**Potato Disease Detection Using Machine Learning**

**ABSTRACT:**

In Bangladesh potato is one of the major crops. Potato cultivation has been very popular in Bangladesh for the last few decades. But potato production is being hampered due to some diseases which are increasing the cost of farmers in potato production. However, some potato diseases are hampering potato production that is increasing the cost of farmers. Which is disrupting the life of the farmer. An automated and rapid disease detection process to increase potato production and digitize the system. Our main goal is to diagnose potato disease using leaf pictures that we are going to do through advanced machine learning technology. This paper offers a picture that is processing and machine learning based automated systems potato leaf diseases will be identified and classified. Image processing is the best solution for detecting and analyzing these diseases. In this analysis, picture division is done more than 2034 pictures of unhealthy potato and potato's leaf, which is taken from openly accessible plant town information base and a few preprepared models are utilized for acknowledgment and characterization of sick and sound leaves. Among them, the program predicts with an accuracy of 99.23% in testing with 25% test data and 75% train data. Our output has shown that machine learning exceeds all existing tasks in potato disease detection.

**EXISTING SYSTEM:**

* F. T. Pinki et.al. dealt with the order of three basic paddy leaf sicknesses ( Leaf impact, Brown spot, and Bacterial curse) and taught manures or pesticides k-implies grouping is utilized for the division of the illness affected part and Visual substance are utilized as highlights during this framework. At that point Support, vector machine classifier does the characterization cycle. The general precision is 92.06%.
* The system proposed by Yao et.al., is aimed at identifying and classifying three types of rice crop damage. In his figure the diseased regions are isolated using the Otsu’s method, then divided. The first picks up the tone, shape and surface features, and the second came from HSV shading space. And finally, the properties are submitted to the vector machine, which classifies in last word.
* U. Kumari et.al, has utilized a methodology of picture Segmentation during which they have extricated different highlights of a picture like difference, relationship, energy, homogeneity, mean, fluctuation and change, and so on. Subsequent to extricating highlights, Neural Network is applied as a classifier to distinguish and arrange sicknesses on the leaves of two plants for example Tomato and Cotton.
* Wiwart M et.al., proposed a system which was aimed at identifying and discriminating deficiencies of four classes of minerals (nitrogen, phosphorus, potassium and magnesium). Before the resolution, the photos are changed to the HSI and L\*a\*b\* shading spaces. Those differentiations are assessed by Euclidean distances decided in both concealing spaces.

**DISADVANTAGES OF EXISTING SYSTEM:**

* The existing methodology arises with certain infeasibilities such as overtime will be taken for processing and shortage of experts at fields in remote locations.
* The existing system model is not suitable for large data sets.
* The existing system model does not perform very well when the data set has more noise i.e. target classes are overlapping.
* In cases where the number of features for each data point exceeds the number of training data samples, the existing system model will underperform.
* As the existing system model works by putting data points, above and below the classifying hyperplane there is no probabilistic explanation for the classification.

**PROPOSED SYSTEM:**

* We have taken the help of image processing to diagnose potato disease and potato leaf disease. Here we have used these parameters to diagnose the disease which can be identified by looking at the characteristics of the disease and the type of disease and we have tried to give more antidotes here. Accuracy is very good with training data in the project and accuracy with sample data is above 99%. So our project will be able to accurately diagnose potato disease and leaf disease.
* All through the proposed model, the VGG16 Architecture is utilized to recognize various kinds of potato infections, having 5 classes of potato sicknesses and accomplished 100% accuracy rate.
* VGG16 is a convolution neural net (CNN) architecture is considered to be one of the excellent vision model architecture till date. Most unique thing about VGG16 is that instead of having a large number of hyper-parameter they focused on having convolution layers of 3x3 filter with a stride 1 and always used same padding and maxpool layer of 2x2 filter of stride 2. It follows this arrangement of convolution and max pool layers consistently throughout the whole architecture. In the end it has 2 FC(fully connected layers) followed by a softmax for output.

**ADVANTAGES OF PROPOSED SYSTEM:**

* The proposed system model is easy to implement and is a great building block for learning purposes.
* The proposed system achieves the highest accuracy of 100%, so which is the best among the existing system models.
* The proposed system model can be pre-trained on ImageNet.
* The proposed system turned out to be an efficient methodology that will play a vital role in monitoring as well as the identification of the plant disease conditions effectively. It can be also used for transfer learning

**SYSTEM ARCHITECTURE:**

Potato Disease Dataset

VGG 16 model

Potato Disease Detection

Performance Analysis and Graph

**SYSTEM REQUIREMENTS:**

**HARDWARE REQUIREMENTS:**

* System : Pentium i3 Processor.
* Hard Disk : 500 GB.
* Monitor : 15’’ LED
* Input Devices : Keyboard, Mouse
* Ram : 4 GB

**SOFTWARE REQUIREMENTS:**

* Operating system : Windows 10.
* Coding Language : Python
* Web Framework : Flask

**REFERENCE:**

Md. Marjanul Islam Tarik, Sadia Akter, Abdullah Al Mamun, Abdus Sattar, “Potato Disease Detection Using Machine Learning”, IEEE Conference, 2021.