Flower Classification Based On Deep Learning Using Tensorflow

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ABSTRACT

Deep Learning, one of the incipient word extensively used in various domains and sectors for past few years. In this work, classification model developed for recognizing 5 types of flowers using CNN algorithm. Around 3670 images were taken to test the algorithm and the outcome is fine-tuned with Google net to attain the best accuracy result. The flowers such as daisy, dandelion, rose, tulip and sunflower are taken from the dataset for testing and implementation. The result is compared with the traditional algorithm and with CNN and proved the better accuracy is obtained in CNN based classification.

Keywords: Flower Classification, Deep Learning, TensorFlow

I. Introduction

Classification is widely used in all field to group the data in commanded way to achieve the significance. Flowers are used as medicine and it also feeds the human being, animals, insects, etc., the grouping of the flower is an essential one for clear understanding of the plant types, similarities, and relationship. The computer technology advancement made this classification an automated one by using various algorithms. Here, in this work Deep learning subset of machine learning has taken to classify the flowers based on the features. The features are extracted automatically from the input data since the deep learning think like a human and the training is more efficient and fast for the thousands of data feed as input. The fundamental task of image classification is to make sure all the images are categorized according to its specific sectors or groups. Tensor flow is used for the flower image classification to obtain the better result. The result is compared with the traditional algorithm and with CNN and proved the better accuracy is obtained in CNN classification.

II.Literature Review

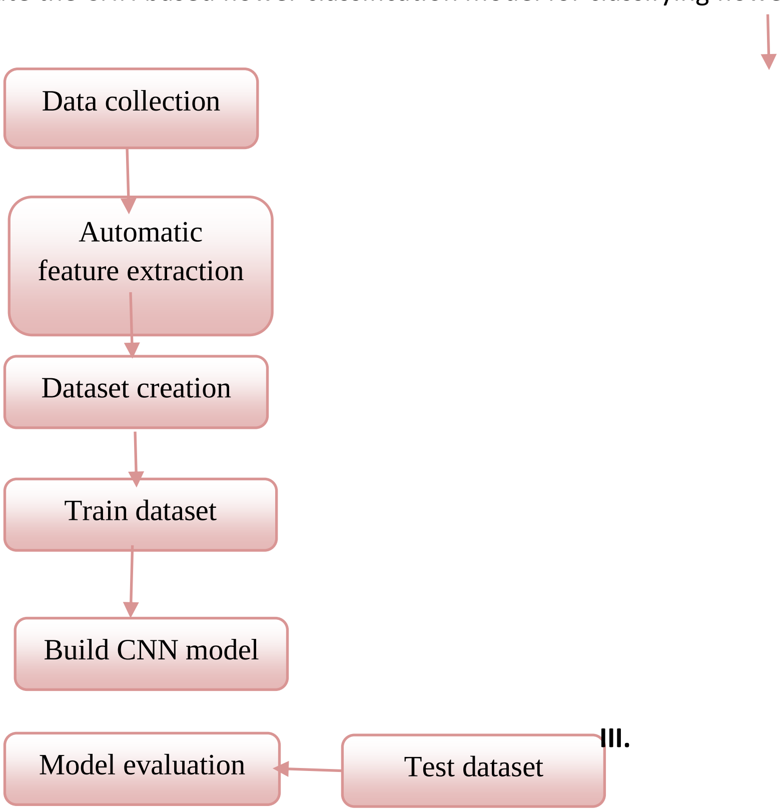
In 2018, Hazemhiary, HebaSaadeh, MahaSaadeh, Mohammed Yaqub created a binary classifier model for flower classification. They developed a model using CNN algorithm and attained the accuracy of 97% [1].

In 2014, hossamMZawbaa, Mona Abbass, SamenHBasha, Maryam Hazman, Abul Ella Hassenian developed a Machine learning approach for automatic flower classification. The Machine learning algorithms SVM, RF,SFTA were used [2].

In 2019, Musa cibuk, UmitBudak, YanhuiGuo, M cevdetince, Abdulkadirsengur developed a approach for efficient deep features selections and classification for flower species recognition. The algorithm SVM with RBF was used. The two data sets were utilizedfor this research and obtained accuracy of 96.39% and 95.70% [3].

In 2014, tanakorntiay, pipimphornbenyphaichit, panomkhawnriyamongkol implemented a concept about flower recognition system based on image processing. The model was implementedusing KNN algorithm and The KNN achieved 80% of the accuracy in this research [4].

From the literature survey, it is observed that many researches can be done using machine learning techniques. it can also perform through deep learning techniques. It is proposed in this research to create the CNN based flower classification model for classifying flower types.



III.

Fig. 1. Architecture of proposed system

Proposed Methodology

The purpose of proposed work is to develop CNN classifiers for predicting the flower types based on flower images and its essential features. Figure1 shows the block diagram of the proposed methodology for flower classification. The data set for flower classification is taken from the popular public database Image Net. The Image Net database is extensively used in many research works for testing the data since the database contains thousands and thousands of images with high resolution and the object is trained, tested and classified with various algorithm.

IV.Data collection

The data collected for the training and testing of the flowers are taken based on the different side, size and color of the image. The flower images daisy, dandelion, sunflower, tulip and rose are taken from the dataset. The image dataset is divided into two datasets for training and testing. The 90% of the images are trained and the remaining 10% of the data is used as testing dataset. The following number of images are taken for each category 633 for daisy, 898 dandelion, 641 roses, 699 tulip and 799 sunflower images with a total of 3670 taken as shown in Table 1.

Table 1: Number of images according to the types of flowers.

S. No	Types of Flowers	No of images
1.	Daisy	633
2.	Dandelion	898
3.	Rose	641
4.	Tulip	699
5.	Sunflower	799
Total number of Images		3670

V.Data Pre - Processing

Data pre-processing technique is asignificant one in classification in order to make the raw data to a useful data and the data normalization and augmentation techniques aid to attain the enhancement in the classification result.

VI.Segmentation

The method basically finds out most frequently occurring hue values in the background and iteratively removes pixels with those values from the image. This eventually results in segmentation of the image as only the foreground remains at the end of the process.

VII.Feature extraction

The CNN Algorithm automatically learned the features from given images and extract the features which called as self learned features and give it to a model for classification process.

VIII.Implementation

In implementing CNN, it consists of five (5) data inputs (five type of different flowers) and undergoes training with multiple hidden layers. The inputs are also set with fixed-size of the 224x224 RGB image. The convolution process is configured with Mobile Net as it produces efficient convolution neural networks.CNN Model is developed by multiple layers which contain input, hidden and output layer. The CNN flower classification model is built through several steps such as input dataset to the model using load_data (), divide the data set into training and testing dataset through train_test split(), input layer and hidden layer creation, model training, model testing and evaluation. In model development, the input layer is created using input layer function with predefined values. In each layer,Maxpooling 2D and Conv2D, filters,kernel_size,pool_size, strides size, padding value and activation function relu is used. The CNN Model is evaluated in terms of accuracy in each epoch. The CNN classification model is shown in figure2.

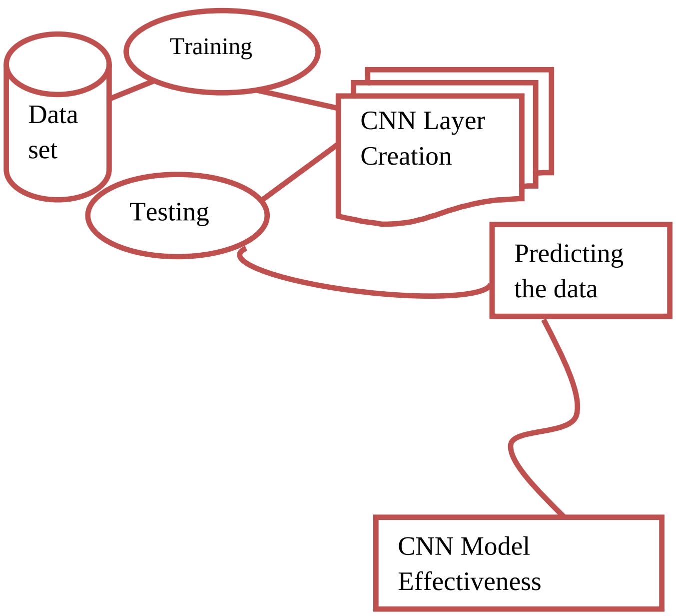


Figure 2. CNN Classification Model

Mobile Net Performance

MobileNet is used as the 'trainer' as it consists of small efficient of convolution neural networks (CNN). There are two ways to configure MobileNet, the input image resolution and the size of the model within MobileNet.Image Resolution is set as 224 and Size of the model is set as 0.50.

Classification

We used a CNN which initialize its first five blocks from the FCN model which was already initialized by the VGG-16 model. However, instead of using 3 fully connected layers in blocks 6–8 (recall Fig. 2), we used 3 convolutional layers with 512 feature maps. The kernel size of the convolutional layer in block 6 is 7 × 7, while the number of output parameters from the convolutional layer in block 8 is N.

IX.Experiments Result

The image dataset taken are trained and tested with the algorithm to obtain the accuracy and the figure 3 to 6 shows the loading, testing, and classification of the five types of the images.

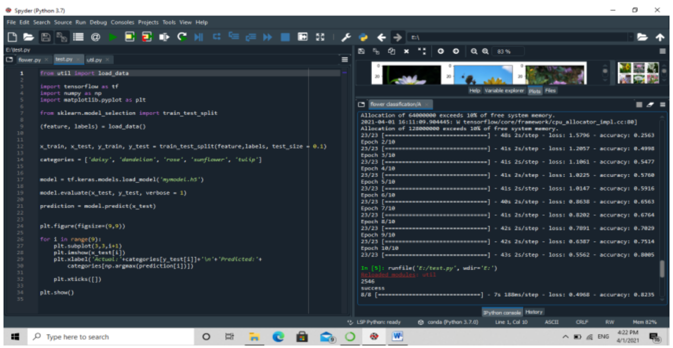


Figure 3: Loading Dataset

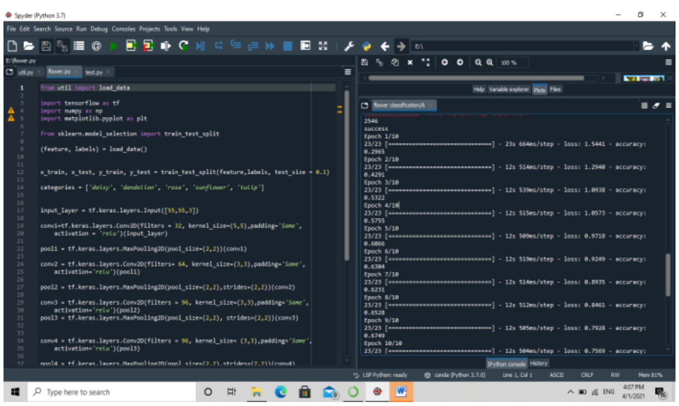


Figure 4: Testing Data

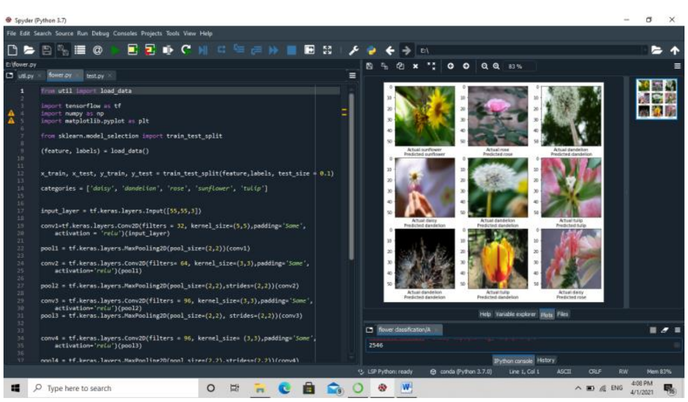


Figure 5: Image Classification

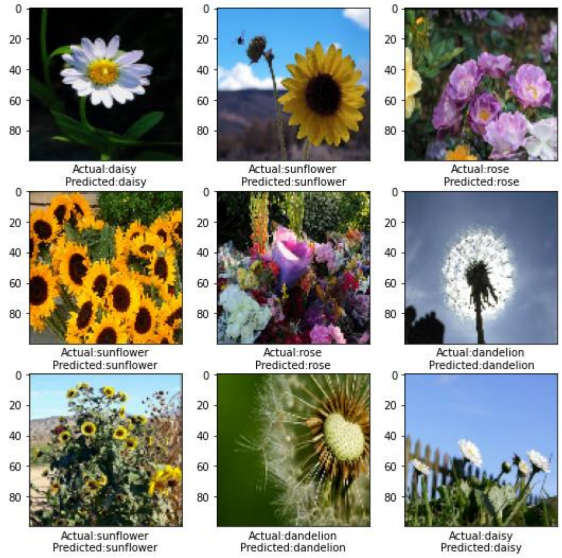


Figure 6: Classification and Prediction of the Flowers

X.Conclusion

In this work, data-set is segmented using the segmentation technique and the segmented data-set is given as the input to CNN model. The test set and training set had 0% overlap and are completely different from each other. TensorFlow and Keras with the Spyder environment is used and experimental results for CNN. We fine-tuned the models using the pre-trained weights of the architectures respectively. We found the top accuracy is 0.8256% and it issuperior than Alex Net. Hence, Google Netpresented better results in comparison with Alex Netdue to the various architectural differences. This model can be used for real-time applications to recognize flowers.

XI.References

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XII.Acknowledgement

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