

A Review on Plant Disease Detection Using Machine Learning Algorithm

Anandita Mishra¹, Dr.Raju Barskar² and Prof. Uday chourasia³

¹CSE Department, University institute of technology RGPV, Bhopal, India, ananditaofficial14@gmail.com

²CSE Department, University institute of technology RGPV, Bhopal, India, raju_barskar53@rediffmail.com

³CSE Department, University institute of technology RGPV, Bhopal, India, uday_chourasia@rediffmail.com

³CSE Department, University institute of technology RGPV, Bhopal, India, uday_chourasia@rediffmail.com

Abstract

This paper reviews Plant Disease Detection. The agriculture sector plays an essential role because of the rapid growth of the population and the increase in demand for food. Therefore, it needs to increase in crop yield. One major effect on low crop yield is a disease caused by bacteria, viruses, and fungus. It can be prevented by using plant disease detection techniques. Machine learning methods can be used for diseases identification because it mainly apply on data themselves and gives priority to outcomes of certain task.

Keywords— Plant disease detection; Classification; Machine Learning.

INTRODUCTION

Agricultural is the backbone of any country's economy. Many farmers want to adopt modern agriculture but they can't due to the several reasons like lack of awareness about latest technology, high cost of the technology etc. The agriculture industries started searching new methods to increase production of food because of increasing population, changes in weather and instability in politics. This makes researchers to search new efficient and precise technologies for high productivity. Disease identification in plant is most important in successful farming system. In general, a farmer recognizes the symptoms of disease in plants by using naked eye observations and this requires continuous monitoring. However, this process is more expensive in large plantations and sometimes this may be less accurate. [1]. In recent years, Machine learning based techniques have good performance in many image processing applications [2]. There are different types of diseases which exist in the plants like fungal, bacterial, viral etc. It has been found 85% plants are affected by fungal like organisms [3].

RELATED WORK

Table 1: Comparisons of Various Machine Learning Techniques.

Name of the author	Image dataset name	Types of disease detected	Future research direction
[4]	Own Dataset	DownMildew, Early Blight, Mosaic Virus, Leaf Miner, White Fly	this research algorithm may apply on huge dataset
[5]	Training dataset	Anthracoise , Areolate or Greymildew , Wilt	Future work on building an Android Application
[6]	Kaggle dataset	Anthracoise, Black spot, Canker, Melanose, Greening, Citrus Scab	Up gradation within the classification precision
[7]	Arkansas Reddit-plant datasets	Anthracoise, Bacterial Blight, Leaf Spot, Canker, Alternaria Alternata	For perfection of classification NN can be used.
[8]	plant village	Balck-Rot, Esca, Leaf Blight.	Accuracy may increase with deep learning .
[9]	PlantVillage	Corn Gray Leaf Spot, Corn Common Rust , Corn Nothern Leaf Blight	To study hybrid features
[10]	Own training Dataset	Papaya leaf diseases	Combination of local and global features can give better result
[11]	self dataset creation	powdery mildew, tan Spot, pink snow mold,	for other plants this method can be applied
[12]	Own dataset	Cotton leaf diseases	Adding more hidden layer
[13]	Back spread is used to preparing database	General plant disease	back propagation calculations may added for further accuracy
[14]	Collected form Buldhana district appx. 900 images	Bacterial Blight ,Alternaria Cerespora ,Grey Mildew Fusarium Wilt	Accuracy may increase with deep learning .
[15]	data set consists of 300 images	Rice Blast Disease	Performance will check with large database
[16]	Collected Dindori in Nashik district 900 appx.	Antharcnose, Powdery Mildew and Downy Mildew.	RF is best accuracy for GLCM features others techniques can be tested in future
[17]	Own dataset	Stem diseases	Disease detection in jute plant

SVM Classifier

SVM Classifier is supervised learning method in Machine learning here analysed data is used for classification. The following authors used SVM Classifier in disease detection of different crops. The experimental result obtained 95% of genuine acceptance rate [18].

ANN Classifier

Artificial Neural Network is computational model in machine learning and pattern recognition. Related work on Plant disease detection using ANN classifier as follows. [19] Evaluated a

proposed work for recognition of plant diseases using feed forward back propagation algorithm and it performed well with a precision of around 93%.

Deep Learning

Deep learning is a different learning method in ANN and also a part of machine learning methods. [20] Proposed a model to detect healthy leaves and 13 different diseased leaves of peach, cherry, pear, Apple and Grapevine using CNN classification technique. More than 30000 images used in dataset, achieved accuracy between 91% and 98% for separate class test and average accuracy 96.3%.

CONCLUSION

In this Survey we discussed traditional methodology, machine learning and deep learning techniques for plant disease detection and classification. We discussed the basics of plant diseases, different methodology of plant disease detection, classification and comparisons of various techniques. In the field of plant agriculture, hundreds of diseases are exist. Among all those diseases we can be classified into three main categories: bacterial, viral, fungal. In future, classification techniques in machine learning like decision trees, Naïve Bayes classifier may be used for disease detection in plants and in the sense of helping farmer an automatic detection of all types of diseases in crop to be detected.

REFERENCES

1. Balakrishna, K., & Rao, M. (2019). Tomato plant leaves disease classification using KNN and PNN. *International Journal of Computer Vision and Image Processing (IJCVIP)*, 9(1), 51-63.
2. Nazki, H., Yoon, S., Fuentes, A., & Park, D. S. (2020). Unsupervised image translation using adversarial networks for improved plant disease recognition. *Computers and Electronics in Agriculture*, 168, 105117.
3. Rezende, V.C., Costa, M., Santos, A. and de Oliveira, R.C., 2019, October. Image Processing with Convolutional Neural Networks for Classification of Plant Diseases. In 2019 8th Brazilian Conference on Intelligent Systems (BRACIS) (pp. 705-710). IEEE.
4. Tulshan, A.S. and Raul, N., 2019, July. Plant Leaf Disease Detection using Machine Learning. In 2019 10th International Conference on Computing, Communication and Networking Technologies (ICCCNT) (pp. 1-6). IEEE.
5. Chopda, J., Raveshiya, H., Nakum, S., & Nakrani, V. (2018, January). Cotton Crop Disease Detection using Decision Tree Classifier. In 2018 International Conference on Smart City and Emerging Technology (ICSCET) (pp. 1-5). IEEE.
6. Doh, B., Zhang, D., Shen, Y., Hussain, F., Doh, R.F., & Ayepah, K. (2019, September). Automatic Citrus Fruit Disease Detection by Phenotyping Using Machine Learning. In

- 2019 25th International Conference on Automation and Computing (ICAC) (pp. 1-5). IEEE.
7. Hossain, E., Hossain, M. F., & Rahaman, M. A. (2019, February). A color and texture based approach for the detection and classification of plant leaf disease using KNN classifier. In 2019 International Conference on Electrical, Computer and Communication Engineering (ECCE) (pp. 1-6). IEEE.
 8. Jaisakthi, S.M., Mirunalini, P. and Thenmozhi, D., 2019, February. Grape Leaf Disease Identification using Machine Learning Techniques. In 2019 International Conference on Computational Intelligence in Data Science (ICCIDS) (pp. 1-6). IEEE.
 9. Kusumo, B. S., Heryana, A., Mahendra, O., & Pardede, H. F. (2018). Machine learning-based for automatic detection of corn-plant diseases using image processing. In 2018 International Conference on Computer, Control, Informatics and its Applications (IC3INA) (pp. 93-97). IEEE.
 10. Ramesh, S. (2018, September). Rice Blast Disease Detection and Classification Using Machine Learning Algorithm. In 2018 2nd International Conference on Micro-Electronics and Telecommunication Engineering (ICMETE) (pp. 255- 259). IEEE.
 11. Nema, S., & Dixit, A. (2018). Wheat Leaf Detection and Prevention Using Support Vector Machine. In 2018 International Conference on Circuits and Systems in Digital Enterprise Technology (ICCSDET) (pp. 1-5). IEEE.
 12. Shah, N., & Jain, S. (2019, February). Detection of Disease in Cotton Leaf using Artificial Neural Network. In 2019 Amity International Conference on Artificial Intelligence (AICAI) (pp. 473-476). IEEE.
 13. Sehgal, A., & Mathur, S. (2019, June). Plant Disease Classification Using SOFT COMPUTING Supervised Machine Learning. In 2019 3rd International conference on Electronics, Communication and Aerospace Technology (ICECA) (pp. 75-80). IEEE.
 14. Wang, G., Sun, Y., & Wang, J. (2017). Automatic image-based plant disease severity estimation using deep learning. Computational intelligence and neuroscience.
 15. Ramesh, S. (2018, September). Rice Blast Disease Detection and Classification Using Machine Learning Algorithm. In 2018 2nd International Conference on Micro-Electronics and Telecommunication Engineering (ICMETE) (pp. 255-259). IEEE.
 16. Pantazi, X. E., Moshou, D., Tamouridou, A. A., & Kasderidis, S. (2016, September). Leaf disease recognition in vine plants based on local binary patterns and one class support vector machines. In IFIP International Conference on Artificial Intelligence Applications and Innovations (pp. 319-327). Springer, Cham.
 17. Reza, Z. N., Nuzhat, F., Mahsa, N. A., & Ali, M. H. (2016, September). Detecting jute plant disease using image processing and machine learning. In 2016 3rd International Conference on Electrical Engineering and Information Communication Technology (ICEEICT) (pp. 1-6). IEEE.



18. Kiran R. Gavhale, Ujwalla Gawande and Kamal O. Hajari, “Unhealthy region of citrus leaf detection using image processing techniques”, IEEE International Conference on Convergence of Technology (I2CT), Pune 2014, pp. 1-6.
19. Dheeb Al Bashish, Malik Braik and Sulieman Bani- Ahmad, “A Framework for Detection and Classification of Plant Leaf and Stem Diseases”, IEEE International Conference on Signal and Image Processing (ICSIP), Chennai 2010, pp. 113-118.
20. Srdjan Sladojevic, Marko Arsenovic, Andras Anderla, Dubravko Culibrk and Darko Stefa-novic, “Deep Neural Networks Based Recognition of Plant Diseases by Leaf Image Classification”, Computational Intelligence and Neuroscience, Article ID 3289801, 2016.