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IMAGE CLASSIFICATION ANDROID APPLICATION

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Abstract: Image classification is used to close the visual perception gap between computers and humans, enabling machines to recognise images in the same manner that people do.

Although the traditional system that is now in place has been used extensively in practical situations, there are still certain issues with practical procedures, such as poor classification accuracy, poor adaptive capacity, and unsatisfying results. Therefore, deep learning has been suggested for picture classification in order to address these issues and improve accuracy.

This essay examines the fundamental ideas around the use of deep learning for image classification, as well as the advantages of deep learning for image classification and the numerous applications that employ deep learning for image classification.

Index Terms **- python, Tensorflow Library, Convolutional Neural Network, Artificial Neural Network.**

I. INTRODUCTION

Neural networks were first proposed in 1944 by Warren McCullough and Walter Pitts, two students from the University of Chicago the researchers moved to MIT in 1952. Inventor The first neural computer, Dr. Robert Hecht-Nielsen, identified a neural network in the form of - "... a computer system consisting of a number of simple and highly connected treatments elements process information according to their dynamic state response to external inputs. Neural networks are used to machine learning, in which the system learns to perform tasks by training set analysis. Thousands / millions interconnected processing nodes are used in NN. Most these buttons are "feed-forward", which means only data move in one direction. Individual node receiving data multiple nodes and send process data to other nodes. During training, initial node weights are assigned to value, when the training data is passed to the NN, the weight is continuously adjusted until it gives the correct result. Deep learning is more advanced in a few years, many technologies GIFTS like, GOOGLE, MICROSOFT, FACEBOOK, BAIDU is interested in deep learning. Basically, Deep Learning is a subfield of machine learning that deals with the algorithm allows the software to train itself to perform image recognition, by displaying a multi-layer neural network for large amounts of data, inspired by the function of The brain is called an artificial neural network. Deep learning is good for identifying patterns in images. It uses the same neurons neat approach to various problems like support Vector machine, linear classifier, regression, Bayesian, Decision trees, grouping and association rules. One an example of deep learning is essentially how Facebook can automatically sort photos, recognize faces, and make recommendations Which friends to tag.

Image classification is the process of assigning the pixels in a digital image into classes of interest. The objective of the image classification is to identify the unique features of the image. In order to classify a set of data into different classes or categories, the relation between the data and the classes into which they are classified must be well known. The image classification is used in different areas like; eg. in satellite remote sensing the features are measurements made by sensing in different wavelengths of the electromagnetic spectrum-visible/infrared/microwave/texture features etc.

II. LITERATURE REVIEW

Neural Networks are basically mathematical models to solve an optimization problem. They are made up of neurons, the basic unit of computation of a neural network. He also called it Artificial Neural Network (ANN). There are different types of ANN - Depending on the function of neurons in human brain and network, artificial neural network or ANN perform tasks in a similar way. Most artificial neural networks will have some similarities with their biological counterparts that are more complex and very efficient in their expected tasks, such as. segmentation classification**.**

Convolutional Neural Network (CNN) is one of the most frequently used deep learning method used for image classification. CNN learns directly from image data so there is no need of manual feature extraction. It has mainly three advantages such as parameter sharing, equivalent representation and sparse interactions.

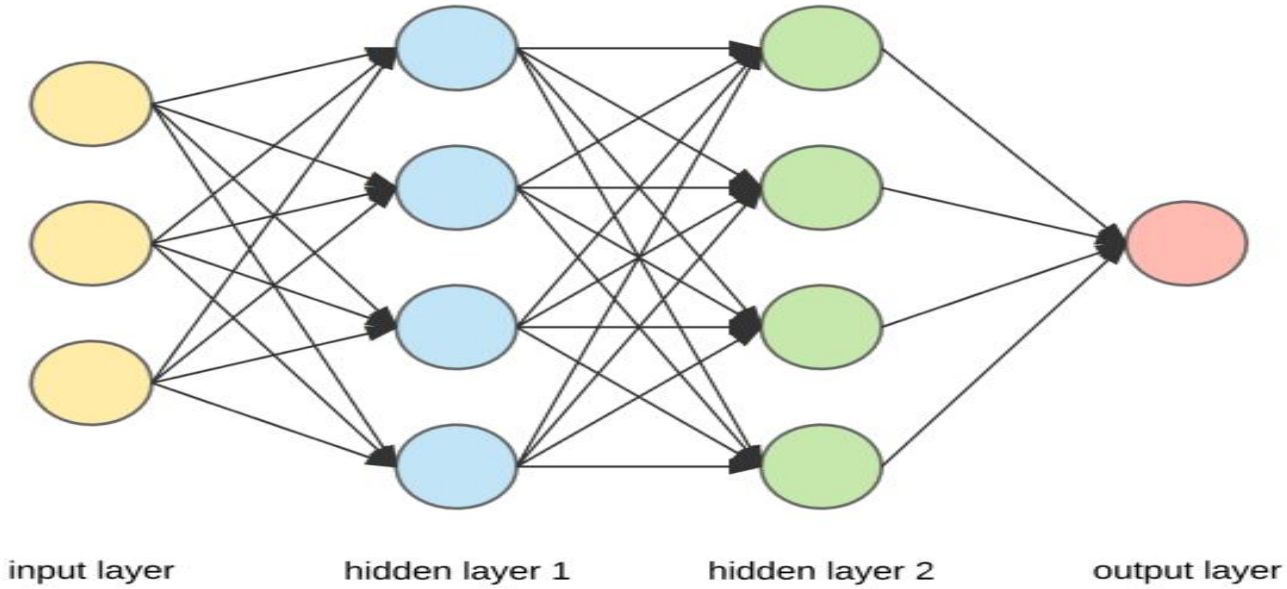
A CNN has various layers-

1- Convolutional layer – it passes the information to the next layer

2- Pooling layer – it combine the cluster of neuron into single neuron into next layer

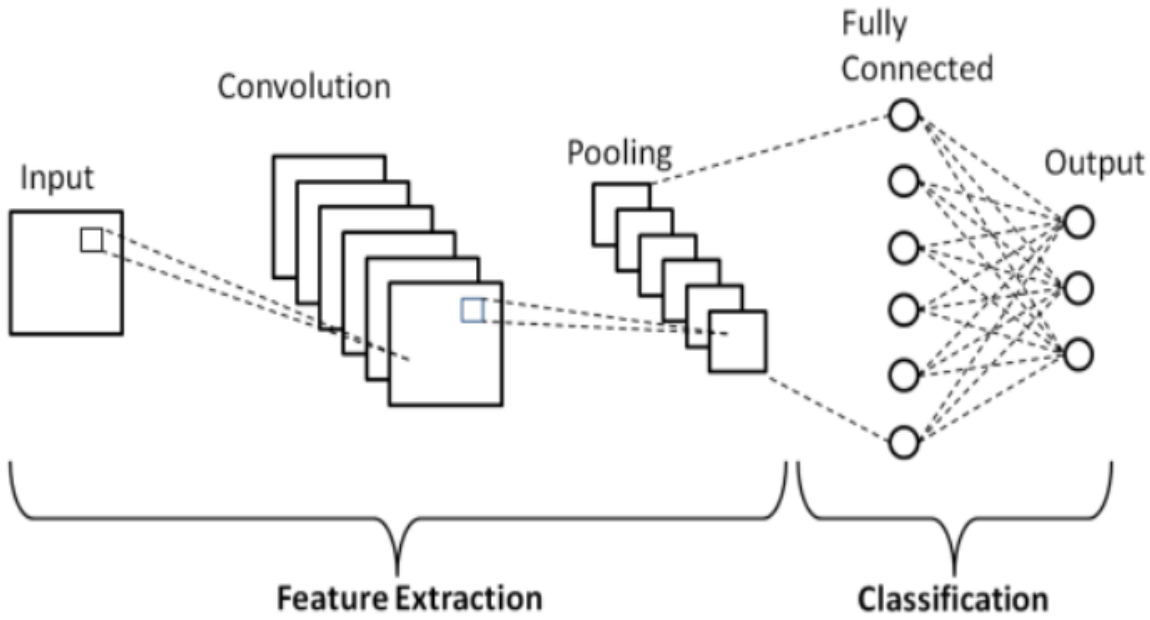
3- A fully connected layer – it connect the every neuron in one layer to every neuron in another layer.

CNN learns feature detection through tens or hundreds of hidden layer. Each layer increases the complexity of the learned features.Various steps in classifying image using CNNFirst it starts with an input image after that many different filters are applied to create a feature map then ReLU function are applied to increase non-linearity then pooling layer is applied to each feature map then pooled images are flattened into one long vector. After flattening input the vector into a fully connected artificial neural network then train it through forward propagation and backward propagation and repeat it until we have a well defined neural network with trained weights and feature detectors.



III. PROPOSED SYSTEM

Our system will work according to the system architecture shown in the figure below, it will first capture the image through a digital camera or else it will capture through the database Whether. Each image will be normalized to a predefined size for the next process. CNN is a multilayer, feed-forward neural networks (FFNN) which can quickly identify, classify, and recognize any features in an image. It is used mainly with visual data, such as image classification. A CNN can be prepared to do image analysis tasks including object recognition, segmentation, classification, and image processing. Large-scale image recognition has been become possible because of large public image databases such as ImageNet. CNN are networks made up of neurons similar to the human brain. These neurons consists of weights and biases that form layers and fire in a particular order to end up with a final output. The networks can be trained in order to recognize particular patterns by feeding them large amounts of data. This is very useful in the field of computer vision since it means that a computer can be trained to recognize different objects.



Outline of CNN

Tensorflow:
Tensorflow is an open source software for numerical computation. It was originally created to conduct machine learning and deep neural networks research. Tensorflow provides neural network architectures and scripts to retrain the networks for users who wants to apply them in different contexts.

Keras:
Keras is an open-source neural-network library written in Python, which is used for the preprocessing, modeling, evaluating, and optimization. It is capable of running on top of TensorFlow. It is used for high-level API as it handled by backend. It is designed for making a model with loss and optimizer function, and training process with fit function. For backend, it designed for convolution and low-level computation under tensors or TensorFlow. Importing the python libraries are used for preprocessing, modelling, optimization, testing and display emotion which having a maximum percentage.

TABLE 1 Training Dataset

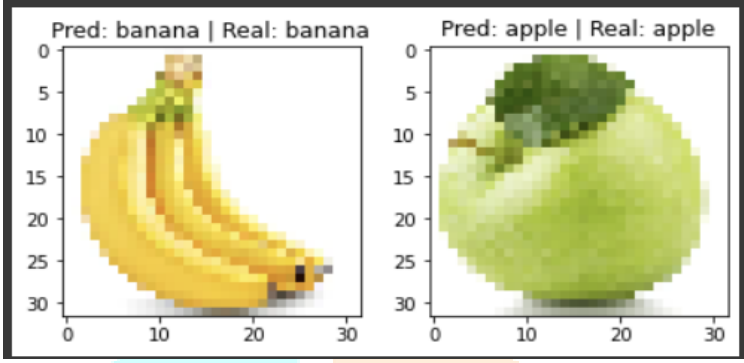
Object Name	Number of Training Dataset	Number of Testing Dataset
Apple	162	47
Orange	145	40
Banana	153	43

Result of Classification

```
import numpy

plt.figure(figsize=(10,10))
for images, labels in test_ds.take(1):
  classifications = model(images)
  # print(classifications)

  for i in range(2):
    ax = plt.subplot(3, 3, i + 1)
    plt.imshow(images[i].numpy().astype("uint8"))
    index = numpy.argmax(classifications[i])
    plt.title("Pred: " + class_names[index] + " | Real: " + class_names[labels[i]])
```



IV. Future Scope And Conclusion

In this paper we proposed a system that uses convolution neural network for extracting and selecting the features for any given image and classify the images into appropriate classes. The Convolution neural network can give high accuracy compared to other classifiers. The performance and accuracy is tested on simple CPU as well as GPU. Hence we conclude that Convolution Neural Networks are a good choice for Image Classification. Further we will deploy this model in android app and make this model easy to handle for user.

V. Acknowledgement

A sincere thanks to Professor Santosh Jadhav for the opportunity to do this project. The amount of knowledge I've gained about deep learning through this project makes me consider it a \class-within-a-class". Truly, I learned more doing this project than I have in entire classes.

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