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NEURAL NETWORKS AND APPLICATIONS

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Abstract - *Neural network is a rising technology in the field of Deep Learning. There are several researches and developments are made in the field by various people over the time. The researches made an great contribution in creating different types of neural networks. Such as, Artificial Neural Network (ANN), Convolutional Neural Network (CNN) which is used for image classification, Recurrent Neural Network (RNN) which is used for sentiment analysis. CNN is widely used to implement some deep learning models which work efficiently to give accurate results of Image classification. And with RNN, Same process happens in the case of Sentiment analysis applications . So by using these neural network libraries, we have implemented application of Image classification and Sentiment analysis .*

Key Words: Deep Learning, Neural Networks, ANN, CNN, RNN.

1.INTRODUCTION

A Family was travelling in a Russian country few years back. None of them was totally familiar with the Russian language. Many of the sings and boards on the road ways and local peoples language was a little difficult for them to understand. At that situation, Google Real Time Translator helped them to understand the language by translating the Russian words in English. A fine application of the Neural network. The Neural Network works like a human brain, which functions in a structural way as it is a base of Deep Learning.

Neural Network is a structural implementation of the neurons connected to each other to solve a particular type of problem from given input. As in our brain there is silicon for the functioning of problem solving, a neural network consist of neurons. Neural networks learn by processing inputs, Examples, datasets…etc, each of which contains a known "input" and "output/result", forming a certain type of relation between the two, which are stored within the data structure or the data set of the net itself. The training of a neural network from a Particular type of data set is usually carried out by determining the difference between the processed output of the network which is the result we get at the end and a target output. This is the error. Some type of adjustments will cause the neural network to get an output which is in so many ways similar to the output which is supposed to be generated. After some required number of these adjustments the training can be terminated based upon some expected types of the criteria. This is known as supervised learning.Image Classification, The software application is going to recognize the image provided by the user and give an output which will be the category in which the particular image falls and the name of object will be final output given by the application. Sentiment Analysis is Recognizing the sentiment behind an particular article takes time as we have to read it through and then give an final judgment about the sentiment behind it. This software application will provide the sentiment behind any particular article provided to it in no time, As it will be able to scan the article in much faster way and give the final output with maximum accuracy.

2. RELATED WORK

2.1 "By Neha Sharma,Vibhor Jain, Anju Mishra. An Analysis Of Convolutional Neural Networks For Image Classification ". This paper presents a very much deep study and research on the performance of widely used convolutional neural networks for recognizing objects or images in real time video feeds. Some of the convolution neural networks for Image detection and Image category classification from images are Alex Nets, ResNet50, GoogLeNet,…etc . A variety of Object or Image data sets are available to test the performance of different types of CNN's.

3. METHODOLOGY

Now a days, people are getting much more familiar and involved in the software applications to do some of their work easily and quickly. For detecting an image and finding out what the image is about our application gives an basic implementation of the image classification. And the Sentiment Analysis model will be able to figure out the sentiment behind an review or an article.The datasets of each software application are imported from the data set libraries of Keras. Imported datasets then get validated by training and testing samples in the library. The accuracy of the model is dependent upon how much datasets we are going to import and train. Epochs are the important part as the datasets importing. Accuracy of the CNN model increases as we run more number of epochs (Except the fact of handling the occurrence of overfitting) . Epochs are

nothing but the total number of iterations of training model.

3.1 BLOCK DIAGRAM

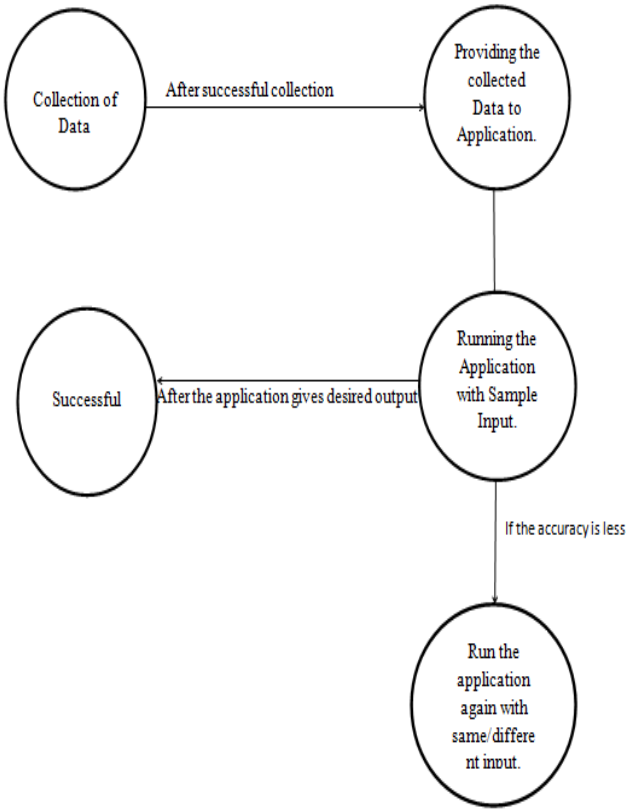


IMAGE CLASSIFICATION

First we imported the datasets from the Keras library and use the datasets for our model training. After importing the datasets we explored the datasets like checking the data types, plotting images etc. Then proceeded to build our CNN model (Convolution Neural Network) by adding layers such as flattening layer, Drop out layer etc. Then we compiled and trained the model through 10 epochs. In each epoch / iteration, the model increased in its level of accuracy.

After achieving the expected level of accuracy, we plotted some model accuracy and loss graphs respectively to get a clear image of our model working efficiency. Finally, we ran our model with a sample input. If the accuracy of the result is less then we will train the model with different data sets with more epochs to increase the accuracy level of the model. Accuracy of the model is directly depended upon the training of the datasets. By this way we achieved the accurate image classification model.

SENTIMENT ANALYSIS

The IMDB large movie review data set is a binary classification data set—all the reviews have either a positive or negative sentiment. We have imported this data set in our model and then trained our model with maximum epochs to get the expected accuracy level. As explained above in the process of image classification, we followed the same process with respect to sentiment analysis to get the result accurately.

4. COMPONENT REQUIREMENT

HARDWARE SPECIFICATION
- Processor : INTEL I3, I5 OR ABOVE
- RAM : 4 GB RAM
- Hard disk : ANY
- Monitor : 20 color monitor

SOFTWARE SPECIFICATION
- Front end : GUI
- Back end : python
- Software tool used : python IDLE
- Platform : Windows 8 or 10

5. EXPERMENTAL OUTPUT

The applications give accurate results according to the datasets they have been trained on. Following output results show the steps of data import , training and testing

of the model for Image classification and Sentiment analysis respectively.

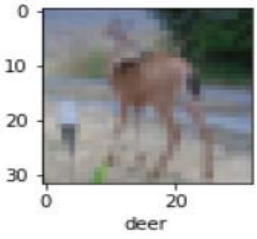
```
[1] import tensorflow as tf
    from tensorflow.keras import datasets, layers, models
    import matplotlib.pyplot as plt
    import numpy as np
```

```
[2] (X_train, y_train), (X_test,y_test) = datasets.cifar10.load_data()
    X_train.shape

    Downloading data from https://www.cs.toronto.edu/~kriz/cifar-10-python.tar.gz
    170500096/170498071 [==============================] - 3s 0us/step
    (50000, 32, 32, 3)
```

5.1 image of importing data set ‘cifar’ for Image Clssification

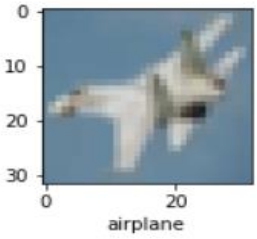
```
[27] plot_sample(X_test, y_test,100)
```




```
[28] classes[y_classes[4]]

     'deer'
```

```
[38] plot_sample(X_test, y_test,10)
```




```
[39] classes[y_classes[10]]

     'airplane'
```

5.2 Image of the Accurate result of image classified by the model

Above images 5.1 and 5.2 show data import and accurate results of model for Image classification.

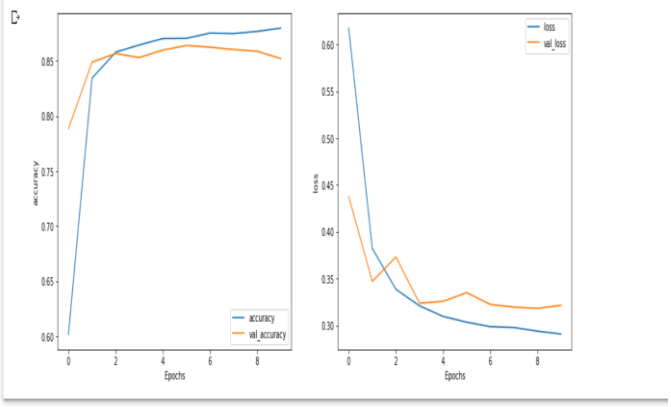
```
dataset, info = tfds.load('imdb_reviews', with_info=True,
                          as_supervised=True)
train_dataset, test_dataset = dataset['train'], dataset['test']

train_dataset.element_spec
```

```
Downloading and preparing dataset imdb_reviews/plain_text/1.0.0 (download: 80.23 MiB, generated: Unknown size, total: 80.23 MiB) to /root/tensorflow_datasets/imdb_reviews/plain_text/1.
Shuffling and writing examples to /root/tensorflow_datasets/imdb_reviews/plain_text/1.0.0.incompleteLUCI30/imdb_reviews-train.tfrecord
Shuffling and writing examples to /root/tensorflow_datasets/imdb_reviews/plain_text/1.0.0.incompleteLUCI30/imdb_reviews-test.tfrecord
WARNING:absl:Dataset is using deprecated text encoder API which will be removed soon. Please use the plain_text version of the dataset and migrate to `tensorflow_text`.
Shuffling and writing examples to /root/tensorflow_datasets/imdb_reviews/plain_text/1.0.0.incompleteLUCI30/imdb_reviews-unsupervised.tfrecord
Dataset imdb_reviews downloaded and prepared to /root/tensorflow_datasets/imdb_reviews/plain_text/1.0.0. Subsequent calls will reuse this data.
(TensorSpec(shape=(), dtype=tf.string, name=None),
 TensorSpec(shape=(), dtype=tf.int64, name=None))
```

5.3 image of importing 'IMDB reviews' data set for Sentiment Analysis

```
plt.figure(figsize=(16,6))
plt.subplot(1,2,1)
plot_graphs(history, 'accuracy')
plt.subplot(1,2,2)
plot_graphs(history, 'loss')
```



5.4 image of 'Accuracy graph' for Sentiment Analysis

```
[32] sample_text = ('It was an average movie. Nothing unique to notice. I will not recommend this movie')
     predictions = model.predict(np.array([sample_text]))
     print(predictions)
     if (predictions > 0):
       print("Positive Review")
     else:
       print("Negative Review")

     [[-0.32937126]]
     Negative Review
```

5.5 Image of Accurate result of Sentiment Analysis by the model

Above images 5.3, 5.4 and 5.5 show the data import, Accuracy graph and final accurate result for the sentiment analysis.

6. CONCLUSION

By this project we have implemented some accurate result giving neural network models for Basic Image Classification and Sentiment Analysis. The neural network libraries are vast in number and helpful to build a network. We used TensorFlow and Keras Data set libraries for our model. This models can do the accurate image classification of data set testing images and can do accurate sentiment analysis respectively. There is further scope in the image classification model to develop a mobile application for scanning and classifying images. In Sentiment Analysis model it can be further expanded into more data set platforms. Web-based media, and afterward the online stages contain a tremendous measure of the information as tweets, online journals, and updates on the status, posts, and so forth Supposition investigation of the

information is helpful to communicate the assessment of the bunch or any person. Estimation investigation is the examination of feelings and sentiments from a Movie. Also, the correlation of the Hours of India film audits and Datasets of similar films are taken utilizing Machine Learning Calculations. By studying these areas, We implemented the Basic Image Classification and Sentiment Analysis model.

7. REFERANCES

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