MAIZE LEAF DISEASES DETECTION AND YIELD PREDICTION USING DEEP NEURAL NETWORKS

[1]Shraddha, [2]Dr.K.R.Shailaja
[2]Associate Professor in computer science department,
Dr. Ambedkar Institute of Technology Bangalore, India.

***Abstract*---Agriculture is one subject which has a excessive effect on existence and financial fame of human beings. Improper control ends in loss in agricultural products. Farmers lack the expertise of disorder and for this reason they produce much less production. Kisan name facilities are to be had however do now no longer provide provider 24*7 and on occasion conversation too fail. Farmers are not able to give an explanation for disorder well on name want to evaluation the photograph of affected vicinity of disorder. Identification of the plant sicknesses is the important thing to stopping the losses withinside the yield and amount of the rural product. The research of the maze leaf sicknesses suggest the research of visually observable styles visible at the maze leaf. Due to the development and improvement in era wherein gadgets are clever sufficient to understand and locate plant sicknesses. Recognizing infection can spark off quicker remedy which will reduce the terrible affects on harvest. This paper consequently cognizance upon maze leaf disorder detection the usage of photograph processing approach.This paintings makes use of an open dataset of 5000 snap shots of bad and solid plants, wherein convolution machine and semi supervised strategies are used to symbolize crop species and locate the illness fame of four wonderful classes.**

I. INDRODUCTION

India is a cultivated us of a and approximately 70% of the populace relies upon on agriculture. Farmers have massive variety of range for deciding on numerous appropriate plants and locating the correct insecticides for plant. Disease on plant ends in the full-size discount in each the first-class and amount of agricultural products. The research of plant sickness talk over with the research of visually observable styles at the plants. The photo processing strategies may be used withinside the plant sickness detection. In maximum of the instances sickness signs are visible at the leaves, stem and fruit. The plant leaf for the detection of sickness is taken into consideration which suggests the sickness signs.

Different disorders emerge in exceptional components of the plant might be perceived with the guide of utilizing watching the other in signs, spots, conceal and so on The considerably less time ingesting and computerized visualization technique is the basic necessity in agribusiness to upgrade the harvest fabricating rate. As of late, photograph preparing strategies had been utilized to clear up the exceptional issues basically dependent on farming bundles need to go over ailment leaf, stem, and organic product [1-2]. Leaf ailment seriousness measurement and identification the usage of photo strategy had recommended with the help of exploitation one among a sort analysts [3-6]. Maize is a fundamental nourishments and feed crop. Its plant zone and standard yield are the fundamental crucial withinside the worldwide aside from rice and wheat [1]. Nonetheless, in cutting edge years, the inconstancy of types of maize sicknesses and furthermore the confirmation of harm they purpose have expanded, pretty owing to changes in development frameworks, the model of microorganism assortments, and snappy of plant insurance measures.

Figure1: Healthy leaf, Rust and Gray leaf spot

Maize leaf maladies have severa side effects and manifestations. It are routinely better depleting for unpracticed ranchers to analyze diseases than for taught plant pathologists [7]. As a check gismo in malady diagnostics, a computerized gadget this can be intended to find plant diseases by strategy of capacity of the plant's show up and obvious manifestations and signs and side effects is moreover of magnificent guide to ranchers. various endeavors had been dispensed to the snappy and ideal assessment of leaf disorders. By the use of computerized picture way procedures, help vector registering gadget (SVM), neural organizations and absolutely unique systems, we will find and characterize leaf ailments [8-13]. A SVM - all} totally multi - classifier come to be conscious by method of proposes that of Song et al. [8] and end up dispensed to find a total load of maize leaf infections. The excellent good precision develop to be 89.6%. The methodology of classification the use of SVM is handiest appropriate to little examples, for a huge assortment of tests, it can not accomplish extreme notoriety exactness. Chen and Wang [9] proposed a methodology for the distinguishing proof of maize leaf ailments specifically fundamentally dependent on photo technique time and a probabilistic neural network (PNN). The fine notoriety exactness of this strategy end up 90.4%. Notwithstanding, for the PNN

classifier, the ID exactness and charge of this technique diminishes as an outcome of the shift of tutoring tests increments. A procedure of maize leaf sickness recognizable proof all} totally on adjustive weight multi-classifier combination end up being intentional through methodology of capability of Xu et al. [10]. Seven no longer unusualplace sorts of maize leaf infection are inspected by utilizing method of capability of this methodology. The successive incredible charge come to be 94.71%. Wang et al. [11] Zhao et al. [12] and Zhang [13] proposed various procedures the use of advanced picture way strategies predominantly basically dependent on Fisher discriminant, Retinex set of approaches mixed with significant part assessment (PCA) and SVM, and quantum neural network (DNN) and blend highlights for distinguishing proof of maize leaf problem. the most extreme top notch precision of these assessment rise as 95.3%, anyway less maize ailments are disturbed in these strategies. totally exceptional methods are wont to discover maize diseases [8-13], the five star acknowledgment precision end up being 95.3%, which may moreover not, at this point meet the forefront wants for extreme acknowledgment exactness. In this way, withinside the conform to - up study, we tend to need to discernment while in transit to strengthen the distinguishing proof precision.

II. PROPOSED METHOD

Maize, Zea mays, ought to be a yearly grass withinside the individual hover of family unit Graminaceae and is a staple nourishments crop completely mature all round the world. The maize plant has a simple stem of hubs and fragments. A blend of large leaves reach out off of each internode and therefore the leaves standard 8–21 in sync with plant. The leaves are straight or unsubdivided (spear like) with an obvious midvein (number one vein) and may likewise reinforce from thirty to 1 hundred cm (11.8–39.four in) long. The male and female inflorescences (bloom bearing region of the plant) are situated one when the opposite at the plant. The male inflorescence is alluded to as the 'tuft' at the indistinguishable time as the young lady inflorescence is the 'ear'.The ear of the maize is an altered spike and there can be 1–three ordinary with plant. The maize grains, or 'pieces', are encased in husks and standard 30–a thousand steady with ear. The parts may likewise be white, yellow, red, purple or dark. Maize is a yearly plant, making due for handiest one developing season and would perhaps increase 2–three m (7–10 ft) in tallness. Maize can furthermore be known as corn or Indian corn and is accepted to begin from Mexico and Central America. The enter picture accepted recognized as investigate photo, preprocessing can be done the utilization of k-way grouping and resizing of photo.

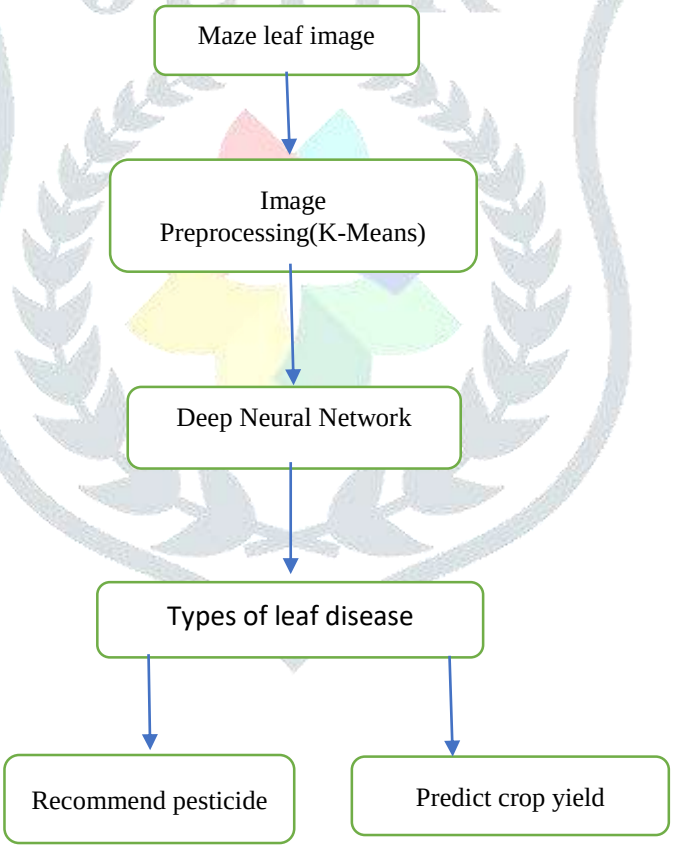

Figure 2: Flow Chart depicting overview of the process

This paper placed forth a version that's used to educate DNN that allows you to become aware of leaf disease. Tenser glide, an open supply library is used to perform numerical computations in neural networks along side facts glide graphs. Nodes constitute mathematical operations at the same time as graph edges constitute multidimensional facts arrays. Deep neural community in system gaining knowledge of is a form of synthetic neural community wherein neurons are related in a sample this is inspired with the aid of using the corporation of animal visible cortex. Receptive discipline which takes place to be restrained vicinity of area is the area in which character cortical neurons reply to stimuli. Different neurons withinside the respective fields partly overlap that allows you to tile the visible discipline. Individual neurons react to the stimuli inside its discipline.

A. Machine Learning

Machine Learning (ML) is essentially that area of pc technology with the assist of which pc structures can offer feel to statistics in a good deal the equal manner as people do. In easy words, ML is a kind of synthetic intelligence that extract styles out of uncooked statistics through the use of an set of rules or method. The key recognition of ML is to permit pc structures to study from enjoy with

out being explicitly programmed or human intervention**.**

B. Deep Neural Network

A deep neural community is a neural community with a positive degree of complexity, a neural community with extra than layers. Deep neural networks use state- of-the-art mathematical modeling to system statistics in complicated ways. (a) Input Layer: the schooling statistics set normally given on this layer, the range of nodes of this deposit relies upon at the statistics withinside the schooling set.In this paper, the vicinity of white pixels withinside the X-ray photograph is given as a enter schooling statistics set. (b) Hidden layer: the accuracy of the community relies upon upon the range of nodes withinside the hidden layer. (c) Output layer:the range of nodes on this layer relies upon upon the range of statistics withinside the target. In this paper, the patient's age and blood calcium degree are set as a target. Aneural community, in general, is a generation constructed to simulate the hobby of the human brain – specifically, sample popularity and the passage of enter via numerous layers of simulated neural connections.

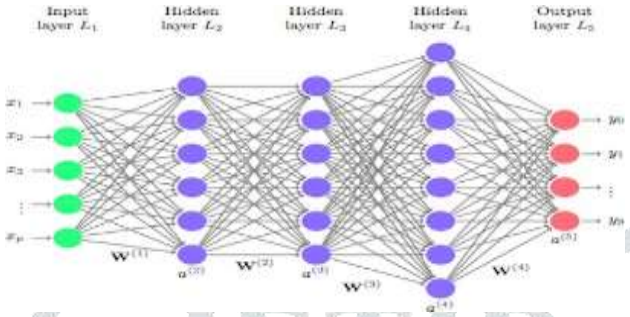

Figure 3: Deep Neural Network Layers

III. RESULT

Figure 4: Input image vs segmented Image

```
---------------------------------Results---------------------------------

Fertilizer Requirement (kg/acre)
-----------------------------------
['UREA \tDAP OR  SSP \tMURIATE OF POTASH \tZINC']
-----------------------------------------------------------------------


['155 \t55      150 \t      20 \t          0']
-----------------------------------------------------------------------


Yield 10 to 20 quintals( 100kg per 1 quintals ) per acre.
 With hybrids we can get yield up to 40 quintals per acre
Given Input images is Corn_Common_rust
-----------------------------------------------------------------------


Seed treatment with Metalaxyl86 gm/kg of seeds.
 Remove infected plant and destroyed away from the field.
 Spray with Metalaxyl81 gm/Ltr or Metalaxyl + Mancozeb@ 2.5 gm/Ltr of water.
Afferected Area is =8545  Pixels
Afferected Area in Percentage =13.496398592578125 %
```

Figure 5: Testing Ouput

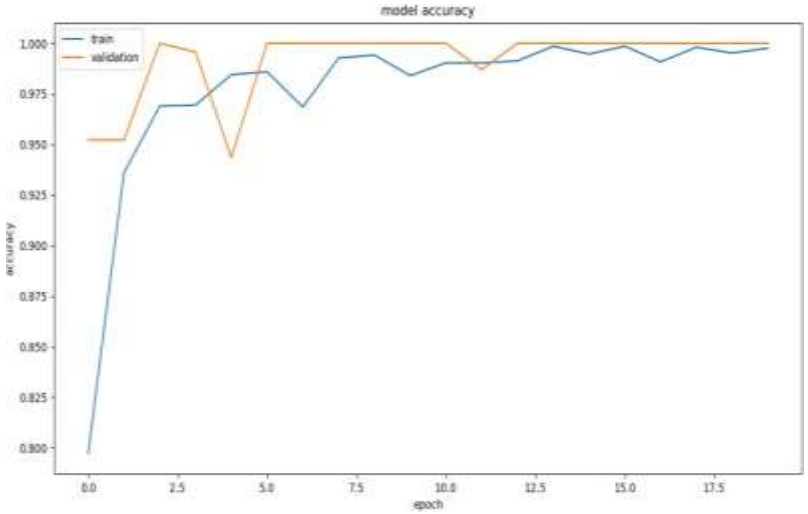

Figure 6: Experimental Results of identify the best learning rate value for DNN model in Maze leaf images dataset.

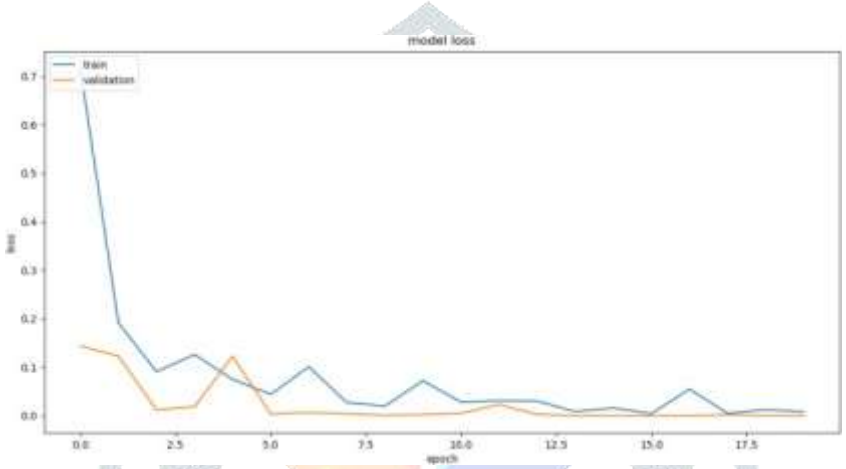

Figure 7: Experimental Results shows the loss value for DNN model.

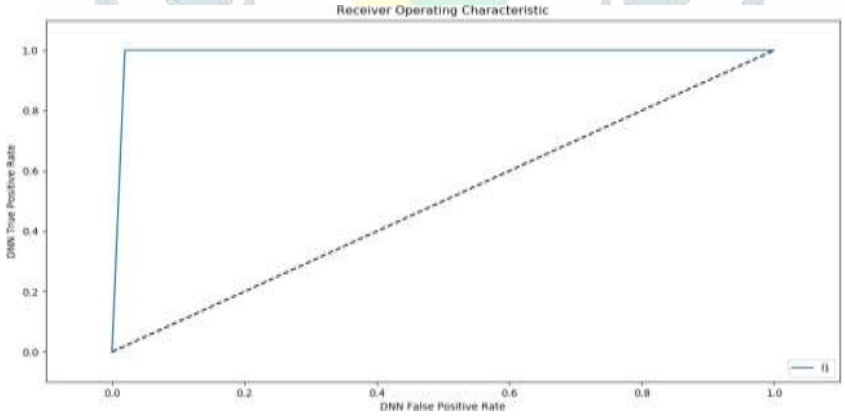

Figure 8: Experimental Results shows True positive vs False Positive Rate of learning rate value for DNN model in Maze leaf images dataset.

CNN confusion matrics:

[[101 0 2]

[0 239 0]

[1 0 232]]

SB_CNN accuracy= 99.47826086956522

DNN confusion matrics:

[[101 1 1]

[0 239 0]

[0 0 233]]

DNN accuracy= 99.65217391304347

IV. CONCLUSION

In this paper, it's been concluded that maze leaf ailment detection is the green era for the ailment detection withinside the maze leafs. The maze ailment detection strategies include not unusualplace 3 steps which can be pre- processing, segmentation and type. In the current instances diverse strategies has been proposed for the plant ailment detection which can be primarily based totally on those 3 steps. Image segmentation is completed utilising K approach clustering to differentiate the inflamed districts zone. Then photograph is feed to are then applied for characterization into wholesome or ailment affected type. Exploratory after outcomes of type through utilising DNN classifier to categorise statistics into greater than instructions demonstrate.

REFFRENCE

[1] G. Savita, A. Parul, "Detection and classification of plant leaf diseases using image processing techniques: a review," Int. J. Recent Adv. Eng. Technol., vol. 2, pp. 2347–812, 2014.

[2] S. B. Dhaygude, N. P. Kumbhar, "Agricultural plant leaf disease detection using image processing," Int. J. Adv. Res. Electr. Electron. Instrum. Eng., vol. 2, pp. 599-602, Jan. 2013.

[3] S. B. Patil, and S. K. Bodhe, "Leaf disease severity measurement using image processing," Int. J. Eng. Technol., vol. 3, pp. 297–301, Oct. 2011.

[4] P. Chaudhary, and A. K. Chaudhary, A.

N. Cheeran and S. Godara, "Color transform based approach for disease spot detection on plant leaf," Int. Comput. Sci. Telecommun., vol. 3, pp. 65-71, June 2012.

[5] S. Bashir, and N. Sharma, "Remote area plant disease detection using image processing," IOSR J. Electron. Commun. Eng., vol. 2, pp. 31-35, Sep. 2012.

[6] S. Naikwadi, and N. Amoda, "Advances in image processing for detection of plant diseases," Int. J. Appl. Innov. Eng. Manage," vol. 2, pp.168-176, Nov. 2013.

[7] S. A. Miller, F. D. Beed, C. L. Harmon, "Plant Disease Diagnostic Capabilities and Networks," Annual Review of Phytopathology, vol. 47, no. 1, pp. 15-38, Sep. 2009.

[8] K. Song, X. Y. Sun, J. W. Ji, "Corn leaf disease recognition based on support vector machine method," Transactions of the Chinese Society of Agricultural Engineering, vol. 23, no. 1, pp. 155-157, Jan. 2007.

[9] L. Chen, L. Y. Wang, "Research on application of probability neural network in maize leaf disease identification," Journal of Agricultural Mechanization Research, vol. 33, no. 6, pp. 145-148, Jun. 2011.

[10] L. F. Xu, X. B. Xu, H. Min, "Corn leaf disease identification based on multiple classifiers fusion," Transactions of the Chinese Society of Agricultural Engineering, vol. 31, no. 14, pp. 194-201, Jul. 2015.

[11] N. Wang, K. R. Wang, R. Z. Xie, J. C. Lai, B. Ming and S. K. Li, "Maize leaf disease identification based on fisher discrimination analysis," Scientia Agricultura Sinica, vol. 42, no. 11, pp. 3836- 3842, Nov. 2009.

[12] Z. Qi, Z. H. Jiang, C. H. Yang, L. Z. Liu and Y. Rao, "Identification of maize leaf diseases based on image technology," Journal of Anhui Agricultural University, vol. 43, no. 2, pp. 325-330, Feb. 2016.