Flower Recognition Using Neural Network

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Abstract – *Flowers come in a variety of types and colours. It would need a specialist with a lot of experience on flowers to distinguish between them and identify the species. In this rapidly evolving era, applying artificial intelligence to real-world issues solves a lot of hassle for a lot of people. In this paper we are showing that CNN can be used to recognise and automatically identify different species of flowers in the environment.*

Keywords - *Artificial Intelligence, Computer Vision, Convolutional neural network, Deep Learning, Flower recognition system using CNN, Flower recognition system using VGG16, Machine learning, Multi-class Classification.*

1. INTRODUCTION

CNN entails picture categorization and object recognition, making it appropriate for use in this study's flower recognition system, through which it should identify the flowers and classify them according to species. CNN model is made of five layers which are: two convolutional layers, two pooling layers, and one fully connected layer. In order to create feature maps, the convolutional layer applies learnable filters to the input images and convolutes them. By offering ever-more-complex generalizations, the maps become less sensitive to rotation and distortion toward the higher layer.

2. METHODOLOGY

The first step of the procedure was to input the photos into the model. Before the photos could be utilized as a training dataset, they needed to be processed. To prevent overfitting, the dataset was divided into two parts: a training dataset that made up 70% of the total, and a testing dataset that was the rest 30%. The method would result in the experimental result for the training and testing dataset. In order to assess the model's accuracy, the activity continued with an evaluation and analysis of the findings from the earlier phase.

Since the lighting in the night would be different, only photographs taken during the day were chosen. Additionally included were a mixed view angle. It was challenging to recognise some flower types since they were so similar, such as dandelion and sunflower, even though some of them had highly distinct and distinctive characteristics. The scales and degrees of illumination used to acquire this dataset varied as well. The variety of the classifications and the subtle differences among each category made classification more challenging. This could be rectified using image augmentation.

3. IMPLEMENTATION

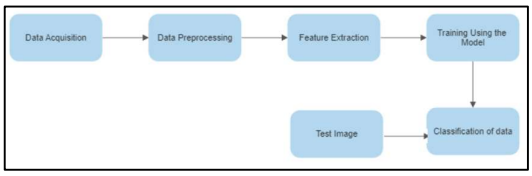
Step 1: During this step, photos are gathered that can be used to train the model, enabling it to recognise an unfamiliar image later. utilising the knowledge learned during the training phase, the flower.

Step 2: To improve the effectiveness of the model, the photos gathered in the previous stage were shrunk and enhanced here. The image will then be divided between 30% testing sets and 70% training sets.

Step 3: The actual training of the model happens at this stage. The model extracts characteristics from the flower that was used for training in this phase, including its colour and shape. The convolutional layer, the Relu layer, the pooling layer, and the fully connected layer are the layers that each training image will go through before being sent through the stack of layers.

Step 4: After the model has finished learning from the training set, it attempts to become better by adjusting the weight values. The optimizer utilised is stochastic gradient descent, and the loss function is categorical cross entropy.

Step 5: After the validation phase, the model is prepared to use the information it learned throughout the training and validation phases to identify a flower from an unknown image. After the model has classified a flower, it displays the name of that flower.



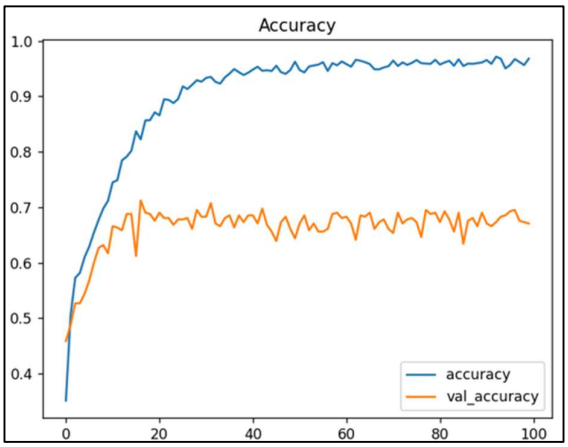
4. DATASET

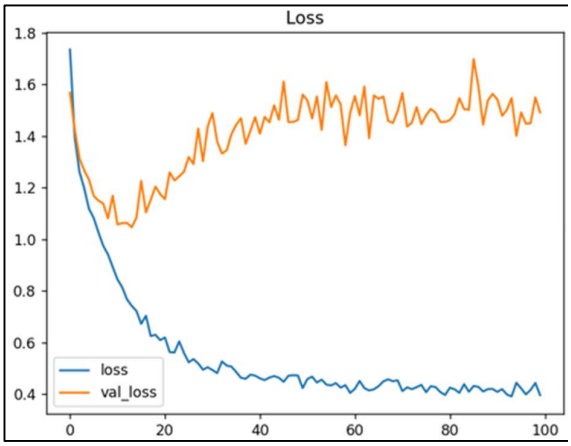
Datasets were collected from Kaggle. Here for the dataset, we merged two datasets together to form a bigger dataset. First dataset consists of 2746 images that contain images of daisies of 501 images, 646 images of dandelions, 497 images of roses, 495 images of sunflowers, and 607 images of tulips. Then, the second dataset contains a total of 500 images, wherein there are 100 images of daisies, dandelions, roses, sunflowers, and tulips.

5. RESULT AND ANALYSIS

Basic CNN Model

The model was trained with a batch size of 32 and 100 epochs.



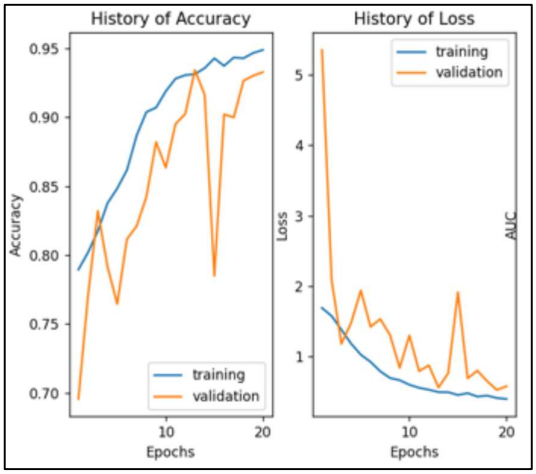


The above graphs indicate the plots of training accuracy, validation accuracy and training loss, validation loss.

The model achieved an accuracy of 95%. When the model was fed with real time image taken on a camera, a prediction of 70% accuracy was obtained.

VGG16 Model

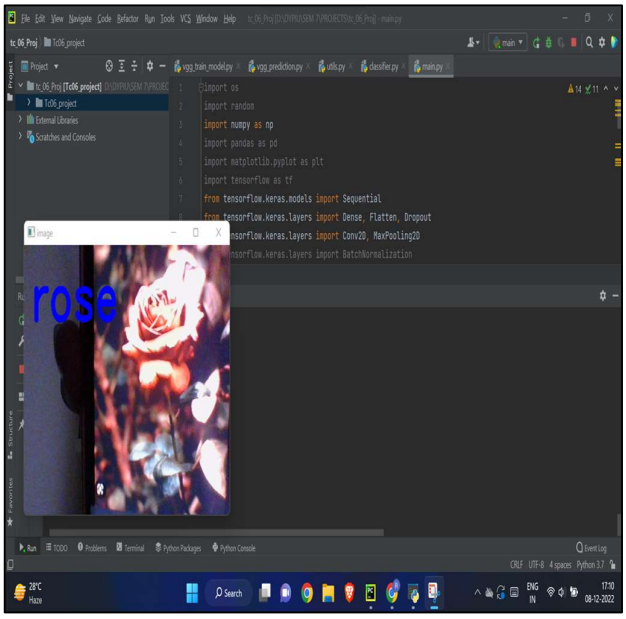
Here, the model was trained with a batch size of 64 and 100 epochs.



The above graphs indicate the plots of training accuracy, validation accuracy and training loss, validation loss.

The model achieved an accuracy of 95%. When the model was fed with real time image taken on a camera, a prediction of 93% accuracy was obtained.

Final Output:



6. CONCLUSION

By identify the flower, we could learn more about the plant overall. The model presented here takes an input image, and displays the name of the flower. The models we have used here are CNN

models, and these are the most efficient form of image classification techniques, so the results provided could be considered as true.

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