LOVELY PROFESSIONAL UNIVERSITY

Transforming Education Transforming India

ADVANCED MACHINE LEARNING

OBJECT DETECTION

(flower recognition system)

Submitted To:- MD. Imran Hussain

Assistant Professor Lovely Professional University

Submitted By:- Dipanshu Maddheshiya

Reg. No. :- 11811293

Section:- KMO72

Assignment No. :- CA2

https://colab.research.google.com/drive/1gWvt4dsEYuXb2ef4V2r8VUTXO7GPRe4E

INTRODUCTION

Plant species recognition based on floweridentification remain a challenge in Image processing andComputer Vision community mainly because of their vastexistence, complex structure and unpredictable variety ofclasses in nature. Because of these natural complexities, it ishighly undesirable to perform normal segmentation or featureextraction or combining shape, texture and color featureswhich results in moderate accuracy on benchmark datasets.Although some feature extraction techniques combiningglobal and local feature descriptors reaches state of the artaccuracy in classifying flowers, still there is a need for arobust and efficient system to automatically identify andrecognize flower species at a larger scale in complex color characteristics of an image alone is not sufficient toquantify flowers because in a multi-species environment, twoor more species could be of same color. As an example,Sunflower and Daffodil will have similar color content.

❖ CONVOLUTIONAL NEURAL NETWORK:-

Convolutional neural networks are a class of machine learning networks which are commonly applied to image visualization problems such as classification. CNNs were inspired by the connections of the neurons and synapses in the brain. The design of these networks is made up of series of convolutional, pooling, and fully connected layers. The convolutional layer does what its name describes, it applies a number of convolutional filters to the input images in order to acquire the learning parameters for the network. Pooling layers are placed in between convolutional layers, and are used to reduce the number of parameters used for learning, and thus reduce the computation required. Finally, fully connected layers are full connections to the previous layer, rather than the small window the convolutional layers are connected to in the input. Convolutional neural networks are commonly used for image classification, however, there are limitations to this application. A human can identify the contents of certain images much more quickly than a

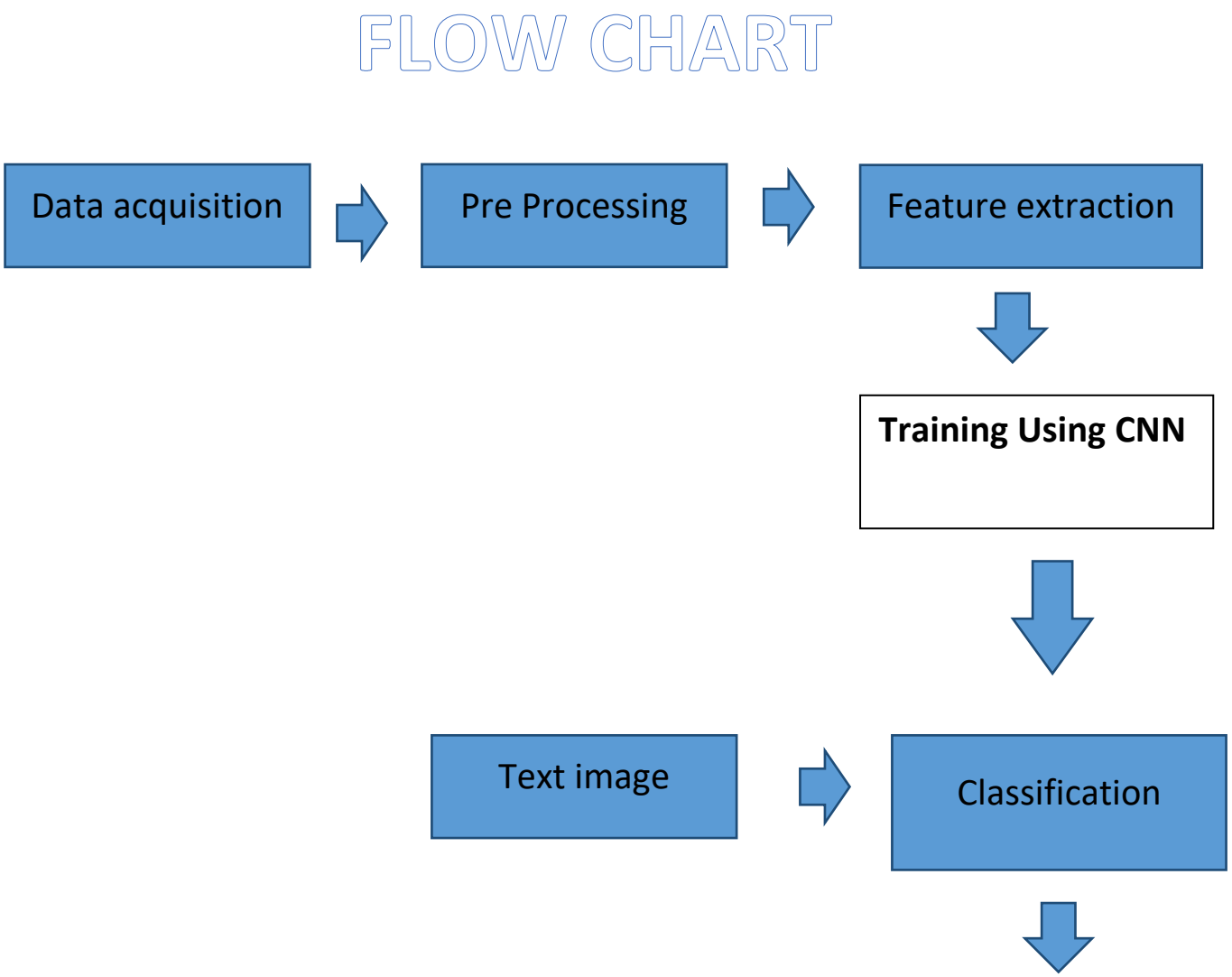
computer, but CNNs have proven to have a 97.6% success rate when applied to facial recognition.

➢ DATASET USED:-

On investigating the datasets available in the internet for flowers, the Flowers-Recognition dataset from Kaggle we take for this project.This dataset contains labeled 4242 images of flowers.This is mainly because of the high variations in scale, poseand light conditions in the images of the dataset. The datasetalso has high intra-class variation as well as inter-classvariation.In this dataset work, the data collection is based on data flicr,google images,yandex images.

You can use this dataset to recognize plants from the photo. The pictures are divided into five classes: chamomile, tulip, rose, sunflower, dandelion. For each class there are about 800 photos. Photos are not high resolution, about 320x240 pixels. Photos are not reduced to a single size, they have different proportions. Each category has different number of images.

➢ PROPOSED ARCHITECTURE:-



Benefits Module

➢IMPLIMENTATION:-

The proposed system was implemented as follows:

Step 1: Image acquisition: This step involves collecting images that can be used to train the model so that later when it comes across an unknown image, it can identify the flower based on the knowledge acquired during the training phase.

Step 2: Image Preprocessing: Here the images collected in the previous step were resized and augmented to increase the efficiency of the model. During augmentation, the size of the dataset would be increased by performing operations such as rotation, shear etc. Then the image will be split into 80% training and 20% Validation sets.

Step 3: Training Phase: This is the step where the actual training of the model takes place. In this phase the model extracts features such as color and shape of the flower used for training. Each of the training images will be passed through a stack of layers which includes convolutional layer, Relu layer, pooling layer and fully connected layer.

Step 4: Validation phase: Once the model completes its training from the training set it tries to improve itself by tuning its weight values. The loss function used is categorical cross entropy and the optimizer used is stochastic gradient descent.

Step 5: Output prediction: Once the validation phase is over, the model is ready to take an unknown image of a flower and predict its name from the knowledge it gained during training and validation phases. Once the classification is done by the model, it displays the common name as well as the family name of that flower.

Step 6: Benefits Module: Once the identity of the flower is found out, a previously created zip file is imported and the benefits of the corresponding flower will be found out and displayed to the user.

Step 7: Output : Finally the developed model was deployed and the output we get.

➢RESULTS AND EXPERIMENTAL ANALYSIS:-

The classification report obtained after the training and validation phase is shown in figure. The graph plots the training loss, validation loss, training accuracy and the validation accuracy for each epoch.

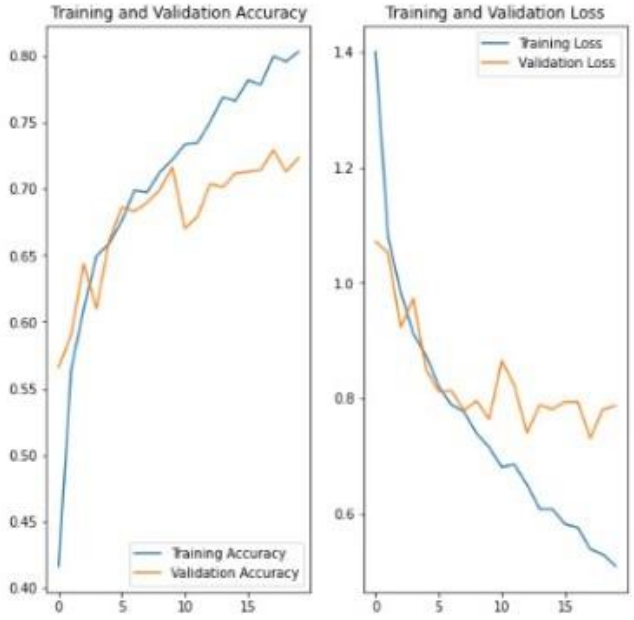
The model consists of three convolution blocks with a max pool layer in each of them. There's a fully connected layer with 128 units on top of it that is activated by a relu activation function.

The model attained an overall accuracy of 90%. When the model is fed with a real time image of dandelion taken on a mobile camera, a correct prediction with 98.46% accuracy was obtained. After applying data augmentation and Dropout, there is less overfitting than before, and training and validation accuracy are closer aligned.

```
for i in range(9):
  ax = plt.subplot(3, 3, i + 1)
  plt.imshow(images[i].numpy().astype("uint8"))
  plt.title(class_names[labels[i]])
  plt.axis("off")
```

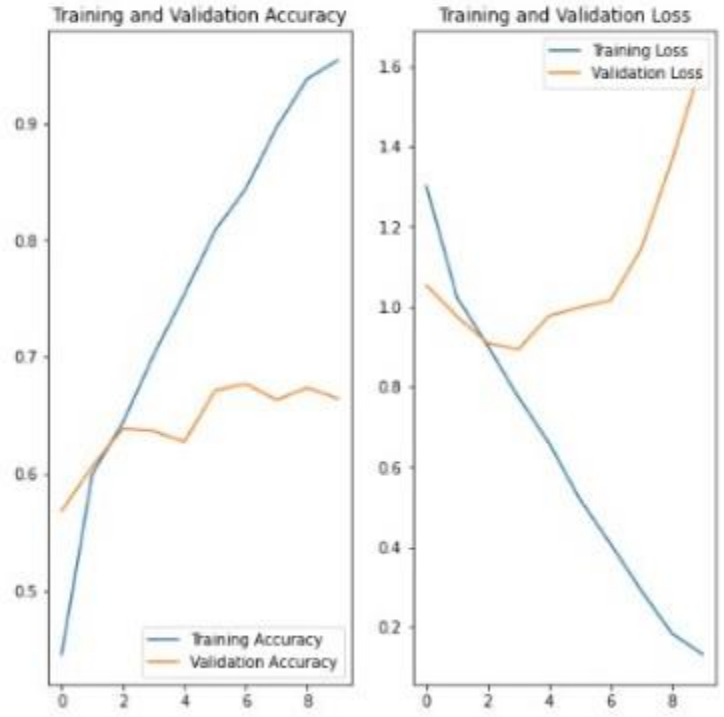
➢ALL OUTPUT SCREENSHOTS:-

```
plt.figure(figsize=(8, 8))
plt.subplot(1, 2, 1)
plt.plot(epochs_range, acc, label='Training Accuracy')
plt.plot(epochs_range, val_acc, label='Validation Accuracy')
plt.legend(loc='lower right')
plt.title('Training and Validation Accuracy')

plt.subplot(1, 2, 2)
plt.plot(epochs_range, loss, label='Training Loss')
plt.plot(epochs_range, val_loss, label='Validation Loss')
plt.legend(loc='upper right')
plt.title('Training and Validation Loss')
plt.show()
```



In [22]:
```
plt.figure(figsize=(10, 10))
for images, _ in train_ds.take(1):
  for i in range(9):
    augmented_images = data_augmentation(images)
    ax = plt.subplot(3, 3, i + 1)
    plt.imshow(augmented_images[0].numpy().astype("uint8"))
    plt.axis("off")
```

```
plt.plot(epochs_range, acc, label='Training Accuracy')
plt.plot(epochs_range, val_acc, label='Validation Accuracy')
plt.legend(loc='lower right')
plt.title('Training and Validation Accuracy')

plt.subplot(1, 2, 2)
plt.plot(epochs_range, loss, label='Training Loss')
plt.plot(epochs_range, val_loss, label='Validation Loss')
plt.legend(loc='upper right')
plt.title('Training and Validation Loss')
plt.show()
```



➢ CONCLUSION AND FUTURE SCOPE:-

❖ CONCLUSION:-

Flower being the most attractive part is the best way to identify a plant. Thus identifying the flower can help in knowing more about that plant. The proposed system takes as input, an image of a flower and displays the common name as well as the family name of the flower. Since the model is a convolutional neural network which

has proven to be one of the most efficient image classification methods, the proposed system is highly reliable. A zip file is imported after classification and the corresponding uses of the plant are displayed to the user thus making the system more useful. Further the model was deployed into this application.

❖ FUTURE SCOPE:-

Developers :

The project is complete ready for practical use, someone who wishes to learn the basics of CNNs and Tensor flow, substituting their own classes. The project is essential for anyone that wants to improve their project. It have scope to improve both the dataset and the CNN architecture, however, this will require more research and knowledge of CNN design. Additionally, someone who is interested in Tensor flow and Android development or front end development can be benefited from this work.

Scientist or Botanist :

This research and project will be helpful for botanists or biologists, although any scientist would likely wish to use their unique dataset. The project would most likely be useful to scientists for classifying large amounts of data and generating statistics for the dataset. Using our

Android application Botanists or other scientists dealing with flowers to identify easily.

Traveler or Nature Enthusiasts:

Our developed project will be much helpful while spending time outdoors to identify flowers by a mobile application. This application works completely in offline which use mobile camera to identify flowers. It will be really helpful for Traveler, Hiker and Nature Enthusiasts.

➢ REFERENCES:-

[1] AvishikthaLodh, RanjanParekh,"Flower Recognition System based on Color and Gist Features", IEEE 2017.

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[4] D S Guru,Y H Sharath and S Mnajunath,"Texture Features in Classification of Flower Images", IJCA Special Issue on RTIPPR