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Plant Disease Detection using CNN & Remedy

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ABSTRACT:The proposed system helps in identification of plant disease and provides remedies that can be used as a defense mechanism against the disease. The database obtained from the Internet is properly segregated and the different plant species are identified and are renamed to form a proper database then obtain test-database which consists of various plant diseases that are used for checking the accuracy and confidence level of the project .Then using training data we will train our classifier and then output will be predicted with optimum accuracy . We use Convolution Neural Network(CNN) which comprises of different layers which are used for prediction. A prototype drone model is also designed which can be used for live coverage of large agricultural fields to which a high resolution camera is attached and will capture images of the plants which will act as input for the software, based of which the software will tell us whether the plant is healthy or not. With our code and training model we have achieved an accuracy level of 78% .Our software gives us the name of the plant species with its confidence level and also the remedy that can be taken as a cure**.**

KEYWORDS: Convolution neural network, Test-Database ,Accuracy, Confidence.

I.INTRODUCTION

The primary occupation in India is agriculture. India ranks second in the agricultural output worldwide. Here in India, farmers cultivate a great diversity of crops. Various factors such as climatic conditions, soil conditions, various disease, etc affect the production of the crops. The existing method for plants disease detection is simply naked eye observation which requires more man labor, properly equipped laboratories, expensive devices ,etc. And improper disease detection may led to inexperienced pesticide usage that can cause development of long term resistance of the pathogens, reducing the ability of the crop to fight back. The plant disease detection can be done by observing the spot on the leaves of the affected plant. The method we are adopting to detect plant diseases is image processing using Convolution neural network(CNN). The first implementation of the plant disease detection using image processing was done by Shen WeizhegWuyachun Chen Zhanliang and Wi Hangda in their paper[1].

.II. RELATED WORK

Machine learning is a computational way of detecting patterns in a given dataset in order to make inferences in another, similar dataset. A classical textbook example is the machine recognition of handwriting such as postal addresses on envelopes. In recent years, generic object recognition has made tremendous advances, and is now approaching human accuracy. In the paper[1],author Mrunalini represents the technique to classify and identify the different diseasethrough which plants are affected. In Indian Economy a Machine learning based recognition system will prove to be very useful as it saves efforts, money and time too. The approach given in this for feature set extraction is the color co-occurrence method. For automatic detection of diseases in leaves, neural networks are used. The approach proposed can significantly support an accurate detection of leaf, and seems to be important approach, in case of steam, and root diseases, putting fewer efforts in computation. In paper[2] they incorporated all the hybrid features of a leaf color, texture shape (geometric feature) by the respective methodology. PlantVillage: a tool for crop health; an online platform dedicated to crop health and crop diseases, called PlantVillage (available at www.plantvillage.org).The content has been written by plant pathology experts, reflecting information is sourced from the scientific literature.

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However, as the site is targeted directly to food growers, rather the professional plant pathologists, great care has been taken to write the content in a way that is easy to understand. We curate all images into the PlantVillage database using the diagnosis from the experts. Only expertly identified leaves are present in the database. New diseases can occur in places where they were previously unidentified and, inherently, where there is no local expertise to combat them[3-5]. In the paper,various different approaches are currently used for detecting plant diseases and most common are artificial neural networks (ANNs) [6] and Support Vector Machines (SVMs) [7]. They are combined with different methods of image preprocessing in favour of better feature extraction. Implementing the appropriate management strategies like fungicide applications, disease-specific chemical applications, and vector control through pesticide applications could lead to early information on crop health and disease detection. This could facilitate the control of diseases and improve productivity. In the paper[8], authors present review and recognize the demand for developing a rapid, cost-effective, and reliable health-monitoring sensor that facilitates advancements in agriculture.

III.PROPOSED SYSTEM

A.OBJECTIVES:

We can reduce the attack of pests by using proper pesticides and remedies .We can reduce the size of the images by proper size reduction techniques and see to it that the quality is not compromised to a great extent. We can expand the projects of the earlier mentioned authors such that the remedy to the disease is also shown by the system . The main objective is to identify the plant diseases using image processing. It also, after identification of the disease,
suggest the name of pesticide to be used. It also identifies the insects and pests responsible for epidemic. Apart from these parallel objectives, this drone is very time saving. The budget of the model is quite high for low scale farming purposes but will be value for money in large scale farming. It completes each of the process sequentially and hence achieving each of the output.
Thus the main objectives are:
1) To design such system that can detect crop disease and pest accurately.
2) Create database of insecticides for respective pest and disease.
3) To provide remedy for the disease that is detected.

B.FLOWCHART :

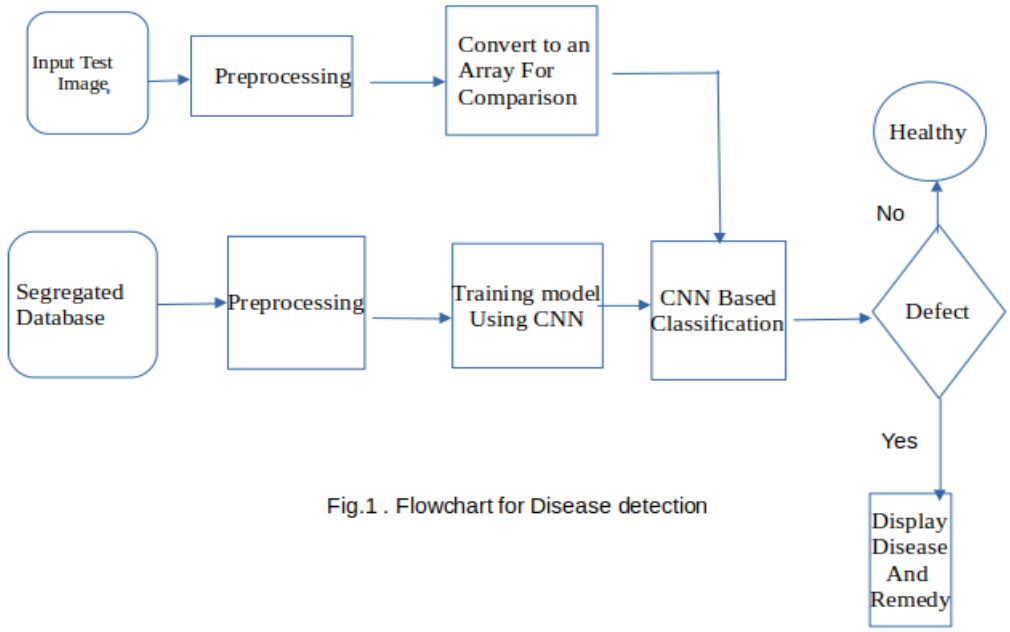

Fig.1 . Flowchart for Disease detection

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General explanation :
1.The input test image is acquired and preprocessed in the next stage and then it is converted into array form for comparison.
2.The selected database is properly segregated and preprocessed and then renamed into proper folders.
3.The model is properly trained using CNN and then classification takes place.
4.The comparison of the test image and the trained model take place followed by the display of the result.
5.If there is a defect or disease in the plant the software displays the disease along with the remedy .

C.METHODOLOGY:
Preprocessing and Training the model (CNN): The database is Preprocessed such as Image reshaping ,resizing and conversion to an array form. Similar processing is also done on the test image. A database consisting of about 32000 different plant species is obtained , out of which any image can be used as a test image for the software. The train database is used to trainthe model (CNN) so that it can identify the test image and the disease it has .CNN has different layers that are Dense, Dropout, Activation, Flatten,Convolution2D, MaxPooling2D. After the model is trained successfully ,the software can identify the disease if the plant species iscontained in the database. After successful training and preprocessing ,comparison of the test image and trained model takes place to predict the disease.

Database collection: Initial step for any image processing based project is acquiring proper database which is valid . Most of the time the standard database is preferred but in certain circumstances we do not get proper database .So in such conditions we can collect the images and can form our own database. The database is accessed from crowdAI which is plant disease classification challenge . Data available here is not labeled .So the first task is to clean and label the database. There is a huge database so basically the images with better resolution and angle are selected . After selection of images we should have deep knowledge about the different leaves and the disease they have. Huge research is done from plantvilllage organization repository. Different types of plant images are studied and corresponding . After detail study, labeling in done by segregating the images and with different diseases

Diseases of different plants database:
• Apple black spot
• Apple broad leaf spot
• Apple needle leaf spot
• Apple normal
• Bell paper normal
• Blueberry normal
• Cherry normal
• Cherry powder normal
• Corn blight
• Corn rust

3.4.REMEDY:
After the disease is successfully predicted with a good confidence level , the corresponding remedy for the disease present is displayed that can be taken as a cure. The different plant diseases and their remedies are shown in the table below:

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Symptoms	Disease	Remedy
Apple black Spot	Botryosphaeria Obtusa	Liquid sulphur,copper
Apple Broad leave spot	Frogeye leave spot	Neem oil
Apple needle leaves spot	ACLSV	Baking soda
Apple normal		
Bell pepper blight	Stem phylium solani	Liquid copper
Cherry powdery mildew	Shothole	Strobilurin,abound
Corn blight /1	Cochliobolus heterostrophus	Insecticidal soap,safe fatty acid
Corn rust	Uredinales	Mancozeb/Triforine
Grape black spot	Guignardia bidwellii	Copper,captan,ferbam
Grape blight	Grape phylloxera	No remedy available yet
Grape rust	Phakopsora Euvities	Microthiol dispress,Kumuls DF
Peach blight	Taphrina Defomans	Burdeaux mixture
Potato black spot	Colletotrichum coccodes	Azoxystrobin
Potato powdery mildew	Golovinomyces Oromti	JMS stylet oil,milstop
Squash powder mildew	Podosphaaera Xanthii	Neem oil
Strawberry rust	Mycosphahaerella fragariae	Tetrahydrophtalimide
Tomato bacterial spot	Xanthomonas Campestris	Sodium Hypochlorite
Tomato early blight	Alternaria Solani	Bacillus Subtilis,Hydroperoxyl
Tomato late blight	Phytophthora Infestance	Actinovate,copper
Tomato powdery mildew	Leveillua taurica	Sesame oil,Rosemary oil
Tomato septorial leaf spot	Septria Lycopersica	Chlorothalonil,macozeb
Tomato spider mite	Tetranychus	Horticultural oil,Insecticidal soap
Tomato target spot	Corynespora cassicola	Cholorothalonil,macozeb
Tomato yellow leaf curl	Begomo virus	Dinotefuran imidacopid

Table 1:Plant Diseases and their Remedies

IV.RESULTS

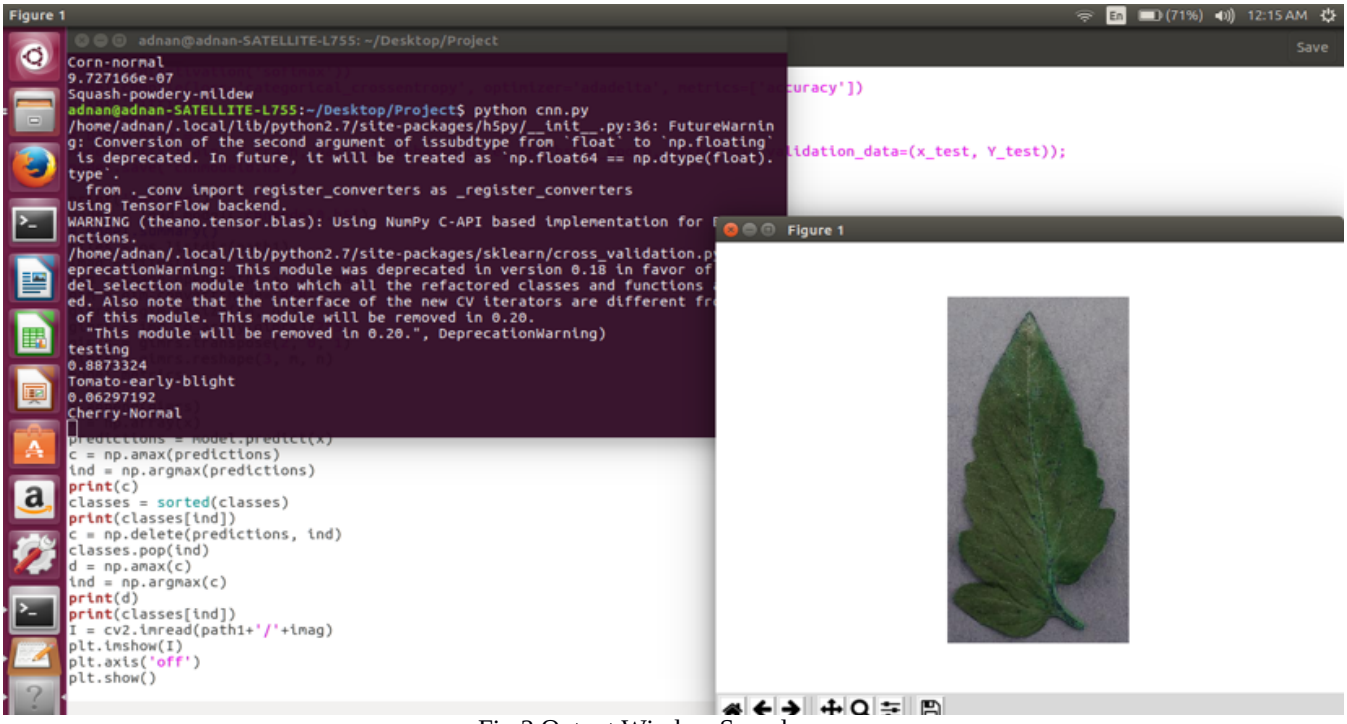

Fig 2.Output Window Sample

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V.CONCLUSIONS

The proposed system was developed taking in mind the benefits of the farmers and agricultural sector .The developed system can detect disease in plant and also provide the remedy that can be taken against the disease. By proper knowledge of the disease and the remedy can be taken for improving the health of the plant .The proposed system is based on python and gives an accuracy of around 78%.The accuracy and the speed can be increased by use of Googles GPU for processing . The system can be installed on Drones so that aerial survaillances of crop fields can be done.

REFERENCES

1. Mrunalini R. et al., An application of K-means clustering and artificial intelligence in pattern recognition for crop diseases ,2011.
2. S.Raj Kumar , S.Sowrirajan," Automatic Leaf Disease Detection and Classification using Hybrid Features and Supervised Classifier", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, vol. 5, Issue 6,2016..
3. Tatem, D. J. Rogers, and S. I. Hay, "Global transport networks and infectious disease spread," Advances in Parasitology, vol. 62, pp. 293–343, 2006. View at Publisher · View at Google Scholar · View at Scopus.
4. J. R. Rohr, T. R. Raffel, J. M. Romansic, H. McCallum, and P. J. Hudson, "Evaluating the links between climate, disease spread, and amphibian declines," Proceedings of the National Academy of Sciences of the United States of America, vol. 105, no. 45, pp. 17436–17441, 2008. View at Publisher · View at Google Scholar · View at Scopus.
5. T. Van der Zwet, "Present worldwide distribution of fire blight," in Proceedings of the 9th International Workshop on Fire Blight, vol. 590, Napier, New Zealand, October 2001.
6. H. Cartwright, Ed., Artificial Neural Networks, Humana Press, 2015.
7. Steinwart and A. Christmann, Support Vector Machines, Springer Science & Business Media, New York, NY, USA, 2008. View at MathSciNet.
8. Steinwart and A. Christmann, Support Vector Machines, Springer Science & Business Media, New York, NY, USA, 2008. View at MathSciNet.
9. S. Sankaran, A. Mishra, R. Ehsani, and C. Davis, "A review of advanced techniques for detecting plant diseases," Computers and Electronics in Agriculture, vol. 72, no. 1, pp. 1–13, 2010. View at Publisher ·View at Google Scholar · View at Scopus.
10. P. R. Reddy, S. N. Divya, and R. Vijayalakshmi, "Plant disease detection techniquetool—a theoretical approach," International Journal of Innovative Technology and Research, pp. 91–93, 2015. View at Google Scholar.
11. A.-K. Mahlein, T. Rumpf, P. Welke et al., "Development of spectral indices for detecting and identifying plant diseases," Remote Sensing of Environment, vol. 128, pp. 21–30, 2013. View at Publisher · View at Google Scholar · View at Scopus.