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Corn Leaf Disease Detection Using Machine Learning

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A B S T R A C T

One of the primary factors determining any nation's growth is agriculture. About most of people in India depends upon the farming. The crops contract a variety of diseases as a result of diverse seasonal conditions. These illnesses first harm the plant's leaves before spreading to the entire plant. the plant, which in turn impact the type and volume of crops grown. due to the abundance of flora,it becomes quite challenging for the human eye to identify and categories each plant's disease on the farm. the area. Additionally, because these diseases may spread, it is crucial to diagnose each plant. Hencein order to detect corn plant diseases, this work focuses on supervised machine learning methods such Naive Bayes (NB), Decision Tree (DT), K-Nearest Neighbor (KNN), Support Vector Machine (SVM), and Random Forest (RF). pictures of the plant. These categorization methods are examined andcompared in order to choose the model that is most accurate and most suited for plants. Illness prognosis. The most accurate algorithm is the RF one, with a high accuracy rate.in comparison to the other classification methods. The aforementioned training models allforthe early detection and classification of the fresh image by the farmers. Diseases in order to avoid them.

Keywords:**Classification, Detection, Naïve Bayes, Decision Tree, K-Nearest Neighbor, Support vector machine.Random forest**

1. INTRODUCTION

With the aid of technology, the agriculture industry has made significant strides. Farmers are having issues because of a variety of variables, including plant diseases and global climate change. There are several causes for the crop loss production that causes the farmers' suicide instances. the passing of time, Cost-effectiveness and precision for visual crop quality evaluation Examining is a difficult task. Researchers had arrived in order to address this issue. offers several solutions thanks to the creation of new technologies like object for the quality evaluations, detection and image processing are used. In this essay, picture the identification and classification of diseases involve processing technology. crops This picture processing approach calls for high-decision pics for detection and category of illnesses which changed into hard to capture. Due to this reason, it's also a tedious undertaking to are expecting illnesses correctly and maximum correctly. This paper intends to increase a version that correctly come across and classify the illnesses of leaves on the early level of illnesses with the aid of using the use of system gaining knowledge of algorithms and take essential steps to save you from such leaf illnesses. for ailment detection and category from plant leaf and additionally assessment is made most of the numerous category strategies. It additionally gives distinct strategies so that it will offer the maximum accurate result Compared to other techniques. These

classification methods have been successful Biomedical signal processing Healthcare. In this article, corn plants (Zeamays) Various leaf diseases. In India, corn is next to the most important food crop with rice and wheat. It is an important source of carbohydrates for humans. Apart from that, it is cultivated for cooking oil, animal feed, flour and also as oil. Raw material for the production of furfural. Corn is cultivated in several states of India. Maharashtra, Andhra Pradesh, Tamil Nadu, Bihar, Karnataka, Madhya Pradesh, Uttar Pradesh, Gujarat, Rajasthan. Corn is usually harvested in the fall It is the month and is sown at the beginning of the monsoon season the main causes of corn disease are biological (bacteria, fungi, nematodes, viruses) and non-biological (undernourishment, water,) And temperature). Corn pathogens mainly affect leaves, fruits and stems. Some of the major illnesses are (A) Cercosporin leaf spots or gray leaf spots. 1. Small necrotic spots on the leaves, extending in a rectangular shape. Lesions as the lesion matures. They turn brown and eventually gray. Government The use of disease-resistant hybrid seeds and the use of foliar fungicides. (B) Normal rust is the presence of brown acne. available Both top and bottom leaves when acne breaks,they release powdery red spores. If the pustule has a severe infection, It may appear on the tassel or ears, or the leaves may turn yellow. Government, the use of resistant hybrids and the use of germicidal sprays such as Folicur, Oxychloride, AMISTAR Copper, Bravo (c) Northern Leaf Blight. Oval gray-green lesions are first seen on the leaves. Through the process of pathogens, these lesions turn from light gray to brown. Cultivation is a subsequent crop rotation with non-host crops.

2. SYSTEM ANALYSIS

EXISTING SYSTEM

- To discoverwhether or not the leaf is diseased or healthy, positivesteps totaken. i.e., Pre-processing, Feature extraction, Training of classifier and Classification. Pre-processing of picture, is bringing all of thepics. length to a discounted uniform length.
- Then comes extracting functions of a pre-processed picturethatperformed with the assist of HOG.
- There has been no version for predicting better accuracy and no platform for an idealrecognition.
- There no rightrecommendation on fertilizer or pesticide primarily based totally on soil.

PROPOSED SYSTEM

- Specialized model for high value crops or specific crops with a larger and different number of diseases
- Can be developed to identify the disease and categorize its disease type
- Provides the platform for high accuracy and correct prediction of the model
- Find out how the disease can be cured by this plant
- Get tips on fertilizer based on soil quantity

OBJECTIVE AND SCOPE

- To locate the interplayamong the illnessesinflicting agent and host plant on the subject oftypical environment
- To discovernumeroussicknesses in vegetation.
- To put into effecta technique for stopping the illnesses and offeringcontrol for decreasing the losses/damages
- Prevent the sickness on vegetation for farmers
- Help out the pesticide corporation in predicting the brand-new pesticide solutions

PROBLEM STATEMENT

- To detect thespecific hint for disease leaves of plant and propose the pesticide as in line with the kind ofdisorder to farmer

3. LITERATURE SURVEY

[1] Plant diseases are the most common reason for low yields and low incomes for farmers. Currently, researchers are doing their best to find a mechanism to automatically detect plant diseases. Accurately identifying plant diseases can help you find ways to control losses as soon as possible. In this paper, we are trying to develop a new approach to predict plant diseases using machine learning techniques. Experimental results show that plant diseases can be accurately classified.

[2] Th. Detection of plant leaf disease is also possible with experimentally evaluated software solutions. Currently, machine learning and deep learning have been used in recent years. The agricultural sector is no exception to machine learning. In this article, we applied "Convnets" to detect and classify plant diseases. We have collected the Plant Village dataset from Kaggle. Contains images of leaves of 15 different classes of plants from three different plants: potato, pepper and tomato. I split the dataset into 3 datasets and applied convnet to the 3 datasets. The detection accuracy of potato disease, pepper disease, and tomato disease achieved 98.3%, 98.5%, and 95%. Experimental results show that our model achieved good accuracy for the detection and classification of plant leaf diseases.

[3] This paper focuses on supervised machine learning techniques such as Naive Bayes. (NB), Decision Tree (DT), K-nearest neighbor method (KNN), Support vector machine Use (SVM) and Random Forest (RF) to detect corn plant diseases A photo of a plant. Analyzing the above classification method, compare to choose the best model for your installation Prediction of illness. The RF algorithm produces results with the highest accuracy of 79.23%. Compared to other classification methods. All the trained models mentioned above Used by farmers for early detection and classification of new images Illness as a preventive measure.

[4] The latest advances in computer vision were developed through deep learning and allow us to detect and diagnose diseases in plants by using a camera. This study provides a system for detecting multiple diseases in several plant varieties. The system was designed to detect and identify several plant varieties specifically apple, corn, grapes, potato, sugarcane, and tomato. The system can also detect several plant diseases, as it consists of 35,000 images of healthy and diseased plant leaves, and the researchers were able to train deep learning models to detect and identify plant diseases and the absence of these diseases. The trained model achieved a correct answer rate of 96.

4. ALGORITHM USED FOR CLASSIFICATION

Classification is a supervised learning approach that assigns data to specific classes. Labels for the two processes:
(1) Learning phase (training step) models a classification model that represents a predefined set of classes. Here The classification algorithm is modeled by the classifier using the learning algorithm of those specific class designations
(2) data from the perspective of the trained model the one created in the first step is used to classify the data. Test data is used Calculate the performance of the trained model, taking into account some parameters Accuracy, precision, recall, F-score, etc. Detailed descriptions of various types of classification models such as K-NN, NB, DT, SVM, RF, etc. Are used.

The k-Nearest Neighbor (KNN)

This is a nonparametric supervised machine learning algorithm commonly used in pattern recognition. It is based on the principle of the nearest neighbor rule used in. The process of classifying machine learning tasks. In this method, the classifier Used to train patterns to classify test patterns based on similarities between Test pattern for each training pattern. The results of the k-NN classifier are as follows: The class membership value to which it belongs. Classified based on crowd Neighbors vote and assign objects to the most used ones k-nearest neighbor class label. It works like a kind of instance-based learning where operations and all calculations are locally approximated. Different by the end of the classification process.

Naïve bayes (NB)

This is a variant of the stochastic classifier based on the Bayes classifier principle. The prior probabilities of the pattern are known and assumed to exist Posterior probabilities are assigned to class labels. In this hypothesis, Posterior probabilities calculate the maximum probability value of existing data It belongs to a specific class label. It is calculated by multiplying the conditional probabilities of each feature using Bay's theorem. This hypothesis is It usually doesn't last in a real environment, but it's often quite successful.

Classification task

Decision Tree

This is a supervised classification and regression algorithm in supervised learning. Build a classifier by splitting the data into smaller groups (tree structure). Higher disagreements are built based on this split. Gini coefficient Entropy is one of the commonly used attribute selection measures. Used as a measure of parallax. The advantage of this algorithm is the results may be easy for humans. DT can hardly be generated Training errors when the tree can learn from depth without constraints wood. There are many variations of decision trees such as ID3, C4.5, CART, etc. Most commonly used in a variety of data mining and machine learning applications**.**

Support Vector Machine (SVM)

This is a supervised machine learning classifier defined by the separation hyperplane. This algorithm finds the optimal hyperplane that maximizes the margin between Data points of both classes in high-dimensional space. SVM properties A so-called kernel trick that is useful for non-linear classification. Highly expected to acquire features that are easier to identify in a high-dimensional feature space. can It be completed by converting the function with some common functions such as: Linear, polynomial, and radial basis functions. Function conversion is possible Significantly increases the dimension of the feature space. Therefore, training will increase Timing of the classification process. It can turn the functionality into something higher Ratio by calculating the inner product without converting the feature set.

Random Forest

This is an ensemble of how to learn a randomized decision tree classifier. that is It is operated by building multiple decision trees during training. Class designation the percentage of the test dataset is measured based on the adjustments in each classification tree. Or Classifier results depend on the class designation with the highest score. Through the classification tree. This algorithm uses bagging and feature randomness Trying to create an uncorrelated forest during the construction of individual trees A tree that predicts performance more accurately than an individual wood.

5. SYSTEM DESIGN

The leaves of plants are susceptible to various disorders. This may be due to humidity or environmental conditions. Common illnesses include viral, bacterial and fungal illnesses. This can change the shape of the color by These variations are difficult to find due to similar patterns. Therefore, early detection of these diseases can prevent the loss of plant A machine learning approach for classifying plant diseases has been proposed below figure show the flow the step for detecting the disease.

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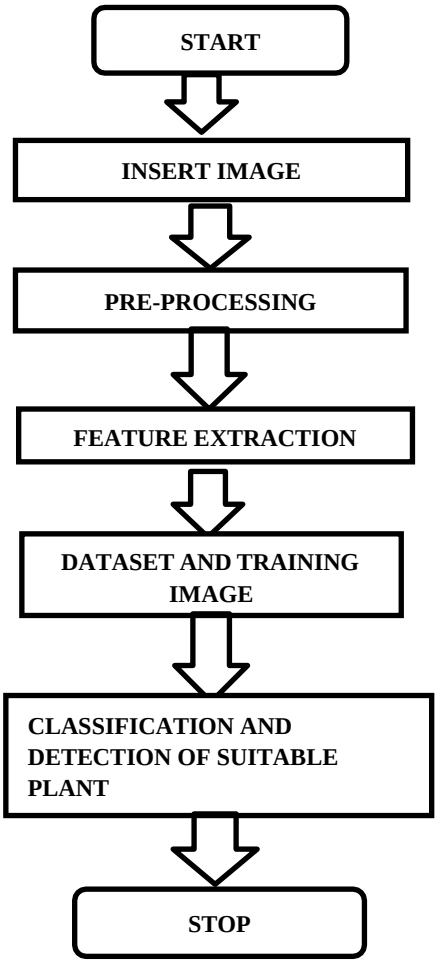


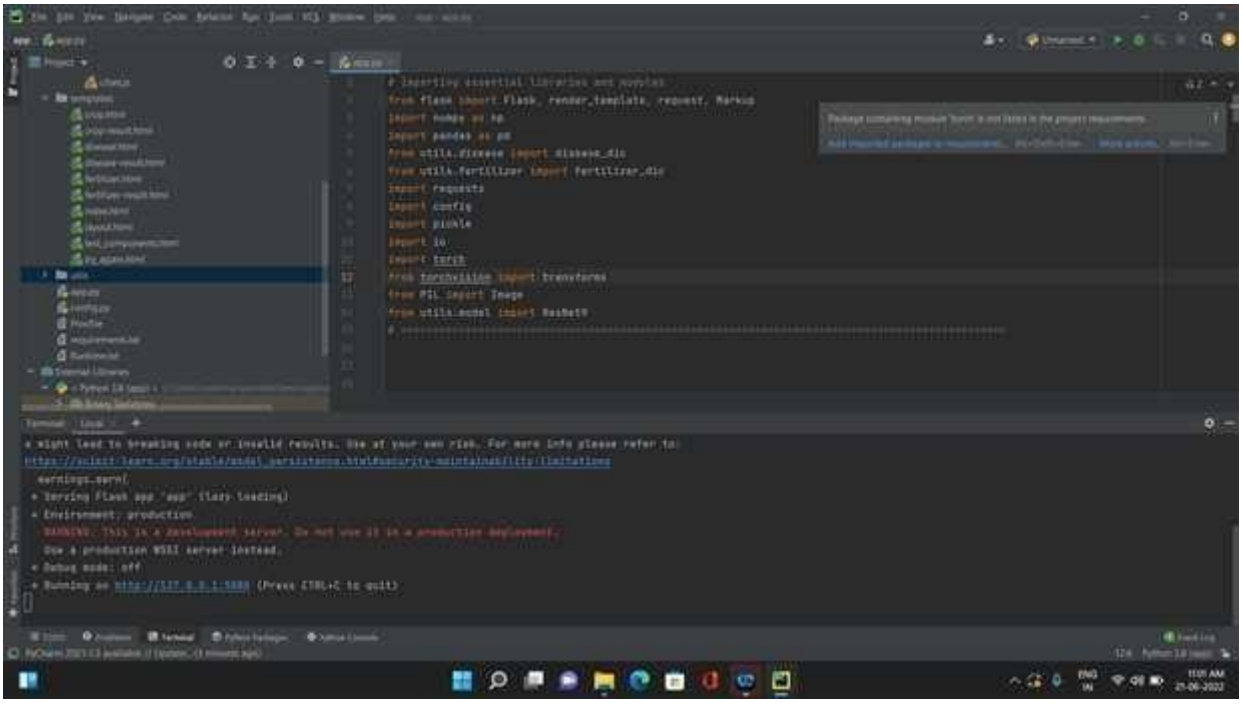
Fig 5:STEP FOR DETECTION OF DISEASE

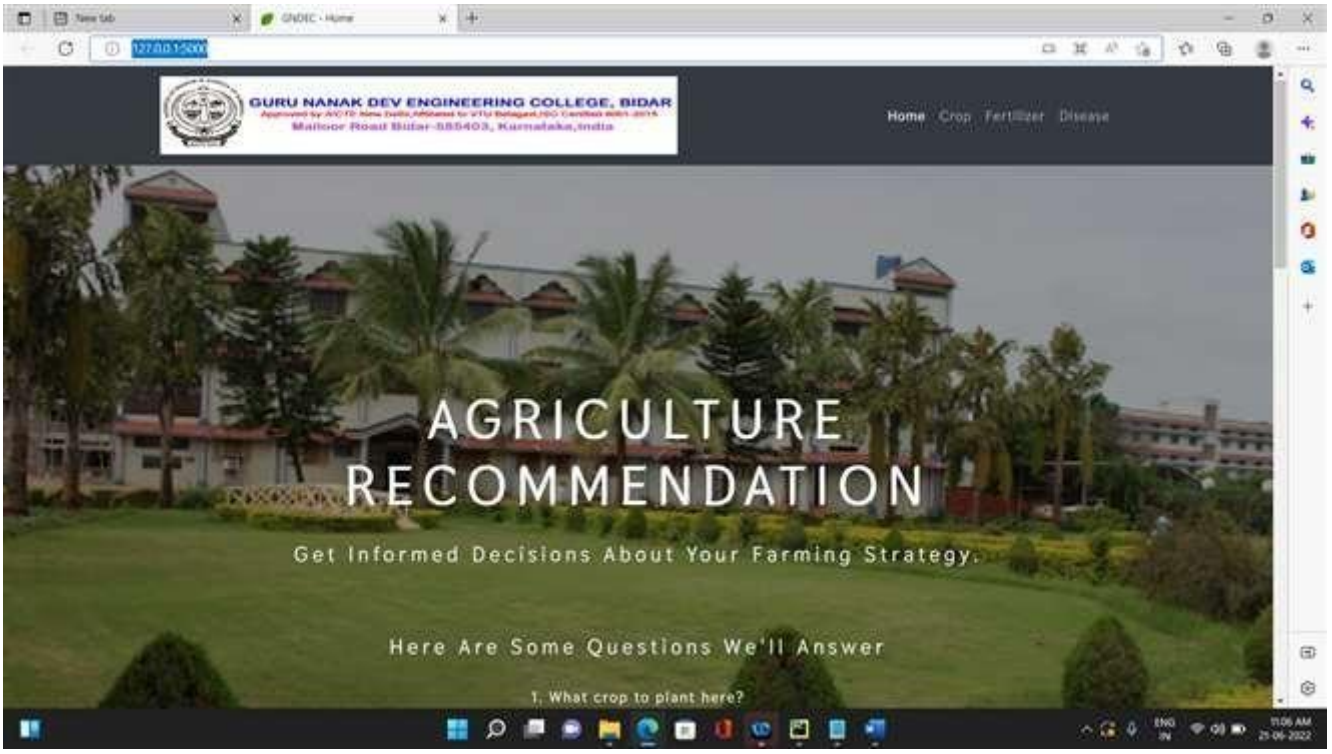
Brief explanation of the step for detection of the disease so that plant get early diagnosis

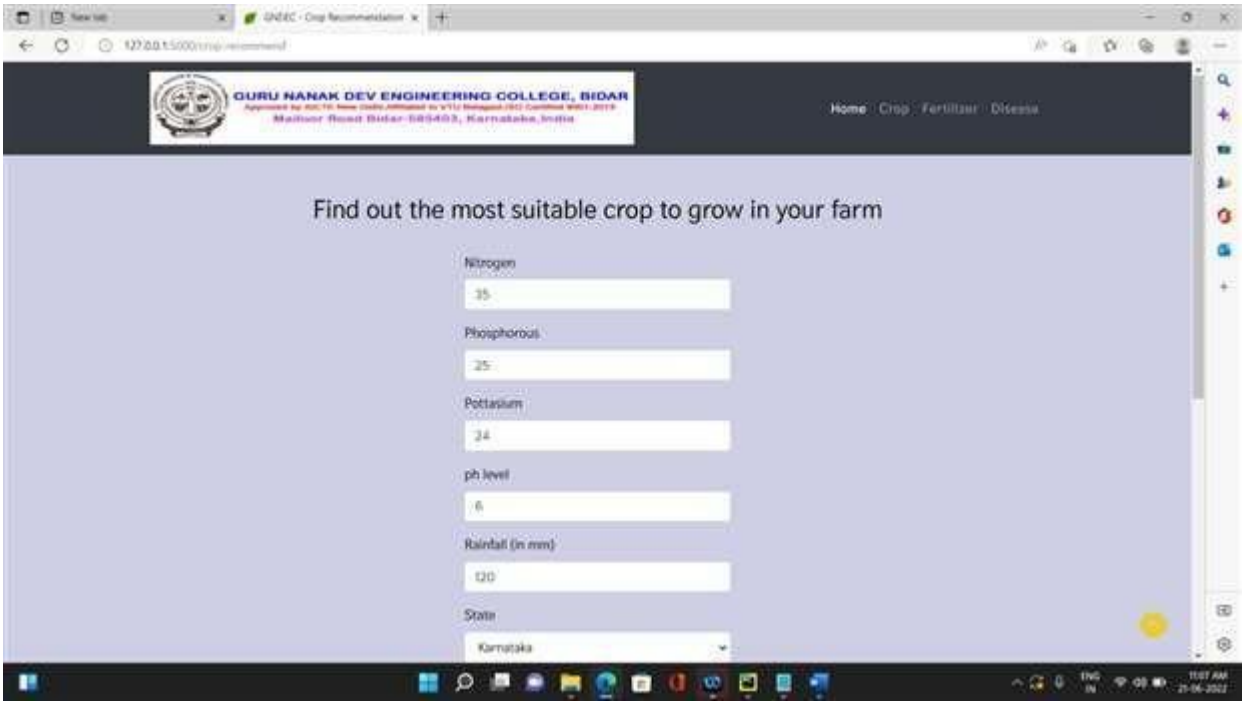
- **Insert Image:** Take a picture of the leaves of the plant.
- **Pre-Processing:** Apply pre-processing techniques to remove all types of noise and enhance image features. The image is preprocessed using Contrast Enhancement. By mapping the input intensity to a new value, it improves the image features that improve the contrast of the image
- **Feature Extraction:** This step is important for classifying images. Instead of selecting the entire image, only featureis extracted from the infected area. The gray co-occurrence matrix (GLCM) is used to extract features.
- **Dataset and Training Image**: The dataset used for training is from the internet and contains images of plants infected with various types of diseases and healthy leaves. Here, sample input sheet images containing infected and healthy images are used for training and sent to the classifier

- **Classification and Detection of Suitable Plant:** The Support Vector Machine (SVM) is the classifier used for the classification here. This is a binary classifier that uses thehyperplane. The sample closest to the limit is selected. Classify classes using different kernels. Multiclass classification is performed using one-to-one or one-to-many mappings. The class is and is determined by the best output function. Label to identify the plant.

6. OUTPUTSCREEN




GURU NANAK DEV ENGINEERING COLLEGE, BIDAR
Home Crop Fertilizer Disease
AGRICULTURE RECOMMENDATION
Get Informed Decisions About Your Farming Strategy.
Here Are Some Questions We'll Answer
1. What crop to plant here?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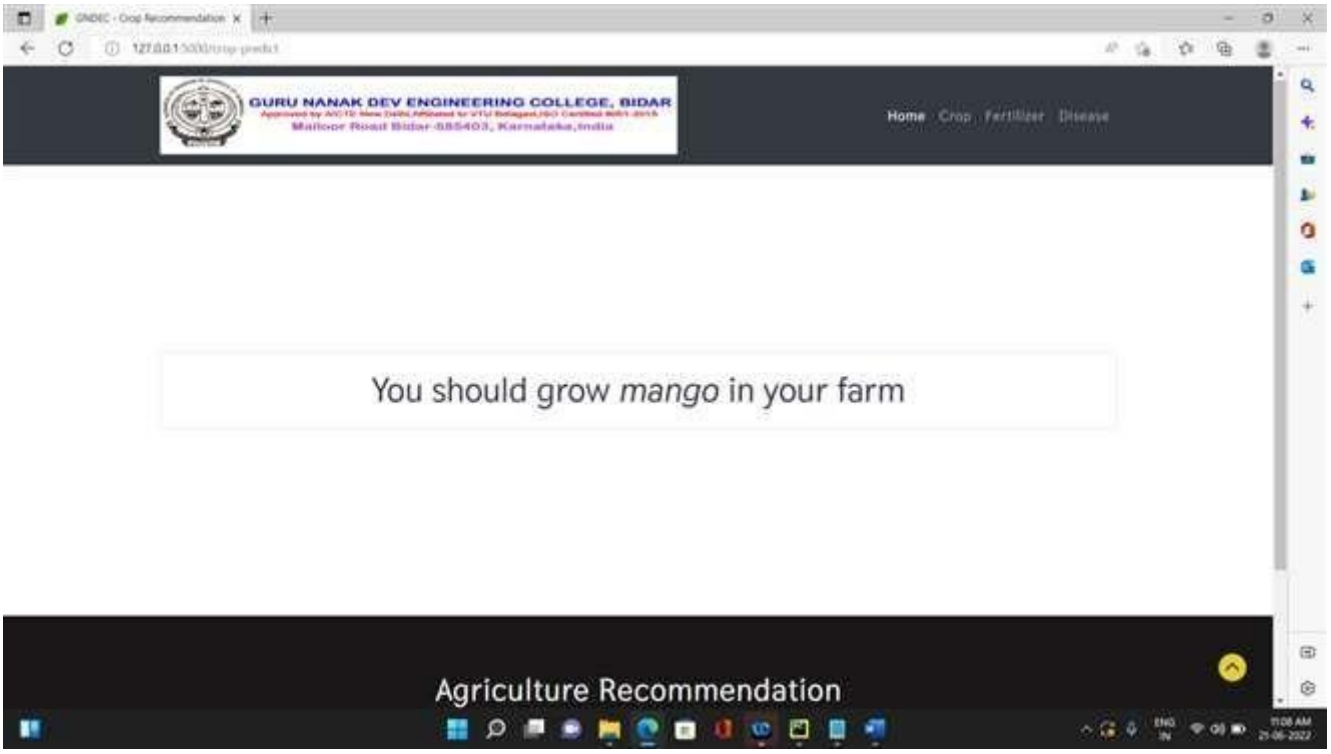
Home Crop Fertilizer Disease
Find out the most suitable crop to grow in your farm
Nitrogen
35
Phosphorous
25
Pottasium
24
ph level
6
Rainfall (in mm)
120
State
Karnataka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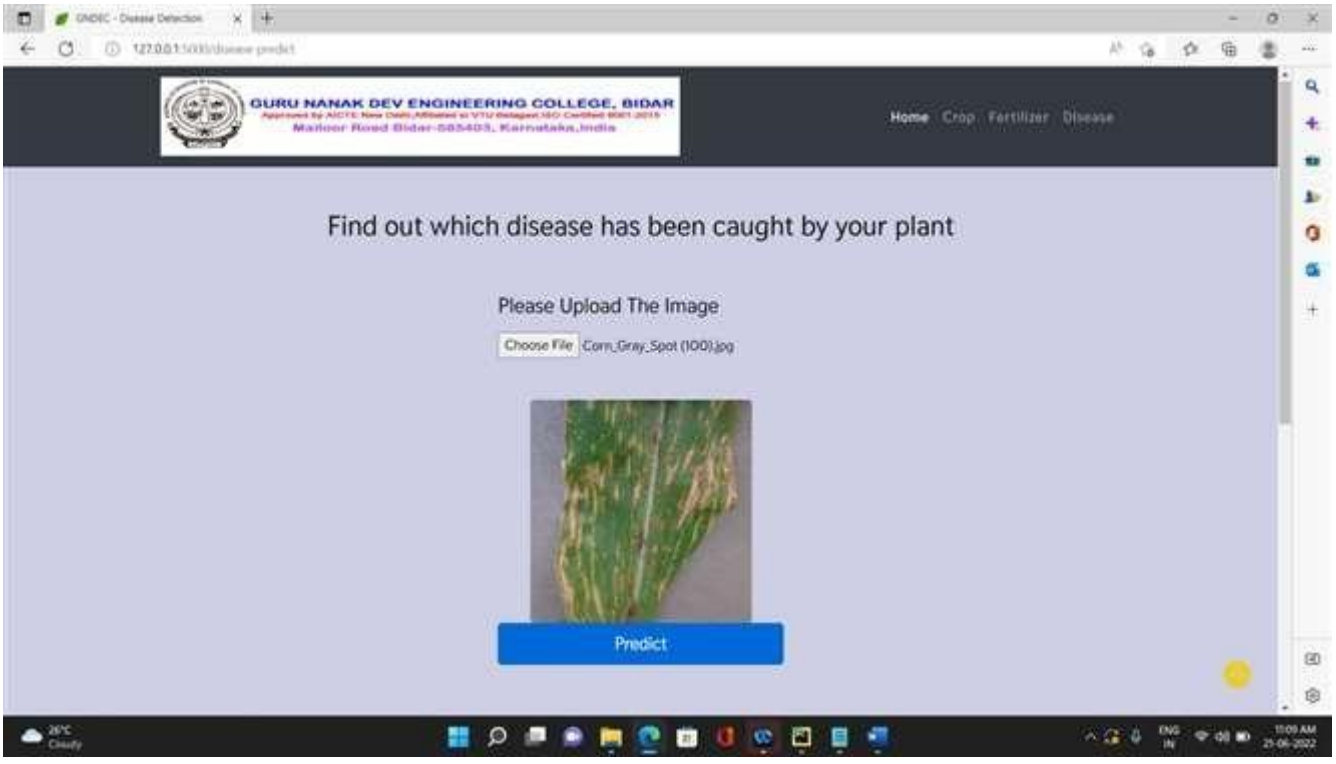
Home Crop Fertilizer Disease
You should grow *mango* in your farm
Agriculture Recommendation


GURU NANAK DEV ENGINEERING COLLEGE, BIDAR
Home Crop Fertilizer Disease
Find out which disease has been caught by your plant
Please Upload The Image
Choose File Corn_Gray_Spot (100).jpg
Predict

7. CONCLUSION

This task uses supervised machine learning techniques: NB, ANN, DT, SVM, and RF to detect a variety of corn leaf diseases. The proposed methodology was applied usinglabelled images to train the classification model. Of the remaining classification models for detecting disease, HF classifiers have been observed to record the highest accuracy when testing image data. Based on the disease detected, farmers can take the necessary steps to prevent corn disease early. Early detection also increases productivity by finding the best crops to grow on the farm, and this task and this work able to give advice on fertilizer depending on soil quality. However, there are some pitfalls associated with individual models of the classification process that may not be applicable to all datasets. In the future, these models can be implemented using multiple high-dimensional datasets in several other classification methods.

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