DISEASE IDENTIFICATION IN PLANTS USING DEEP LEARNING METHODS

In India about 70% of the population relies on agriculture. It has become significantly more important to feed the steadily growing population. A plant disease is a change of the original state of the plant that affects or modifies its vital functions. It is mainly caused by bacteria, fungi, microscopic animals or viruses, and has a strong impact on agricultural yields and on farm budget. According to the Food and Agriculture Organization of the United Nations, transboundary plant diseases have increased significantly in recent years due to globalization, trade, climate change and the reduction in the resilience of production systems due to decades of agricultural intensification. The risk of transboundary epidemics is increasing and can cause huge losses in crops, threatening the livelihoods of vulnerable farmers and the food and nutritional security of millions of people. Early detection of disease symptoms is one of the main challenges in protecting crops and limiting epidemics. Plant diseases affect the livelihood of this imperative source more. It results in depletion of production and economic losses in agriculture. It is mandatory to protect and control the crops losses in order to aggregate the agricultural productions. Using agronomists, the traditional method, takes a lot of time to continuously observe the crops and moreover finding an agronomist in rural areas is also very challenging. Therefore, developing a system which can use visible or noticeable symptoms to identify and distinguish plant disease habitually to offer appropriate support will unquestionably help all the farmers to reduce crop losses and will increase production. Computer vision is a form of artificial intelligence (AI) that involves using computers to understand and identify diseases in plants. It also helps in increasing the accuracy of disease protection in plants, making it easy to have food security. One of the areas that computer vision has helped most is the detection of the severity of the diseases.

Machine learning is a sub part of artificial intelligence which works automatically or give instructions to do a particular task. Machine Learning (DL), a part of the computer vision, is useful and promising in determining the severity of diseases in plants and animals [2]. It is also used to classify diseases and avoid the late detection of diseases [1]. The main aim of machine learning is to understand the training data and fit that training data into models that should be useful to the people. So it can assist in good decisions making and predicting the correct output using the large amount of training data. The color of leaves, amount of damage to leaves, area of the leaf, texture parameters are used for classification. Hence, image processing and machine learning models can be employed for the detection of plant diseases. The use of computer vision (CV) and machine learning (ML) could improve the detection and fighting of diseases. ML is meant for parsing the data and learning from it. Based on the requirement they applied to get the decision. Several algorithms were developed to address the various tasks of classification, clustering, association rule mining, outlier detection, and so on.

In agribusiness research, ML procedures are on a very basic level used to recognize, perceive, and anticipate crop diseases and plant pressure phenotyping. Many Machine Learning (ML) models have been employed for the detection and classification of plant diseases but, after the advancements in Deep Learning (DL), a subset of ML, appears to have great potential in terms of increased accuracy. Many developed/modified DL architectures are implemented along with several visualization techniques to detect and classify the symptoms of plant diseases. This Deep learning has recently attracted a lot of attention with the aim to develop a quick, automatic and accurate.

Unlike unmistakable confirmation of grains subject to genomics data, ML procedures in plant disease research are significantly dependent on motorized stages, for instance, raised vehicles and ground robots with sensors to assemble steady data from fields