Introduction: A major portion of our crops gets damaged every year due to plant diseases. Most of these diseases show symptoms on their leaves and can be identified accordingly. But an expert on identifying these diseases are not available widely. So, we have come up with a solution to make the disease prediction available to the local farmers via cheap smartphones. Farmers can easily take pictures of the leaves. The photo is then analyzed via machine learning and identifies the diseases.

**Motivation:** Bangladesh is an agricultural based country. Agriculture is the largest employment sector in Bangladesh. Agriculture remains the most important sector of Bangladeshi economy, contributing 19.6 percent to the national GDP and providing employment for 63 percent of the population. In our project we are trying to help in this important sector of Bangladesh. Our model identifies the diseases of the crops from a picture of the disease. It will help the farmers to take actions against the disease immediately. So that we can save million tons of crops which will help us to feed our population and earn millions of dollar by exporting them.

**Implementation:** We have implemented our project by using Convolutional Neural Network (CNN). Although the model is focused on potato, tomato, apple and corn diseases detection it can be trained using different leaf dataset and can be later modified for Rice diseases detection. The datasets have to be divided into three portions for Training, Cross-Validation and Testing with a ratio of 60:20:20.

**Pre-Processing:** The collected images need to be preprocessed before any classification and training can be done. The blurry and low-quality images need to be corrected. Using Median, the blurry images can be corrected to some degree. A good PSF (Point Spread Function) is needed that will correct the blurred images most. The image has to be converted to grayscale to reduce the dimension of image and detect the contour of leaf. The disease area and shape can be extracted from the greyscale image easily.

**Model Training:** We trained our model with 7500 images of different kind of plant diseases. We used supervised learning for training purpose. The dataset is an open source dataset collected from CrowdAI competition. We used CNN (Convolutional Neural Network) with 38 layers to train the model.

**Test Result:** We received 98.54% test accuracy for the Test data.

**Model Deployment:** We deployed the model in a cloud Virtual machine using docker. The virtual machine can handle large amount of concurrent processing in a short amount of time for faster result.

**Android App:** This is a very convenient app. It only takes camera and storage permission from the users. It only takes 14-15 MB of storage. Data usages of this app is too low because we resize the picture first and then send it to our server. About 150 pictures can be processed by using only 2MB of Data package. It also drains battery a little because all the processing is done on our server. The app is mainly used for taking the input and showing the output.

**Bangla Feature:** As this app is for our farmers, we have tried to make it more user friendly to them. We have used Bangla fonts and Bangla voice assistance in our app. So that it could be more understandable to them.

**Outcome:**