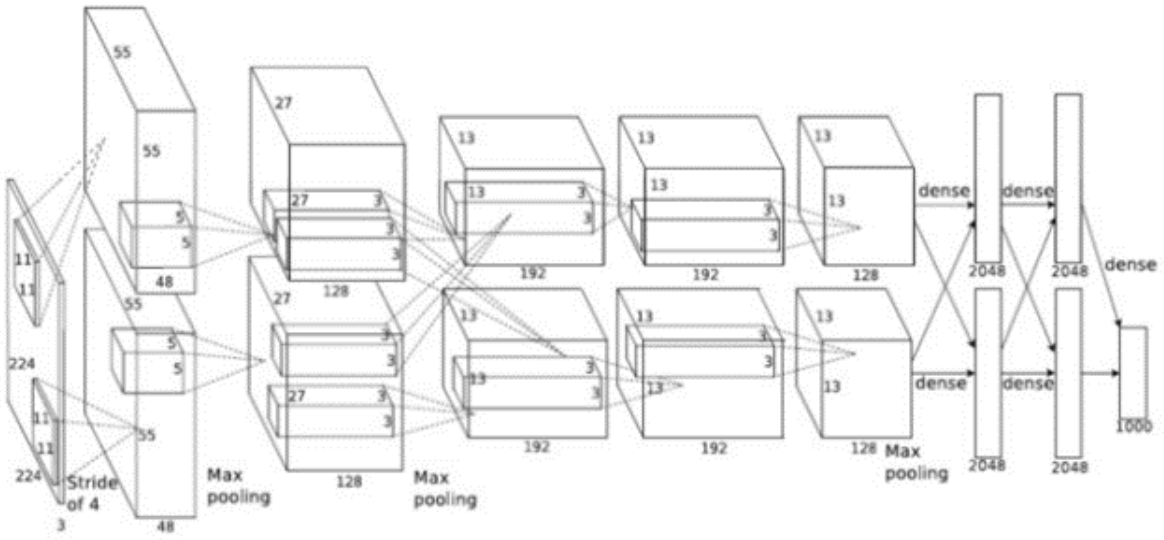

Figure 2: ImageNet Convolutional Neural Network

4.3.4 Residual Neural Network

A residual neural network (ResNet) is an artificial neural network (ANN) of a kind that builds on constructs known from pyramidal cells in the cerebral cortex. Typical ResNet models are implemented with double- or triple- layer skips that contain non-linearities (ReLU) and batch normalization in between.

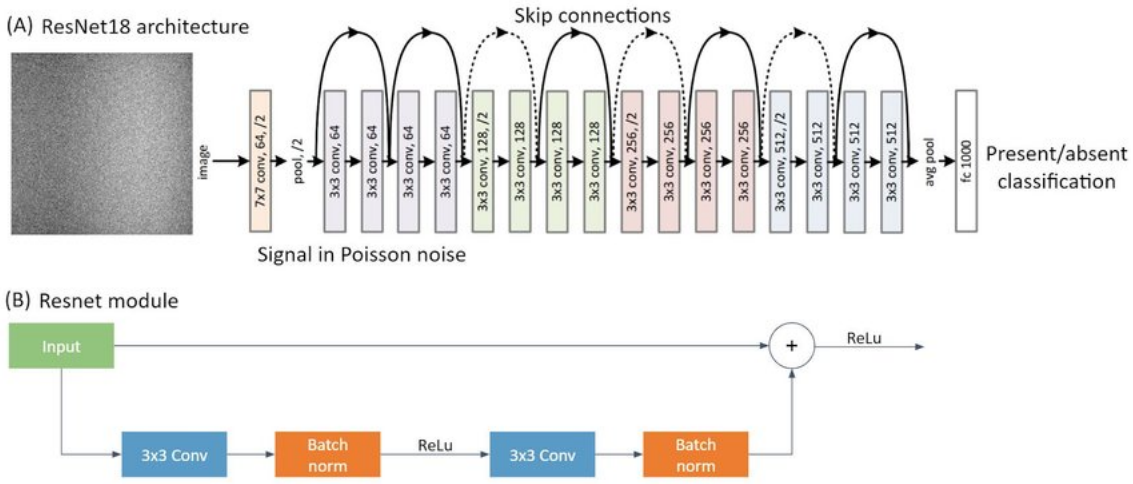

Figure 3: Residual Neural Network

5 Experimentation

We experimented different neural networks on our datasets. our aim was to achieve the highest possible accuracy of our model. That's why, we trained different neural networks on the dataset.
The highest accuracy we achieved is eighty-seven percent. All other neural networks which we used were giving the accuracy less than eighty-seven percent.

6 Problems

In this project, we faced many problems. Some of these problems are given below:

6.1 Data Size and RAM crashed

The dataset downloaded from www.kaggle.com was a large dataset. That's why, when we trained our model on a large size of data, Ram of Google colab was crashed. That's why we decreased the size of data, and then the problem was resolved.

6.2 Pre-Processing

There were also a problem faced in pre-processing of images. We were facing difficulties in converting the images to gray scale images.

7 Accuracy

We were able to achieve maximum accuracy of eighty-seven percent, which is a good accuracy in machine learning. Accuracy graph for our highest accuracy achieved is shown below:

8 Conclusion

Finally, after spending a lot of time, we were able to reach some results for our product. Project was properly planned. In this journey, we faced many issue during the implementation, and we learned first time that how to resolve them. We used different neural networks for this. After this project, we gained some confidence to work in the world of computer vision.

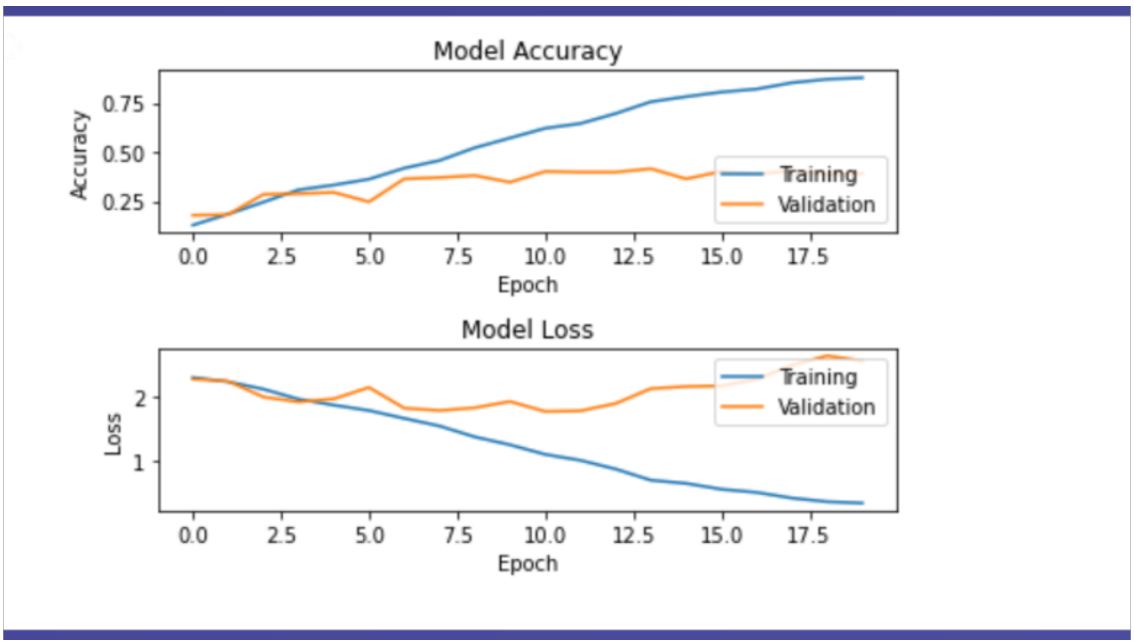

Figure 4: Accuracy by CNN

9 References

- Dataset Retrieved Dec 10, 2021, from **https://www.kaggle.com/datasets**
- Models Literature Retrieved Dec 10, 2021, from https://en.wikipedia.org/