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Flower Recognition Using Deep Learning

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ABSTRACT: We have developed a deep learning network for classification of different flowers. For this, we have used convolutional Neural architecture for the classification purpose. By keeping all hyper-parameters for the architecture, we have found the training accuracy of and testing accuracy of. These results are extremely good when compared to random classification accuracy of 0.98%. This method for classification of flowers can be implemented in real time application and can be used to help botanists for their research as well as camping enthusiasts.

I.INTRODUCTION

Plant identification is an important task for researchers, students, and practitioners in field of the agriculture, forest, biodiversity protection, and so on. Recently, thanks to advanced research in the computer vision community, a number of works have been dedicated to the automatic plant identification based on images of plant organs (e.g., leaf, leaf scan, fruit, stem, entire, stem, flower). Among them flower image plays an important role for the plant identification because its appearances (e.g., colour, shape, texture) are highly distinguishing. Appearances of flowers are stable and less invariant with weather conditions, age of plant. In views of the botanic experts, flower images therefore are most valuable source for the plant identification task. However, to develop an automatic plant identification system based on flower images, the proposing techniques face to many challenges such as large inter-class similarity, but small intra-class similarity, lighting and viewpoint variations, occlusion, clutter, and object deformations [2]. These issues are illustrated in Fig. 1 with several species.

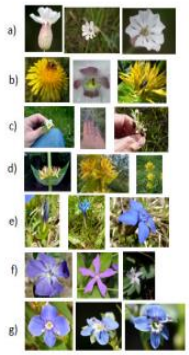

Figure 1: Challenges of flower identification. (a) Viewpoint variations; (b) Occlusion; (c) Clutter; (d) Light variation; (e) Object deformations; (f) Small intra-class similarity; (g) Large inter-class similarity.

In the project, some approaches on the flower identification have been proposed [1], [2], [5]. They usually consist of four steps: pre-processing, segmentation, hand-design feature extraction and classification. Since flower images have complex background therefore those works are time consuming and the obtained accuracy is still low, particularly, with a large number of species. Recently, learning feature representations using a convolutional Neural Networks (CNN) show a number of successes in different topics in field of the computer vision such as object detection, segmentation and image classification [9]. Feature learning approaches provide a natural way to capture cues by using a large number of code words (sparse coding) or neurons (deep networks). They are useful cues because natural characteristics of the objects are captured. Therefore, in this paper, we examine and demonstrate effectiveness of the deep convolutional neural networks that could be more effective for flower-based plant species identification.

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The purpose of this project is to use Tensor flow, an open-source dataflow and machine learning library, to build an image classifying Convolutional Neural Network (CNN) for classifying the flower image. Tensor flow, in addition to providing developers a simple way to build neural network layers, can also be run on mobile platforms such as Android. The ultimate goal of this project is to design and optimize a convolutional neural network for use with flower classification, and eventually build a simple classification app for mobile devices around the trained network. The mobile app will allow users to try and classify flowers while outdoors or offline [1].

At the primary stage of our journey looked for research paper and tools related with our idea. Even we deeply searched the Internet to find if there any system that can identify flower automatically. But unfortunately, we found very few resources. There exists a handful papers in there. That time we take this as a challenge and start our research to make a system which can recognize flower in real time. After a lot of hard work our project now come to light finally. Now our application can identify around 10 Bangladeshi common flowers with some foreign flowers also. The most unique feature of project is it can identify flower in real time. For some kind of flower, it provides 100% accuracy rate. Different flower is same to look at we know. If this occurs during identification time that time our application shows 3 or 2 most similar result. Convolutional Neural Network (CNN) and Image Classification technique used in our project which can identify flower with the confidence level from 0 to 1. We use Tensorflow an open-source library for training process.

II. SIGNIFICANCE OF THE SYSTEM

Flowers are the most attractive and distinguishing feature of a plant. Therefore, flower recognition can help to know more about the plant. The two main common features of flowers are their colour and shape. Those features can be used to train the model such that it can later identify an unknown flower.

III. LITERATURE SURVEY

The purpose of this project is to use Tensorflow, an open-source dataflow and machine learning library, to build an image classifying Convolutional Neural Network (CNN) for classifying the flower image. Tensorflow, in addition to providing developers a simple way to build neural network layers, can also be run on mobile platforms such as Android. The ultimate goal of this project is to design and optimize a convolutional neural network for use with flower classification, and eventually build a simple classification app for mobile devices around the trained network. The mobile app will allow users to try and classify flowers while outdoors or offline. After examining, inquiring, researching and comparing all the related works on Flower Identification, we come to have different and many types of conclusions. First of all, none of them are using real time object detection and identification. All of them are just stuck into by taking picture of object and search through their database to identify the object. Secondly is accuracy rate, most of the big project hit the accuracy rate up to 90% so they say. But the community feedback shows the different colour. Users complain about the miss detection of plants and less information about it. It also takes long time for analysing and searching their database. Because of our real time flower identification, it is more like instant detection of flower.

IV. METHODOLOGY

A CNN consists of an output layer, as well as multiple hidden layers. The hidden layers of a CNN typically consist of convolutional layers. pooling layers, fully connected layers and normalization layers.

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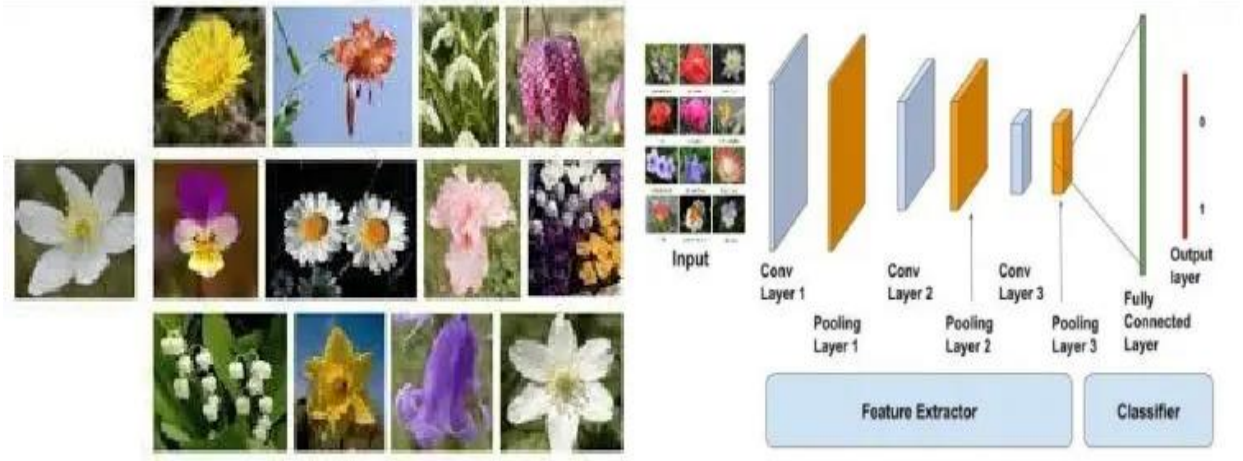

Image Input Layer

This layer consists of the input of the network i.e, image here. The size of input to our network is 64 *64.

Convolutional

Convolutional layers apply a convolution operation to the input, passing the result to the next layer. The convolution emulates the response of an individual neuron to visual stimuli. Each convolutional neuron processes data only for its receptive field. A fully connected layer for a (small) image of size 100 x 100 has 10000 weights for each neuron in the second layer. The convolution operation brings a solution to this problem as it reduces the number of free parameters, allowing the network to be deeper with fewer parameters. For instance, regardless of image size, tiling regions of size 5 x 5, each with the same shared weights, requires only 25 learnable parameters. In this way, it resolves the vanishing or exploding gradients problem in training traditional multi-layer neural networks with many layers by using back propagation. We have used total three Convolutional Layers all having input image of size 64*64. The Kernel of first layer is of the size 5*5 and remaining two have of the size 3*3. The function used is Conv2D ().

Pooling

Convolutional networks may include local or global pooling layer, which combine the outputs of neuron clusters at one layer into a single neuron in the next layer. For example, max pooling uses the maximum value from each of a cluster of neurons at the prior layer. Another example is average pooling, which uses the average value from each of a cluster of neurons at the prior layer. We have used Max pooling in our project. The function that does max pooling is MaxPooling2D**.**The Pool Size for pooling we defined is 2*2.

RELU layer

RELU is the abbreviation of Rectifier Linear Unit. This layer applies the non-saturating Activation Function. It increases the nonlinear properties of the decision function and of the overall network without affecting the receptive fields of the convolution layer.

Fully connected layer

Finally, after several convolutional and max pooling layers, the high-level reasoning in the neural network is done via fully connected layers. Neurons in a fully connected layer have connections to all activations in the previous layer, as seen in regular neural networks. Their activations can hence be computed with a matrix multiplication followed by a bias offset.

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A. Challenges

- Duplicate flower identification is the main challenge of our project. Some flowers are same to look at by size and shape. That time it is so tough to provide the accurate result. We are continue our research to solve this problem.
- Another challenge is to identify same flower of different specific color. Ex- White Rose, Pink Rose. This is a tough work to identify color using convolutional neural network. But we take it as a challenge.
- Other challenge is achieving accurate data. In the market of false and duplicate data, it is very hard to get all of the things right. But we are trying are heart and soul to do better.

B. Solution

Flower regions are usually overlaid on a complex background therefore they are difficult to correctly separate from the background. In this work, we apply saliency-segmentation-based approaches to select the ROI (Region-Of-Interest) on flower images. The main flow of pre-processing techniques is shown in Fig. 2. Firstly, we adapt a saliency extraction method as described in [13] and a common segmentation technique (e.g., mean-shift algorithm). The segmented region is selected based on a condition that its corresponding saliency value is large enough. The connected-region techniques then are applied to merge into interest-of-regions. Figure 3 shows ROIs (left panel) whose top-left and bottom-right points form a rectangle on original images (right panel).

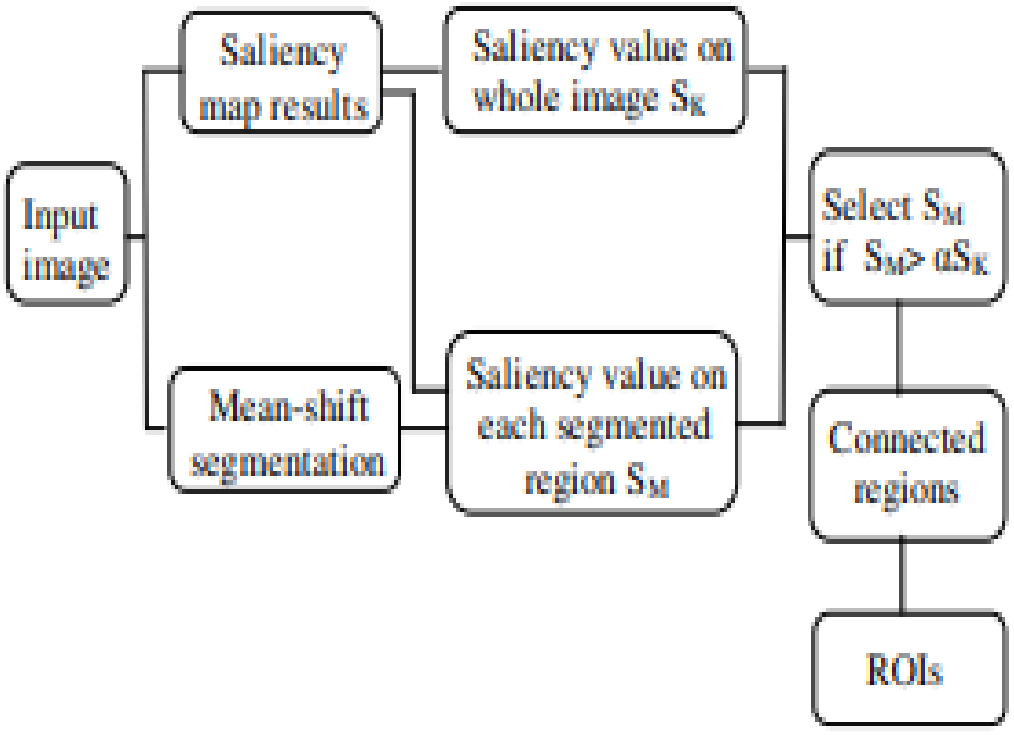

Figure: The proposed pre-processing to select the regions of interest (ROI) of flower

C. Data Description

There are a number of existing datasets which have images of specific flowers. These datasets were generally collected for very specific uses with neural networks that were designed to classify flowers based on certain characteristics. The dataset for this project was produced by searching Google Images using a Python script adapted from a web-crawler created by

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Hardik vasa. As a result, the images of the flowers are a diverse collection of plants in their natural setting. This adds the benefit of training the network for use outdoors. The script had to be modified so that it would receive the list of search keywords from a text file. Google Image Downloader is also helpful to collect specific flower data on windows platform. The search keywords for the dataset are a long list of flower observations in Bangladesh. The search keywords use the full genus-species classification in order to increase the quality of the dataset. For example, rather than searching for the word "Gardenia", which would produce undesired images, the preferred keyword would be "Gardenia jasminoides". The labels for classification, however, are grouped by genus so that each class has 400 to over 1000 images.

The following figure shows the sample dataset image of Shapla flower.

Figure: Dataset of Shapla

V.EXPRIMENTAL RESULT

In this system image is taken as input. So first have to upload image using choose file button we can upload an image after uploading image have to click the predict button. After taking few seconds it will shows the flower recognition.

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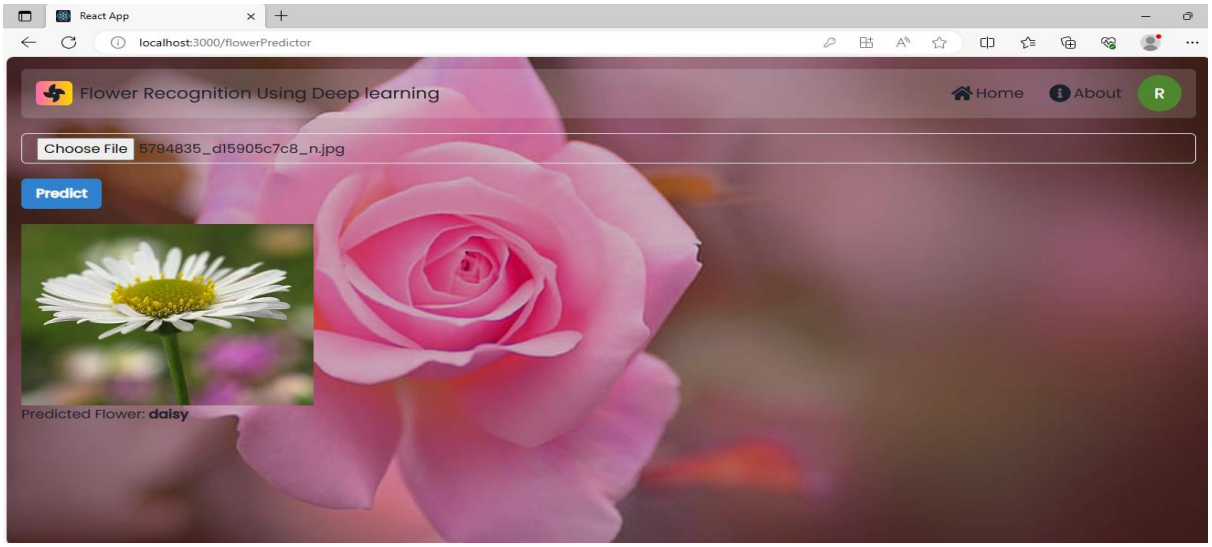

Figure: The user interface displays detected flower as systemic

VI. 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 CSV 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 a web application.

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