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IMAGE CLASSIFICATION OF THE FLOWER SPECIES IDENTIFICATION USING MACHINE LEARNING

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ABSTRACT: Image classification has become one of the key use-cases for demonstrating machine learning. The proposed work will try to classify the given input image of flower species, based on the dataset provided. And it produces an output with the classification of flower in the input image. Flower identification systems are prominently used nowadays. Although modern search engines give mechanisms for visually searching for a query image containing a flower, robustness is lacking due to the intra-class variation among millions of flowers species worldwide. Therefore, a Machine Learning method using Convolution Neural Networks is used in this proposed research work to identify highly accurate flower species. The flower image extraction function is performed using a Pre-Trained Network Extraction of Complex features. On top of that, a machine learning classifier such as Logistic Regression or Random Forest is used to produce a higher precision score. This approach helps to reduce the system requirements required to conduct a Convolution Neural Networks (CNN) to compute the intensive training task.

Keywords: *Convolution Neural Networks (CNN).*

1. INTRODUCTION

Flower is a very important part of nature. Mostly we identify a plant through its flower. Experienced botanists do this identification of flower but a naive person will have to consult flower guidebooks or browse any relevant web pages on the Internet through keywords searching. Our system can recognizes the flower in real time using mobile camera. Currently this Android app can identify around 10 flowers. Most important thing is that this app can fully works in offline. We are continuously working to add more flowers to identify. Everyday we see a huge number of flower species in our house, parks, roadsides, in farms, on our rooftop but we have no knowledge of that flower species or their origin. Even we have no idea about its name. There are several guidebooks for flowers knowledge but it becomes quite difficult to find the name when have the picture. Even the Internet sometimes is not useful. But it is quite difficult for human brain to memorize all the species they see. Even some flower is similar to look at. This application recognizes the flower in real time by using mobile camera. 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 [1].

Fig.1: Rose Identification with highest confidence value

There have a special motivation behind this research and project work. Me and my cousin used to walk along the railway line in afternoon. That time we used to observed a lot of unknown flower around the area. We were curious about that flowers but we could not recognize it. That time we discussed about an idea to make a system which can identify our desired flower automatically. Since then our journey has started and dream have come true now. We developed an android application which can introduce people about that unknown flower which they see but don't identify that. Hope our research & developed project will be helpful for the curious people.

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 occur 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.

2. LITERATURE REVIEW

2.1 Plant Leaf Identification via a Growing Convolution Neural Network with Progressive Sample Learning:

Plant identification is an important problem for ecologists, amateur botanists, educators, and so on. Leaf, which can be easily obtained, is usually one of the important factors of plants. In this paper, we propose a growing convolution neural network (GCNN) for plant leaf identification and report the

promising results on the ImageCLEF2012 Plant Identification database. The GCNN owns a growing structure which starts training from a simple structure of a single convolution kernel and is gradually added new convolution neurons to. Simultaneously, the growing connection weights are modified until the squared-error achieves the desired result. Moreover, we propose a progressive learning method to determine the number of learning samples, which can further improve the recognition rate. Experiments and analyses show that our proposed GCNN outperforms other state-of-the-art algorithms such as the traditional CNN and the hand-crafted features with SVM classifiers.

2.2 An efficient classification of flower images with convolutional neural networks.

Machine learning is penetrating most of the classification and recognition tasks performed by a computer. This paper proposes the classification of flower images using a powerful artificial intelligence tool, convolutional neural networks (CNN). A flower image database with 9500 images is considered for the experimentation. The entire database is sub categorized into 4. The CNN training is initiated in five batches and the testing is carried out on all the for datasets. Different CNN architectures were designed and tested with our flower image data to obtain better accuracy in recognition. Various pooling schemes were implemented to improve the classification rates. We achieved 97.78% recognition rate compared to other classifier models reported on the same dataset.

2.3 Ecological Knowledge is Lost inWealthier Communities and Countries. Environmental Science & Technology

Accumulated knowledge about nature is an important part of people's capacity to manage and conserve the environment. But this ecological knowledge is now being increasingly lost. There have been few cross-cultural and quantitative studies to describe the phenomenon of its loss. Here we show a strong inverse correlation between ecological knowledge and income levels in and among India, Indonesia, and the UK (n = 1095 interviews). Knowledge acquisition and subsequent saturation occurs at an early age in the most resource-dependent communities, but not in the UK, where knowledge levels are low and acquisition is slow. Knowledge variance within communities increases in association with ecological knowledge decline and a scale of progressive knowledge loss was revealed with the most rapid rates of loss in industrialized regions. Various studies have described the mutually exclusive relationship between economic growth and environmental conservation; however this is the first to consider the association between economic growth and social capacity to manage the environment. Understanding ecological knowledge loss is important to understanding the declining capacities of communities undergoing economic development to manage their natural resources and the future of ecosystem diversity in the light of current patterns of economic growth.

2.4 An Efficient Scheme for Vein Detection using Accuvein Apparatus Based on Near Infrared with Broadcom Chip

Venipuncture has been considered as one of the main fitness analysis strategies. Even although venipuncture has been taken into consideration as one of the highest prioritized and commonly accompanied practised in hospitals is to carry out obtain the veinsfor small kids, elderly peoples , fat , anaemic, or

darkish skin colored patients has been a difficult procedure for medical practitioners. To get the solution for this problem, many devices using infrared light have became today's trend. But those devices share a commonplace drawback, for visualizing deep veins or veins of a thicker part of subject like limb. This paper clarifies a vein-picturing device , Accuvein which uses Near infrared (NIR) light. The light inventory quickly extends straightforwardly to the chose selected part of the skin. The camera sensor has been used to come across infrared radiation to take the vein photos. With the addition of an image processing process, the first-class of vein shape obtained is more desirable showing it extra as it should be. The implemented device has met the requirements of a desired output image when limb areas kept under Accuvein device obtaining the efficient images. The visibility of veins for the purpose of Cannulation increased by using Accuvein device.

2.5 Automatic recognition of blooming flowers in Pattern Recognition

This paper describes an automatic method for recognizing a blooming flower based on a photograph taken with a digital camera in natural scene. The problem of identifying an object against the background is known to be difficult. In this paper, we employ a photograph where the object (a blooming flower) is focused but the background is defocused. For extracting a flower region, we propose a new method that extracts a boundary by selecting a route with minimizing a sum of the local cost divided by the route length. Experiments were conducted for 600 pictures (20 pictures each for 30 species). A successful boundary extraction rate of 97% and a flower recognition rate of 90% were obtained.

3. IMPLEMENTATION

According to Saitoh [5] et.al implemented a process that uses two images of the data, one of the possibilities and one of the leaves. To do this, the user will place a black cloth that is not so convenient behind the flower. And even with this approach, the background separation is not straight forward; they actually used a method of clustering k-means in color space (with multiple integrations). For both the flower and the leaf, they considered color and shape information. .

Drawbacks:

The purpose of this study was to discover is there any differences between ERP's Critical Success Factors (CSF) in developed and developing countries or not. And if there are any differences, what are they? This study showed that in during ERP implementation CSFs are not much different in developed and developing countries but still there are undeniable differences.

Feature extraction has been broadly categorized in to Global and local descriptors. Based on its characteristics subdivision of global descriptors done like color, shape, texture and others.Data or collection of numbers that are taken from features of an image. These are quantities that are currently measured. Computer Vision allows for a broader variety of device detection algorithms. We can think of Color, Design and Structure as the primary characteristics when chosen with the characteristics that could differentiate with different group of plants and with their flowers. This is a suitable choice for

quantifying and defining the global image of the flower. This approach is not much likely to produce better results, because these species have several common attributes like sunflower in terms of color and so on would be similar to daffodil, if we select only one feature vector.

Advantages:

Suitable choice for quantifying and defining the global image of the flower.

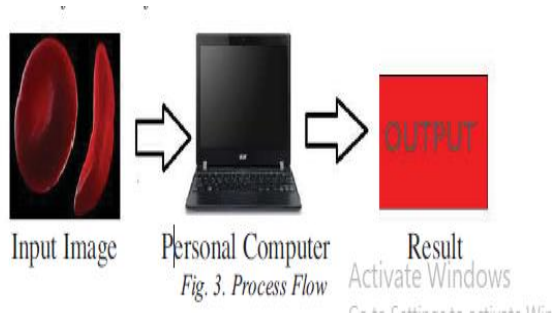

Fig.2: System architecture

Typical plant classification system is a challenging and complicated process for un-experts, i.e. using a standard link recognition tree with dichotomies keys. However, due to substantial advancements in machine vision and machine learning, autonomous picture-based recognition presents an easy and quick way to determine the plants. In previous studies use of the leaf images for this function has been thoroughly explored. Although leaves can be identified during a year at almost any time, the processing of suitable leaf images introduces difficulties as the segmentation.

4. ALGORITHM

CNN:

Deep learning refers to a subfield of machine learning that is based on learning levels of representations, corresponding to a hierarchy of features, factors or concepts, where higher-lever concepts are defined from lower-lever ones, and the same lower-lever concepts can help to define many higher-lever concepts. Deep learning is learning multiple levels of representation and abstraction, helps to understand the data such as images, audio and text. The concept of Deep Learning comes from the study of Artificial Neural Network, Multilayer Perceptron which contains more hidden layers is a Deep Learning structure. In the late 1980s, the invention of Back Propagation algorithm used in Artificial Neural Network brings hope to machine learning and creates a trend of machine learning based on statistical models. In the 1990s, a variety of Shallow Learning models have been proposed such as Support Vector Machines (SVM), Boosting, Logistic Regression (LR). The structure of these models can be seen as one hidden node (SVM, Boosting), or no hidden nodes (LR). These models gained a great success both in theoretical analysis and applications. In 2006, Geoffrey Hinton who is the professor of University of Toronto, Canada and the dean of machine learning and his students Ruslan Salakhutdinov published an article in “Science”, led to a trend of machine learning in academia and industry.

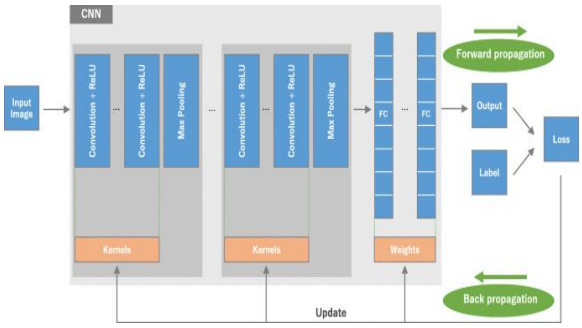

Fig.3: CNN model

CNN is mainly used to identify displacement, zoom and other forms of distorting invariance of two-dimensional graphics. Since the feature detection layer of CNN learns by training data, it avoids explicit feature extraction and implicitly learns from the training data when we use CNN. Furthermore, the neurons in the same feature map plane have the identical weight, so the network can study concurrently. This is a major advantage of the convolution network with respect to the neuronal network connected to each other. Because of the special structure of the CNN's local shared weights makes it have a unique advantage in speech recognition and image processing. Its layout is closer to the actual biological neural network. Shared weights reduces the complexity of the network. In particular multi-dimensional input vector image can directly enter the network, which avoids the complexity of data reconstruction in feature extraction and classification process. Face recognition is a biometric identification technology based on the facial features of persons. The study of face recognition system began in the 1960s, in the late 1980s with the development of computer technology and optical imaging techniques it has been improved; in the late 1990s it truly entered the stages of initial applications. In practical applications, such as monitoring system, the collected face images captured by cameras are often low resolution and with great pose variations. Affected by pose variation and low resolution, the performance of face recognition degrades sharply. And pose variations bring great challenge to face recognition.

5. EXPERIMENTAL RESULTS

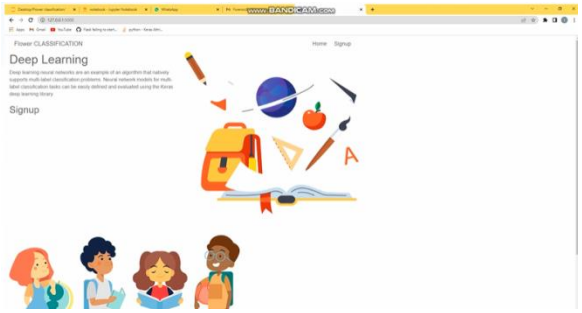

Fig.4: Home screen

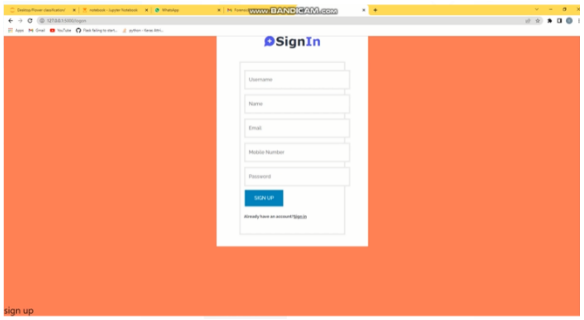

Fig.5: Signup

Fig.6: Signin

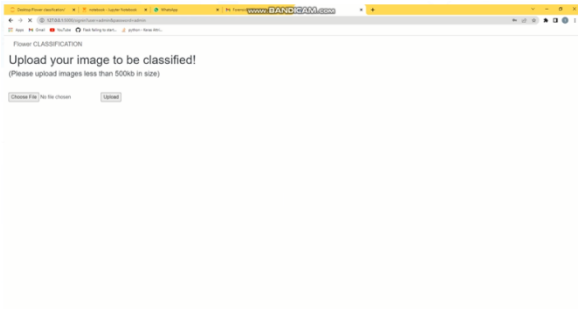

Fig.7: Main screen

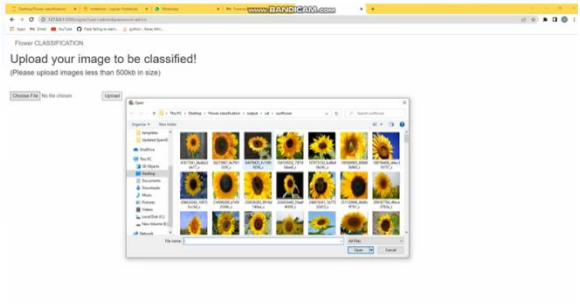

Fig.8: Upload image

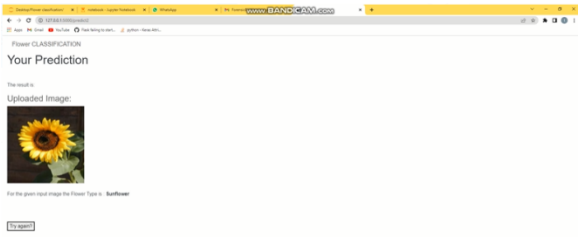

Fig.9: Predicted output

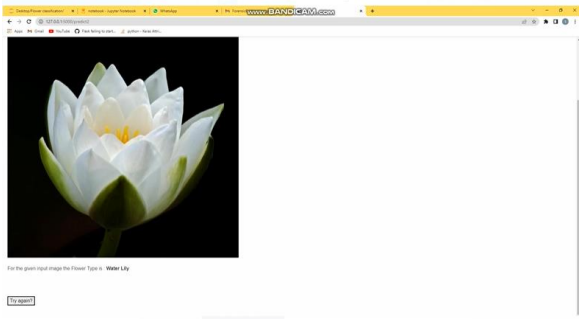

Fig.10: Predicted output

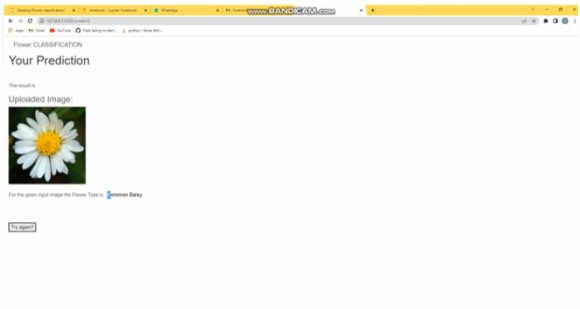

Fig.11: Predicted output

6. CONCLUSION

The question of the total species of flower being known is divided into three parts. First thing is, image characteristics are retrieved from the training dataset using Convolution Neural Network and stored to format HDF5 files. Secondly, the network will be trained using various machine learning classifiers, such as Bagging Tress, Linear Classification Analysis, Gaussian Naive Bayes, K-Nearest Neighbour, Logistic Regression, Decision Tress, Random Forests and Stochastic Gradient Boosting. Finally, the random test images are given to the network for label prediction to assess the accuracy of the device. The software correctly identifies flower species with a Rank of 64.28 using Random Forest as the FLOWERS17 dataset machine learning classifier.

7. FUTURE SCOPE

Future work can be developing the algorithm better segmented techniques. So there is a scope of improvement in the techniques.

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