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A Survey on Deep Learning Approaches For Flower Species Detection

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Abstract: In modern's world , the data is generated on multi-folded and cross platform which can be used to understand and analyse different domains such as Floriculture , Agriculture , Finance etc. In all real time analysis of data where time , money , man-power is playing important roles to measure, pass judgement and react/answer in terms of Floriculture domain because the floriculture cultivation in world are increasing day by day The data generated from analysis which will be in the form of shape , colour , petals , size etc. Flower species and recognition system can provide unique approach for providing flower species analysis which could be a type of clutter of flowers , an area of farm where more flowers having issues like disease , water problem etc. In this process , Lots of data analyse , processed in real tome , provides good level of accuracy , precision , entropy etc. We can use deep learning approaches for detection flower species. This paper provides an overview of several pattern classification and detection mythologies/algorithms in the literature. The objective of the paper having companion with the comparison between different algorithms along with different types of datasets. The main goal is to provide an idea for several methods with different data and to find the many different approaches of the methods used for the detection of flowers using different scenarios

1. INTRODUCTION

Due to advancement in technologies, tools and products , the data has grown on a large scale, The use of information is to find insights and meaning from data with help of different approaches where Deep Learning is one of it where the data is generalized from various sets of examples. One of the approaches used in the use ANN (Artificial Neural Network) uses for complex patterms and prediction problems based on brain as a to develop algorithms. In another approaches using CNN (Convolutional Neural networks) which widely used , efficient recognition algorithms which helps to identify , detect and classify the objects/entities in given field. CNN algorithms approaches designed/implemented with the generalization of samples by performing many features such as simple structure , less training parameters and adaptability. CNN provides various approaches/method to look forward such R-CNN , Fast CNN , YOLO (You Look only once). This approaches as being highly accurate and able to outperform with selective approaches/methods perform the task of detection/identification of flower species. Guru et al. [1] proposed a model that extracting the gray-grade-code co-occurance matrix, color texture moments and gabor descriptors from the flow images for dealing with the flower identification/detection issues. By Dr. S.K.Pattanayak.et.al (2018)[2], this has been observed that Rose, Marigold, Jasmine and Lily are the flower which cultivation is more as compare to Orchids, Carnation, Glardiya from all state of India.

2. RELATED WORK

As the need for processing the data is increased , Researcher/authors have approached/developed the tasks/methodology with multi-dimensional and multi-diverse ways. In case of detection/identification patterns of flower species , the methodologies developed by different researchers and authors got a sight of scalability , performance , reliability of available methods such as RPM(Regional Proposal Network) which can be used to extraction of features from the object using the convolutional network that uses region proposals.

Dhar, Prashenjit et al. with the use of segmentation technique helps in recognition of flower by separating the flower from background easy . In this paper , author proposed a a methodology to organize flower with with help of Local Binary Platform (LBM) and Speed up Robust Features (SURF) as features and SVM as a classifier

With help of active contour segmentation , Segementation of image is completed Local Binary Platform (LBM) and Speed up Robust Features (SURF) features extracted, using this methodology the 87.2% accuracy gained by the system, In this experiment they consider 4 types species (Daffodil , Iris , Daisy and Sunflower). Author concluded

that SURF is an extended version of SIFT algorithms

Santosh Divvala et al, used an approach known as yolo (you look only once) here the method of classification works by splitting the objects as a regression problem where the frame of the input data is split and separated as n*n grids and as detection of the object is done the segregation is performed by determining the class probabilities for each predicted objects

Musa Cibuk et al. automatic flower species classification done with help of DCNN based on hybrid method . It Support the SVM(Support vector machine) for the radial bases function (RBF) classification over the kernel. For selecting features from powers , They used mRMR method. This carried experiment using MatLab using DCNN technology with 90.39% and 85.70% accuracy in flower species detection.

Prabira Kumar et al. they used colour segmentation-based technique used for marigold flower images and the circle fitting algorithms is applied over the flower for counting the circular shapre to get better shape resultant. New algorithms detected and counts the marigold flower with error margin 5% .

Lin Shi et al. in this paper Author sends images to CNN in which the image is measured through the trained set of images by transfer learning based on the inception v3 which based on Tensorflow model of CNN by training the images through supervised learning through the bottleneck layers for 32 categorires of flower images. The error rates of given datasets of 11% to17%

Hutheaifa et al. this paper carried out a flower species recognition techniques using image processing techniques combined with ANN (Artificial Neural Network) . They used 4 stages process like image enhancements , image segmentation, feature extractions and classification process , They achieved 70.89% accuracy in flower species classification.

Shashidhar et al . This paper focus on IRIS flower classification using machine learning with scikit toolkit, The classification of IRIS dataset is discover among the patterns detection from examining petal and sepal size of the IRIS flower.

Ping Lin et al . provided an automatic yield estimation and hardvesting of strawberry flowers with help of help of deep-level objection detection framework. With help of region based convolution neural network (R-CNN) was developed for improving accuracy of detection strawberry flowers in outdoor field.

Xiaoling xia et al. uses the techniques of inception v3 through CNN which is the intial change to the flower extraction and rcognition. It was first paper to describe flowe species using Inception v3 techniques based on dataset oxford -17 and oxford 102

Table 1 - SUMMARIZATION OF SEVERAL METHODS FOR FLOWER SPECIES DETECTION

Method/Dataset	Accuracy Achieved	Output Achieved	Summary	Future Scope
Segmentation Technique – Image Recogintion SVM – Classifier SURF – Feature extraction	87.20%	• Four flower species are measured named as Daffodil, Iris, Daisy, and Sunflower. • SURF is omputationally faster than SIFT	To reduce noisy factor and quality factor from image by author proposed using median filter.	• Number of flower measured in this species is not clear. • Comparison between SIFT algorithm and SURF algorithm not described or mentioned. • More dataset make this clearer to demonstrate the efficiency of the system.

DCNN –image classification SVM for the redial bases functions Flower17 and Flower102	85.70%	• VGG16 produces poor results compare to AlexNet • Flower17 species classification provides result better than Flower102 Species.	AlexNet , VGG16 popular architectire used with A pre-trained model and VGG16	• Better resultant can be achieved with high dataset. • All flower species not recognize and classified which are cultivated in India like Tulip, Lily, Lavender, Jasmine, all species of Rose and marigold.
Jasmine Flower – Quality Detection Mainly focus on colour , shape and texture features	84.69%	• Developed evaluation model based on performance and precision for features , color , textures etc. this helps to detect right shape of flower • Achived accuary of 84.63% in leaves diseases detection	In this experiments different variety of jamine flowers used from different parts of Karnataka including different shape	• The Shaper of flower(full bloomed or bud) is considering in the paper is not clearly describe • Neee better technique will aquire better result in quality detection
Automated algorithm to detect flower region from image and recognize its species , features Dataset (flowers from Jorden)	82%	• The accuracy rate is high for calculating purple and red flowers • Traditional regonition techniques are implemted for fine feature precision	This dataset contains flowers that grow in the Jordanian habitat such as Daisy and Papaver, Iris and Nigricans. Pre-processing was applied to increase the segmentation	• New Machine learning techniques used for the best result • .Flower dataset is not cleared about the capturing techniques, angle, resolution and colour of flower selected. • Only purple flower accuracy is built better as compare to white flower and yellow flowers.
Google's Inception method v3 - Floriculture identification using	77%	• Recognition rate varies a lot from different species of flower due to different shape, colour and no. of petal size. • Best result shown by the Dandelion and the worst rate shown in Rose flower species.	In this work , Data must be pre-processed then it carried out with help of Tensor Flow Convolutional layer along with Transfer Learning	• Better comparison rate among flower is not mentioned with Simple Neural Network, Transfer Learning and combination of both. • . More standard flower set may change the resultant and better transfer Learning methodology improves the recognition of flower.
IRIS Flower classification using Machine learning tool kit Scikit using K-NN Parameter	71%	When the k-NN value with parameter 1 is constructed then the accuracy reach to 67%. When the k-NN value with parameter 5 is constructed, its accuracy	For data driven approach , pattern recognition , computationa approach author used different	• The dataset which build of 150 flower dataset is not clearly describes as whether a standard flower is consider or it captured from the camera • Flower image prediction is

		generated to be 62%. Thus, as the parameter value increases, the accuracy decreases.	machine learnig approaches	not shown in the research paper. • The K-NN methodology comparison with other techniques of machine learning is not described.
Inception V3 through CNN which is the initial change to the flower extraction and recognition the Oxford-I7 flower dataset and Oxford-102 dataset.	81% - Oxford 17 77% - Oxford 102	The flower recognition rate is compare with the older forms of image classification as pattern classification of flower, computer vision , edge detection	This methodology uses the transfer learning technique to retrain the Inception-v model of TensorFlow on the flower dataset.	This technique shows better result as compare to older forms . 3. Accuracy rate in flower images is not shown by the author. 4. Better percentage of classification occurs at which flower species is not describe
Improving Accuracy of Detecting strawberry flowers using (RCNN)	63.4% - RCNN 76.7% - Fast RCNN 76.1- Faster RCNN	Under the bad condiction and situation ,objects considering different features as, size, location, even if strawberry flowers are occluded by foliage, or overlapped	Success rate is very high by applying Faster R-CNN compare to Fast R-CNN and RCNN.	• Traditional R-CNN is very time-consuming method that consumps large space region on hard disk • For regional proposal step , Fast R-CNN is a bottleneck problem •
Method: CNN (Convolutional Neural Network) [6] Dataset: U.S. traffic sign set images	90.82%	Classification of Traffic signal signs	Using CNN, the traffic signs are recognized.	To build an advanced driver assistance system is to achieve real-time traffic sign recognition.
Method: SURF (Speeded-Up Robust Features) [7] Dataset: Vehicle data from Vision- Based Intelligent Environment project	99.07%	Detection of the vehicle along with make and model of vehicle	Using SURF feature extraction of the make and model of the vehicle is done.	
Method: SURF (Speeded-Up Robust Features) [7] Dataset: Vehicle	99.07%	Detection of the vehicle along with make and model of vehicle	Using SURF feature extraction of the make and model of the vehicle is done.	

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data from Vision- Based Intelligent Environment project				
Method: Rapid Learning Algorithm [10] Dataset: MIT CBCL, Caltech Database	95%	Recognition and classification of vehicles.	Using rapid and incremental learning technique classification of vehicles is performed.	
Method: Yolo (you look only once) [13] Dataset: UFPR ALPR	78.3%	Recognition of multiple objects.	Using YOLO architecture recognition of objects and category is performed.	Explore new approaches for CNN to optimize the detection.

3. OBSERVATION

The survery of various approaches provides information about the different scenarios were classification ,and detection of Flowers species is done. Here the segregation of flowers species bsed on their attributes like color , shape , type , location etc. and feature selection the use CNN (Convolutional Neural Network) provides use with classification of images however for detecting multiple objects the classification of images however for detecting multiple objects the method doesn't work. Thus, for the purpose of detecting multiple objects within a given frame, we can use different varients of R-CNN algorithms such as SSD (Single Shot Detector) , YOLO (You Only Look Once) , Fast R-CNN (Regional Convolutional Neural Network), Faster R-CNN (Regional Convolutional Neural Network), Yolo (you look only once) , Region-Based Convolutional Neural Network (R-CNN) , Region-Based Fully Convolutional Network (R-FCN) , Histogram of oriented Graidents(HOG) Each of these has its advantages and disadvantages. As using R-CNN approaches detection of multiple objects is possible however due to the dependency of methods on multiple layers of processing the performance of the detection gets hampered also sometimes for some of the methods the data is parsed multiple times for detection purpose.

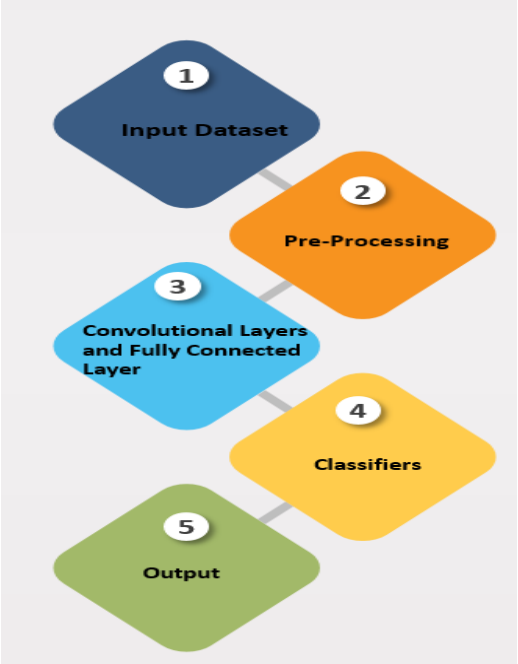

Figure 1- workflow

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The parameters used for the purpose of detection of objects within yolo are as: their confidence values. In yolo the detection of an object is based on certain aspects they are:

(X, Y, H, W, C)

where (X, Y) is the x, y coordinates on an image. ' W' denotes the width of the object. ' H' denotes the height of the object. ' C' denotes the confidence value for the detected object.

The Class of an object and its confidence scores are given as:

P (ObjClass) * P (Obj) * = P(Class)* ….. (1)

In the yolo method, each box creates conditional probabilities for different classes which can be defined as

P (ObjClass | Object) ……. (2)

based on the object present in the grid, the probabilities are defined and conditioned. With the use of the yolo method, only a set of class probabilities are obtained per cell grid. In the yolo method, the confidence is based on the term (IOU) Intersection over union which is given as

P(Obj) * IOU (predicted, truth) ……. (3)

In this, if no object is detected in the cell, then the score of confidence would be zero. Else the confidence score is equal to the intersection over union (IOU) for the predicted box and the ground truth. As yolo uses bounding boxes for the purpose of detecting objects within the divided grids there is a limitation of a number of objects that can be detected. As within a grid if the object size is small the detection becomes a challenge thus to overcome such a scenario there is a need for high quality and clear images.

4. CHALLENGES/ISSUES

For the purpose of recognizing the flower species type the challenges are the diversity of the type of flowers of each catrofy along with the quanity and quality of information that is used to train the model and how well balanced the dataset is to train the model. As the depth and granularity of the training increase , the data need to be that ricj as in the case of the type of flowers detection where flower;s data need to be precisely modelled . Some of other challenges are in the terms of type , color , shape , petals and flower type were based on the different categories the variations of the features. There are also issue related to occulation of flowers in the given frame of relevance, whereas the flower in a given frame becomes smaller the model doesn't recognizite it.

For the purpose of recognizing the vehicle type the challenges are the diversity of the type of vehicles of each category along with the quality of information that is used to train the model and how well balanced the dataset is to train the model. As the depth and granularity of the training increase, the data needs to be that rich as in the case of number plate detection where the number plate data needs to be precisely modeled. Some other challenges are in terms of type, color, the shape of the number plate and vehicle type were based on the different categories the variations of the features. There are also issues related to the occultation of vehicles in the given frame of relevance, whereas the vehicle in a given frame becomes smaller the model doesn't recognize it.

5. CONCLUSION
6.

From the different approaches used for detection of the flower, the use of the intrinsic and non-intinisc approach is observed where a dedicated system is being used to detect the flower species and its properties however the use of a non-intrinsic approach makes the use of the less dependent system and more of a software-based approach. From the survery. We are able to understand the various techniques used and its adventages and dis-adventages and the reason behind the effectiveness of various approaches. The above survey can provide one with the valuable understanding and directions for the approaches used. We have observed how different researchers using different methods outperformed others by evolving the techniques and understanding of various scenarios. Thus, with the rise of more and more computational power, machine learning algorithms will prove to be more beneficial for various classification and detection problems. From the papers discussed, there is a scope of increasing the capability and techniques for the detection of flowers .

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