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Floral Species Identification and Classification By Using Random Forest Classifier

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Abstract:

Image Identification is the process of identifying what an image represent. Image is classified into a particular class by using machine learning algorithm called Feature Extraction. Attributes are the information that are derived from an image. Identified features that could quantify flowers, we could possibly think of Colour, The global features are Texture and Shape. In this proposed system with less work likely to produce good results, if we choose only one feature vector, as these species have many attributes in common like many flowers are similar in terms of colour and so on. So, we need to quantify the image by combining different feature descriptors so that it describesthe image more effectively.

Keywords- Image Recognition, Machine Learning, Feature Extraction, Random-forest algorithm

Introduction

Flowers are not only using for decorative purpose, they also have many notable uses which are veryimportant for animal survival including humans. They support basic functions of our daily lives by providing food, nutrition in turn, and also many flowers are used in medicinal.

Flowers with plants are one the largest consumers of carbon dioxide and producer of oxygen, theyalso have significant impact on the bee population, which are very important for the plants themselves since they help them in the process of pollination. They have very important role in our lives and they will continue to have their important role in the future as well. Thus the knowledge of different types of flower species is very important for botanists in order to study different behaviors of different plants and flowers and their role in the field of medicine, cosmetic,food.

Image classification thus very important in our society, flower identification and classification is one type of them. Study of flowers also helps botanists to influence the fields of medicine, cosmetics, science among others. There are flowers with varying shapes, colours, size. Generally we identify the flowers by their smell, colour, the shape of their petals, and also our knowledge about the different types of flowers available. The types of the flower species with different colour pattern, texture, size, and different shapes of their petals, with significant differences in their overall appearance. But there are also some flowers which have same colour, same size, and similar petals shape; which makes it even harder for accurate classification of flowers. Thus with all those factors involved we get to notice that classification of flowers is a very complex process and if do not have sufficient knowledge of various types of flowers available in our environment, the process of classification gets further hard.

Machine learning is a field to understanding and building methods that 'learn', that is, methods that leverage data to improve performance on some set of tasks. It is seen as a part of artificial intelligence. Machine learning algorithms build a model based on sample data, known as training data, in order to make predictions or decisions without being explicitly programmed to do so. It involves computers learning from data provided so that they carry out certain tasks. For simple tasks assigned to computers, it is possible to program algorithms telling the machine how to

execute all steps required to solve the problem at hand, on the computer's part, no learning is needed. For advanced tasks, it is challenge for a human to developing needed algorithms. In practice, it can be change out to be more effective to help the machine develop its own algorithm, rather than having human programmers specify all required steps.

Machine learning algorithms are used in various applications, such as in medicine, email filtering, speech recognition, agriculture, and computer vision, where it is difficult or unfeasible to develop conventional algorithms to perform the needed tasks. A subpart of machine learning is closely related to computational statistics, which focuses on generating predictions. The study of mathematical optimization methods, theory and application domains to the field of machine learning.

Literature Survey

Sunil Bhutada, K.Tejaswi and S.Vineela[1] In their opinion, Classification and Recognition systems are being used to use the existing data effectively and getting the feature extraction from the data and displays them. Some times we want to classify the flowers using text recognition. Actually the dimensions of flowers are considered and the flower is mentioned in the dataset including the dimensions.

Mohd Azlan Abu1 , Nurul Hazirah Indra , Abdul Halim[2], In Their research study about image classification by using the deep neural network (DNN) or also known as Deep Learning by using framework TensorFlow. Python is used as a programming language because it comes together with TensorFlow framework.

Kavish Sanghvi , Adwait Aralkar , Saurabh Sanghvi and Ishani Saha[3],In their discussion Machine Learning, and Deep Learning have gained immense momentum. It has become a data centric model where neural network developers are "training" the network to be "intelligent" and "independent". The training needs softwares and tools such as classifiers, which feed huge amounts of data, analyze them and extract useful features.

Qing Lv,Suzhen Zhang,and Yuechun Wang, In their paper they used a deep learning model of image classification, which aimed to provide foundation and support for image classification and recognition of large datasets.
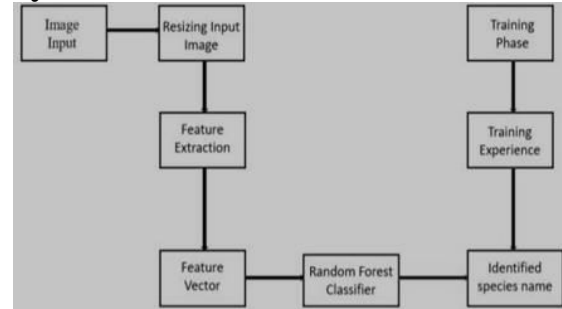
System Architecture:

Figure 1 System Architecture

Implementation
The Random Forest Algorithm:

The Random Forests consists of a collection of tree-structured classifiers. Each tree depends on the random vector values sampled independently and is attribution for all trees in the forest. Random forests have been shown to handle large training datasets and many classes for object detection efficiently. It is an ensemble learning method used for classification, consisting of multiple decision trees. To build a decision tree in a random forest, a bootstrap sample of the data is used and at each node a set of random variable is selected to split on.

Step 1: Choose random samples from a given training set.
Step 2: Separate decision trees are constructed for every sample.
Step 3: Each decision tree will generate as an output.
Step-4: Final output is considered based on Majority Voting or Averaging for Classification and regression respectively.
In the Area of computer vision and image processing, features provides an information that helpful to identify or detect some samples related to particular application.

Common feature descriptors:
Colour - Colour Histogram
Shape - Hu Moments, Zernike Moments
Texture - Haralick Texture
Feature descriptors used:

Figure 2 Acc: 95.3

Color Histogram that measure color of the flower.
Hu Moments that compute shape of the flower.
Haralick Texture that calculate texture of the flower.

Dataset:
The dataset we collected is flower dataset which consists of 150 tuples with three attributes of flowers which includes color, shape and texture of flower. The three different species of flowers included are Sunflower, Doley, Rose, Dandelion and Tulip flowers. Training dataset consists of 80% and testing data is 20% of the existing dataset. Accuracy is obtained using Random forest algorithm, the maximum accuracy obtained.

Results:
To find the proposed algorithm performance we consider five types flowers such as Sunflower, Doley, Rose, Dandelion and Tulip flowers in all cases the proposed algorithm gives an Accuracy of 95.3%.

Figure 3 Acc: 95.3   Figure 3 Acc: 95.3   Figure 4 Acc: 95.3

Figure 5 Acc: 95.3 1

Conclusion
In conclusion, this research is about image classification by using Random Forest Classifier. It can be concluded that all results that have been obtained, showed quite impressive outcomes. Random Forest Classifier classified with up to 95.3% percent of accuracy towards five different types of flowers that have become a trained model. Lastly, Python have been used as the programming language throughout this research since it comes together with framework TensorFlow which leads to designing of the system involved Python from start until ends.

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