Fertilizers Recommendation System For Disease Prediction

1.ABSTRACT :

Agriculture is the main aspect of country development. Many people lead their life from agriculture field, which gives fully related to agricultural products. Plant disease, especially on leaves, is one of the major factors of reductions in both quality and quantity of the food crops. In agricultural aspects, if the plant is affected by leaf disease then it reduces the growth of the agricultural level. Finding the leaf disease is an important role of agriculture preservation. After pre-processing using median filter, segmentation is done by Guided Active Contour method and finally, the leaf disease is identified by using Support Vector Machine.

2.INTRODUCTION :

Detection and recognition of plant diseases using machine learning are very efficient in providing symptoms of identifying diseases at its earliest. Plant pathologists can analyze the digital images using digital image processing for diagnosis of plant diseases. Application of computer vision and image processing strategies simply assist farmers in all of the regions of agriculture.Generally, the plant diseases are caused by the abnormal physiological functionalities of plants. Therefore, the characteristic symptoms are generated based on the differentiation between normal physiological functionalities and abnormal physiological functionalities of the plants. Mostly, the plant leaf diseases are caused by Pathogens which are positioned on the stems of the plants. These different symptoms and diseases of leaves are predicted by different methods in image processing. These different methods include different fundamental processes like segmentation, feature extraction and classification and so on. Mostly, the prediction and diagnosis of leaf diseases are depending on the segmentation such as segmenting the healthy tissues from diseased tissues of leave

2.1 Project Overview :

In this project, two datasets name fruit dataset and vegetable dataset are collected. The collected datasets are trained and tested with deep learning neural network named Convolutional Neural Networks(CNN). First, the fruit dataset is trained and then tested with CNN. It has 6 classes and all the classes are trained and tested. Second, the vegetable dataset is trained and tested. The software used for training and testing of datasets is Python. All the Python codes are first written in Jupyter notebook supplied along with Anaconda Python and then the codes are tested in IBM cloud. Finally a web based framework is designed with help Flask a Python library. There are 2 html files are created in templates folder along with their associated files in static folder. The Python program 'app.py' used to interface with these two webpages is written in Spyder-Anaconda python and tested.

2.2 Purpose :

This project is used to test the fruits and vegetables samples and identify the different diseases. Also, this project recommends fertilizers for prediced diseases.

3.LITERATURE SURVEY :

3.1 Existing problem :

Indumathi proposed a method for leaf disease detection and suggest fertilizers to cure leaf diseases[1]. But the method involves less number of train and test sets which results in poor accuracy. Pandi selvi [2] proposed a simple prediction method for soil based fertilizer recommedation system forpredicted crop diseases. This method gives less accuracy and prediction. Shiva reddy [3] proposed an IoT based system for leaf disease detection and fertilizer recommendation which is based on Machine Learning techniques yields less 80 percentage accuracies.

3.2 Problem statement definition :

Mr.Narasimma Rao is a 65 years old man. He had a own farming land and do Agriculture for past 30 Years , In this 30 Years he Faced a problem in Choosing Fertilizers and Controlling of Plant Disease. Narasimma Rao wants to know the better recommendation for fertilizers for plants with the disease. He has faced huge losses for a long time. This problem is usually faced by most farmers. Mr. Narasimma Rao needs to know the result immediately.

4.IDEATION & PROPOSED SOLUTION :

4.1 Proposed solution :

In this project work, a deep learning based neural network is used to train the collected datasets and test the same. The deep learning based neural network is CNN which gives more than 90% classification accuracies. By increasing the more number of dense layers and by modifying hyperparameters such as number of epochs, batch size, the accuracy rate can be increased to 95% to 98%. Plants are liable to numerous sickness-associated issues and seizures. There are numerous reasons which

may be characterised via way of means of their impact on plants, disturbances because of environmental situations along with temperature, humidity, immoderate or inadequate food, mild and the maximum not unusual place sicknesses along with bacterial, viral and fungal sicknesses. In the proposed system, we use the CNN set of rules to locate sickness in plant leaves due to the fact with the assist of CNN the most accuracy may be completed if the records is good, And we recommend fertilizer to affected.

4.2 Empathy Map :

5.PROJECT DESIGN :

5.1 Project flow :

A digital camera or similar devices are used to take images of different types, and then those are used to identify the affected area in leaves. Then different types of imageprocessing techniques are applied to them, the process those images, to get different and useful features needed for the purpose of analyzing later-Plant leaf disease identification is especially needed to predict both the quality and quantity of the First segmentation step primarily based on a mild polygonal leaf model is first achieved and later used to guide the evolution of an energetic contour. Combining global shape descriptors given by the polygonal model with local curvature based features, the leaves are then classified overleaf datasets. In this research work introduce a method designed to deal with the obstacles raised by such complex images, for simple and plant leaves. A first segmentation step based on graph-cut approach is first performed and later used to guide the evolution of leaf boundaries, and implement classification algorithm to classify the diseases and recommend the fertilizers to affected leaves .

5.2 Flow diagram :

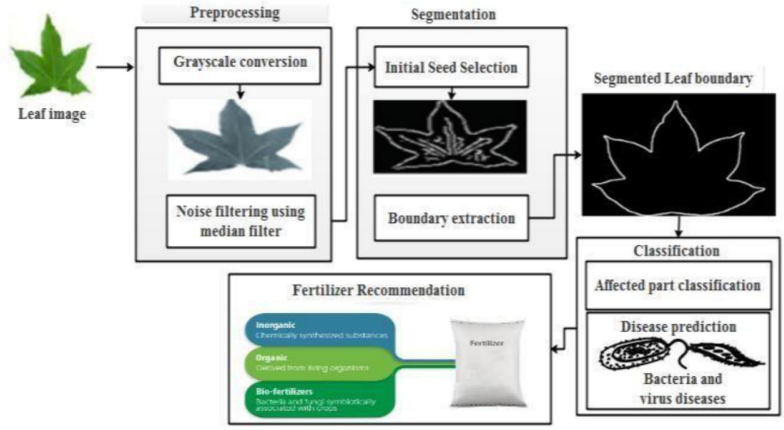


Figure.1 Proposed Architecture

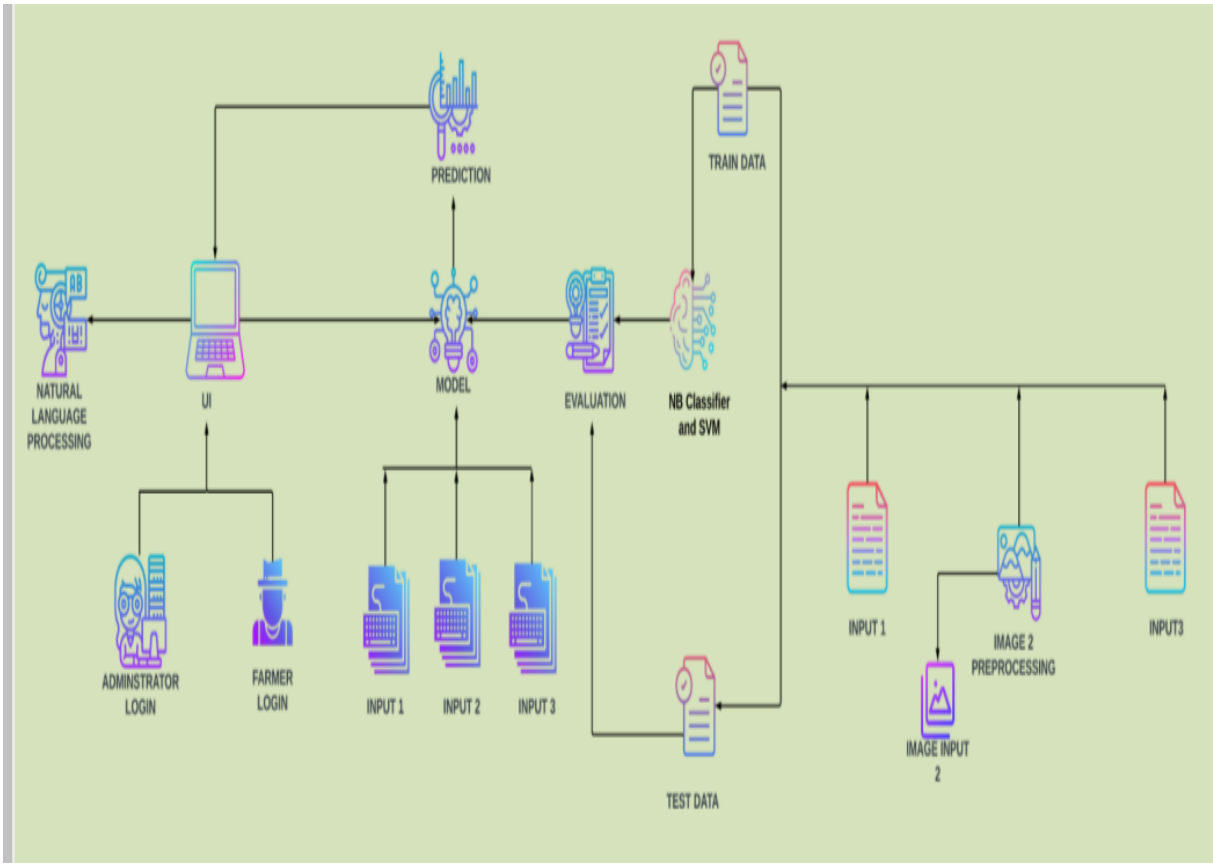
5.3 Project Objectives :

Agricultureis themostimportant sector intoday's life.Mostplants are affectedby a widevarietyof bacterial and fungal diseases. Diseases on plants placed a major constraint on the production and a major threat to food security.Hence, early and accurate identification of plant diseases is essential to ensure high quantity and best quality. In recent years, the number of diseases on plants and the degree of harm caused has increased due to the variation in pathogen varieties, changes in cultivation methods, and inadequate plant protection techniques.An automated system is introduced to identify different

diseases on plants by checking the symptoms shown on the leaves ofthe plant.Deeplearningtechniques are used to identify the diseases and suggestthe precautions that canbetakenfor those diseases.

- To preprocess the images.
- Applying the CNN algorithm to the dataset.
- How deep neural networks detect the disease.
- You will be able to know how to find the accuracy of the model.

5.3 Technical Archiecture :



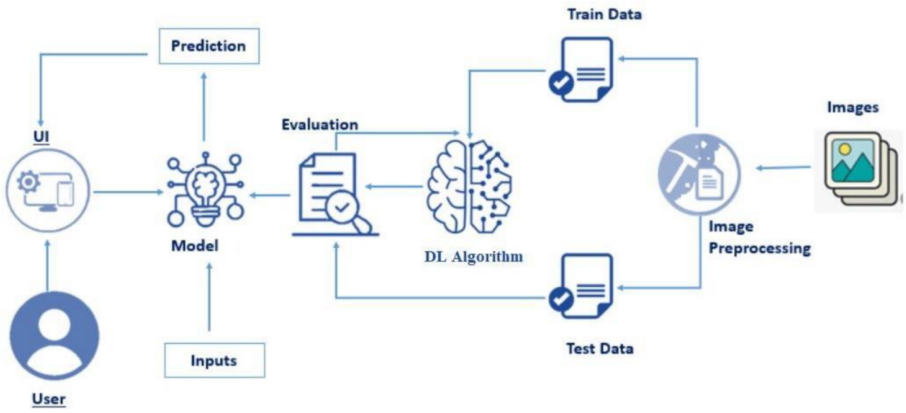
6.SOLUTION ARCHITECTURE :

6.1 Problem Solution Fit :

The solutiontotheproblem isMachinelearning, which isone ofthe Fertilizer Recommentation system for disease Prediction is a simple ML and DL based website which recommends the best crop to grow, fertilizers to use and the diseases caught by your crops. best crop you can grow in your land as per the soil nutrition valueand along with as perthe climate in thatregion. And recommending the best fertilizerforeveryparticular cropis also a challenging task. And theother and mostimportant issue is when a plantgets caught byheterogeneous diseases that effect on less amount of agriculture production .To overcome all these issues this recommendation has been proposed . Nowadays a lot ofresearch and work is being implemented in the smart and modern agriculture domain. Crop recommendation is characterized by a soil database comprised of Nitrogen,Phosphorus, potassium. The ensembles technique isused to build a recommendation

model that combines the prediction of multiple machine learning. Models to recommend the right crop based on soil value and the best fertilizer to use.

6.2 Solution Architecture :



6.3 Flow Chart :

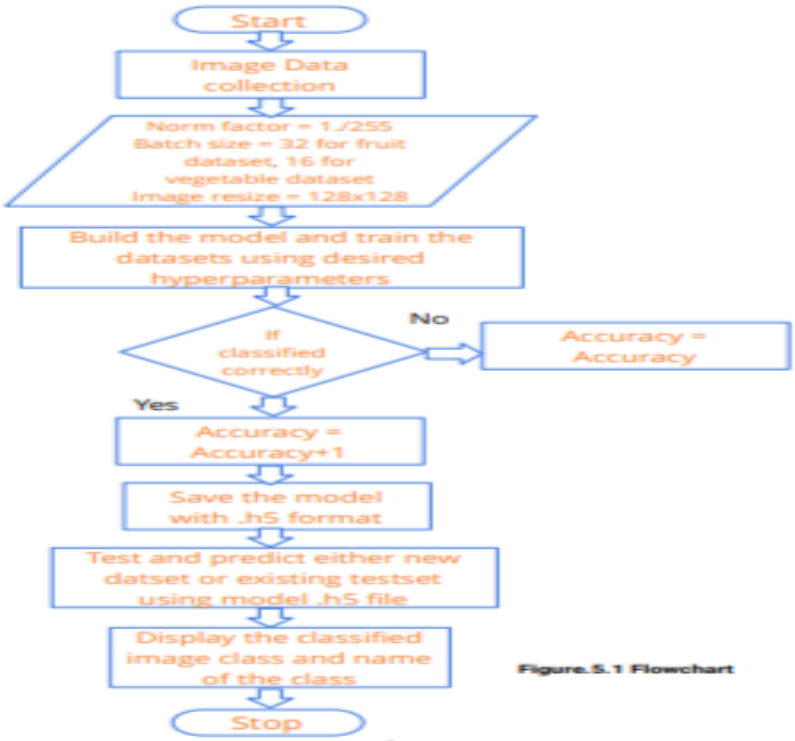


Figure.5.1 Flowchart

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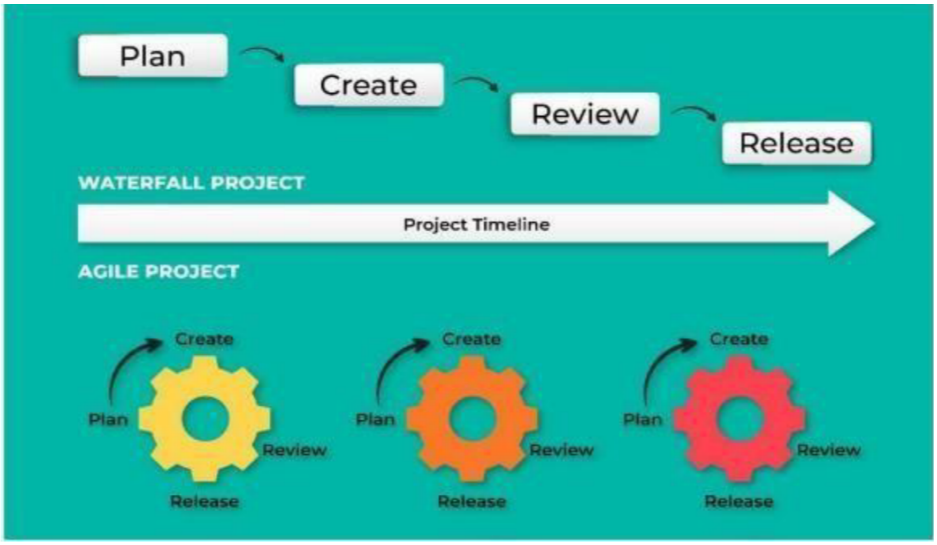
7 .MILESTONE & ACTIVITY LIST :

7.1 Milestone :

Modern Technology are increasing and optimizing the Performance of the Artificial intellicence model.Based crop yield disease prediction system.. In this Project Milestone will be given the Best Solution for the farmer using the completely friendly and simple user interface web application to fetch the solution.

7.2 Activity List :

Phrase 1: Information Gathering and Requirement Analysis.
Phrase 2: Project Planning and Developing Modules.
Phrase 3: Implementing the high accuracy.
phrase 4: Deploying the Model on Cloud and Testing the Model.



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8.REQUIREMENT ANALYSIS :

8.1 Functional Requirements:

Following are the functional requirements of the proposed solution.

- FR-1 User Registration Registration through Form .
- FR-2 User Confirmation Confirmation via Email .
- FR-3 User Profile Filling the profile page after logging in.
- FR-4 Uploading Dataset (Leaf) Images of the leaves are to be uploaded.
- FR-5 Requesting solution Uploaded images is compared with the pre-defined Model and solution is generated.

8.2 Non Functional Requirements :

Following are the non-functional requirements of the proposed solution.

- NFR-1 Usability The system allows the user to perform the tasks easily and efficiently and effectively.
- NFR-2 Security Assuring all data inside the system or its part will be protected against malware attacks or unauthorized access.
- NFR-3 Reliability The website does not recover from failure quickly ,it takes time as the application is running in single server .
- NFR-4 Performance Response Time and Net

Processing Time is Fast .

- NFR-5 Availability The system will be available up to 95% of the time.

9.PROJECT PLANNING & SCHEDULING :

9.1 Sprint Planning & Estimation :

Sprint-1 Model Creation and Training (Fruits)

- Create a model which can classify diseased fruit plants from given images. I also need to test the model and deploy it on IBM Cloud .

Model Creation and Training (Vegetables)

- Create a model which can classify diseased vegetable plants from given images .

Sprint-2 Model Creation and Training (Vegetables)

- Create a model which can classify diseased vegetable plants from given images and train on IBM Cloud 6 .
- Registration USN-1 As a user, I can register by entering my email, password, and confirming my password or via OAuth API 3 Medium .
- USN-2 As a user, I will be redirected to a page where I can

upload my pictures of crops 4 High .

- USN-3 As a user, I can view the results and then obtain the suggestions provided by the ML model 4 .
- Base Flask App A base Flask web app must be created as an interface for the ML model.

Sprint-3

Login

- USN-4 As a user/admin/shopkeeper, I can log into the application by entering email & password .

User Dashboard

- USN-5 As a user, I can view the previous results and history 3 Medium

Integration.

- Integrate Flask, CNN model with Cloudant DB 5 Medium .

Containerization .

- Containerize Flask app using Docker.

Sprint-4

Admin

- USN-6 As an admin, I can view other user details and uploads for other purposes .

Shopkeeper

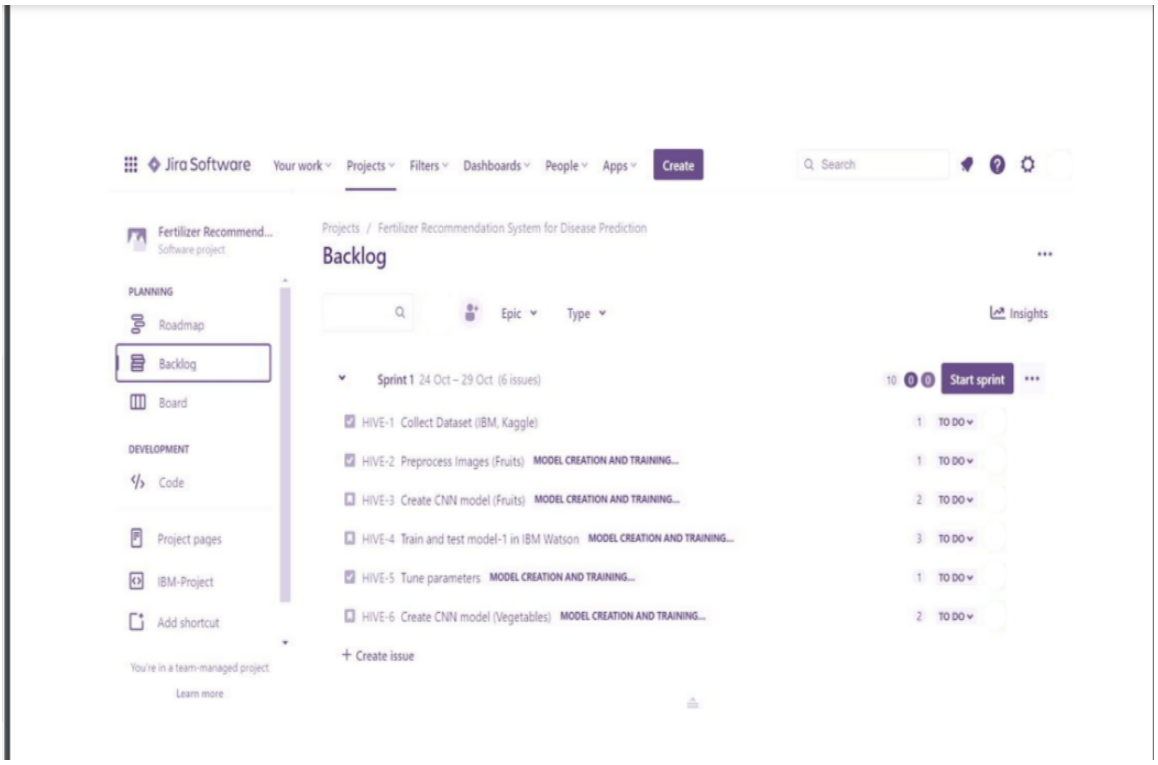
- USN-7 As a shopkeeper, I can enter fertilizer products and then update the details if any .

Containerization

- Create and deploy Helm charts using Docker Image made

before.

9.2 Reports From JIRA :



10.RESULTS :

10.1 Performance Metrics :

To compare the performance of the proposed SVM method with the existing CNN (Convolutional Neural Network) method. Metrics such as True Positive, False Positive, True Negative, False Negative are used. The proposed method is implemented using

.NET. The code existing CNN method was written in Python .

11.ADVANTAGES & DISADVANTAGES :

List of advantages

● The proposed model here produces very high accuracy of classification.
● Very large datasets can also be trained and tested.
● Images of very high can be resized within the proposed itself.

12 .APPLICATIONS :

1. The trained network model used to classify the image patterns with high accuracy.
2. The proposed model not only used for plant disease classification but also for other image pattern classification such as animal classification.
3. This project work application involves not only image classification but also for pattern recognition.

13 .CONCLUSION :

The model proposed here involves image classification of fruit datasets and vegetable datasets. The following points are observed during model testing and training:

● The accuracy of cl`assification increased by increasing the number of epochs. /
● For different batch sizes, different classification accuracies are obtained.
● The accuracies are increased by increasing more convolution layers.
● The accuracy of classification also increased by varying dense layers.
● Different accuracies are obtained by varying the size of kernel used in the convolution layer output.
● Accuracies are different while varying the size of the train and test datasets.

14.APPENDIX :

Github Project Demo Link :

https://drive.google.com/file/d/1wdYC2juIs1VsfsUjx3XvhrxNxCcJhLg-/view?usp=share_link