

Image Classification using CNN

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Abstract – In today's tech-savvy world, technology has come to a great extent and is used on a wide range. Our project solves one of the major trending topics which is CNN. To be precise CNN is a convolutional neural network which is a part of Machine Learning and Artificial Intelligence. To begin with, our project consists of a dataset which has the images categorized into three sections: train, test and predict. Then the image processing of the particular dataset needs to be done. All thanks to the great advanced technology, the model is set to be designed and trained to give the accurate results with the help of CNN.

Key Words: Machine Learning, Artificial Intelligence, CNN, dataset, Image Processing.

1. INTRODUCTION

Machine Learning is now one of the hottest topics around the world. Well, it can even be said as the new electricity in today's new generation. But to be precise what is Machine Learning, well it's just one way of teaching the machine by feeding the large amount of data and give you the result.

The CNN (Convolutional Neural Network) comes under deep learning. They have the best outcomes giving the probability of a particular image. Like for instance as our dataset consists of 6 subsets: 0-buildings,1-train,2-dessert,3-river,4-city,5-streets.

So, if a particular image is of street then with the help of CNN model it classifies into the 5th section.

WORKING

The basic requirements for our project are as follows:

1. A dataset needs to be stored.
2. A model which is required for image classification.
3. A simple, unique interface for the communication.

The dataset consists of 25k images each categorized into:

0-buildings,

1-train,

2-dessert

,3-river,

4-city,

5-streets.

The given dataset is then stored and the next step which is training the model.

For training the model we required, tensorflow from which we require keras. The we need OpenCV for image classification. The CNN model works into the following pattern and all the libraries needs to be extracted for them.

The libraries or the layers which are required are:

1. Convolutional Layers
2. ReLu Layers
3. Pooling Layers.
4. A fully connected layer.

This model works well with the 2D objects and the given dataset was trained almost 30 times to give the accurate results based on the features and functionalities.

Then the integration is done with the help of Django, which is a Python web-framework and the interface was being designed.

Convolutional Neural Network

The CNN (Convolutional Neural Network) comes under deep learning. It is widely used in Image classification and its image recognition.

They are used to analyze and visualize the image and train them to bring the best results. The CNN model is really efficient and fast.

The following steps required are:

1. Input
2. Convolutional Layer
3. ReLu layer
4. Fully Connected model

The basic CNN architecture is as follows:

Input->Convolution->ReLU->Convolution->ReLU->Pooling
->ReLU->Convolution->ReLU->Pooling->Fully Connected

CNNs have an input layer, and output layer, and hidden layers. The hidden layers usually consist of convolutional layers, ReLU layers, pooling layers, and fully connected layers.

1. Convolutional layers apply a convolution operation to the input. This passes the information on to the next layer.
2. Pooling combines the outputs of clusters of neurons into a single neuron in the next layer.
3. Fully connected layers connect every neuron in one layer to every neuron in the next layer.

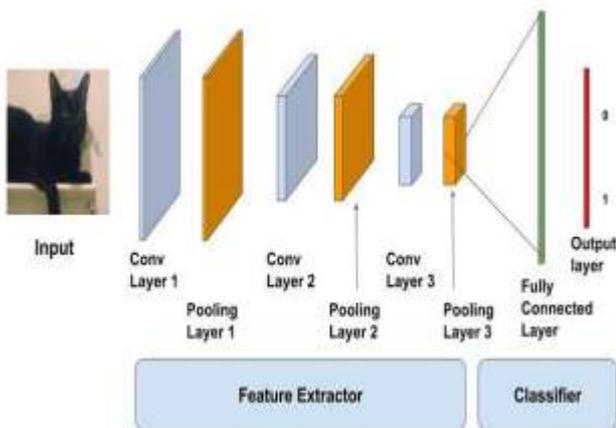


Fig: CNN Architecture

2. TensorFlow

Tensorflow is used for the object detection. It is mainly used for neural networking and the object's accuracy is being classified with the help of keras libraries at the same time.

Following are the basic requirements for the model

1. Model Architecture
2. Prediction
3. Training
4. Launching the model
5. Evaluation
6. Final Output.

The given architecture represents the working of Tensorflow in Object Detection:

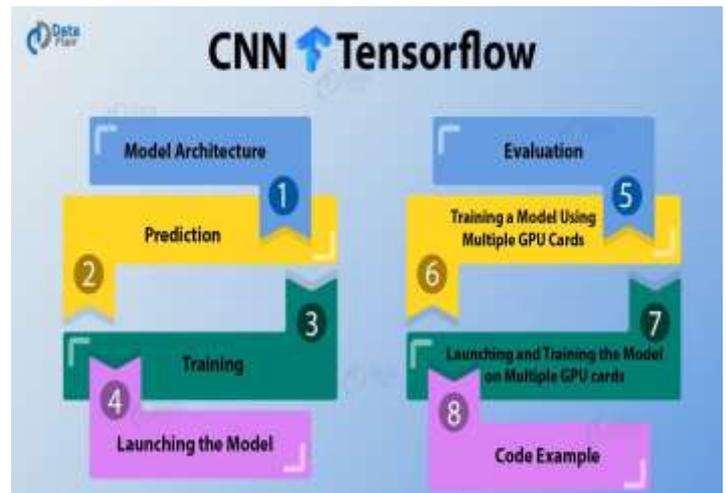


Fig: Object Detection Using Tensorflow

DJANGO

In our project, Django played an important as the architecture and the following design and integrating and running the model was done with the help of Django. A Django is a Python web framework and it work wells and is much smoother.

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