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Recommendation of Crop, Fertilizers andCrop Disease Detection System

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[1, 2, 3, 4, 5]*SKNSITS*

Abstract*: India is a highly populated country and randomly change in the climatic conditions need to secure the world food resources. Framers face serious problems in drought conditions. Type of soil plays a major role in the crop yield. Suggesting the use of fertilizers may help the farmers to make the best decision for their cropping situation .The number of studies Information and Communication Technology (ICT) can be applied for prediction of crop yield By the use of Data Mining, we can also predict the crop yield. By fully analyze the previous data we can suggest the farmer for a better crop for the better yield. This application also provide model which predicts the type of crop disease based on textural similarity of leaves.

I. INTRODUCTION

We present an intelligent system, called Argo Consultant system, which consist of three models:

1) *Crop Recommendation:* This model assist the Indian farmers in making a decision about which crop to grow depending on the season, his farm's geographical location, soil characteristics as well as environmental factors such as temperature and rainfall.
2) *Fertilizers Recommendation:* The system also comes with a model to be precise, accurate in recommendations about required fertilizer based on atmospheric and soil parameters of the land which enhance to increase the crop yield and increase farmer revenue.
3) *Crop Disease Detection:* The system comes with a deep learning-based model which is trained using public dataset containing images of healthy and diseased crop leaves. Themodel serves its objective by classifying images of leaves into diseased based on the pattern of defect and gives solution on disease. PROCEDURE FOR PAPER SUBMISSION

II. LITERATURE SURVEY AND RELATED WORK

A. *Crop Selection Method to Maximize Crop Yield Rate using Ma-chine Learning Technique*

Many more researches started working on identifying this issue of the Indian agriculture and are dedicating more and more time and efforts to help in alleviating the issue. In [1], the 2018 Fourth International Conference on Computing Communication Control and Automation (ICCUBEA) authors are making use of Regularized Greedy Forest for determining a appropriate sequence of crop within the0 given time stamp.

B. *Development of Yield Prediction System Based on Real-time Agricultural Meteorological Information*

Authors from [2] have proposed a model which makes the use of historical records from meteorological data as the training set. And the models have been trained in identifying the weather conditions to be checked for the production of apples. Then it predicts the yield of apples on the basis of monthly weather patterns in a very efficient manner. Even the effect due to the temperature level on the sugar contained in apples is also been taken into account to detect the potential amount of damage.

C. *Analysis and Characterization of Plant Diseases using Transfer Learning*

Various studies have determined that photograph-based absolutely evaluation strategies produce extra correct and reproducible results than those obtained by using human visible checks.[3]

D. *Efficient Crop Yield and Pesticide Prediction for Improving Agricultural Economy using Data Mining Techniques*

Use of several algorithms like Artificial Neural Network, K-Nearest Neighbors, and Regularized Greedy Forest have also been studied and recognized in [4] for selecting a crop based on the prediction of yield rate, which, is actually influenced by the multiple parameters. There are plenty other additional features are included in the system such as the pesticide predictions and also online trading based on the agricultural commodities.

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III. OBJECTIVE

A. We study and understand Machine learningtechniques.
B. We analyze and design Deep Learning Model
C. We implemented on Jupiter Notebook
D. We evaluate the performance by Appling various testcases.

IV. REQUIREMENT SPECIFICATION

A. Hardware Requirements
1) Processor - I3
2) Speed - 1.1 GHz
3) RAM - 2 GB(min)
4) Hard Disk - 20 GB
5) Floppy Drive - 1.44 MB
6) Key Board - Standard Windows Keyboard
7) Mouse - Two or Three Button Mouse
8) Monitor – SVGA

B. Software Requirements
1) Operating System - Windows 7 and above
2) Application Server – Anaconda
3) Front End – HTML
4) Database - CSV File
5) IDE – Jupiter

V. METHODOLOGY

A. For Machine Learning we uses algorithm as follow

We uses Multi label classification(MLB) algorithm which include

1) *KNN - (K Nearest Neighbors):* KNN has been known as a non-parametric method which is being used for making the predictions. Here the predicted value is a class membership. So, the firststep of the K-NN algorithm is for identifying the nearest neighbors of k for each of the incoming new instances. Then the instances are classified through a majority vote of the neighbors of k identified in step 1. Now, the second step involves the k neighbors depending on the labeled sets , and so the label is then get predicted for the new instances.
2) *Random – Forest:* Random-Forest method is an ensemble process of learning which often being used for both the processes of classification and regression. Hence to domesticate the model for performing the process of prediction using the algorithm. And so, the test features must have been passed through the rules of each of the randomly created trees. So as the result of it, a distinct target will be predicted by each random forest for the same test feature. Then, on the basis of each predicted target the votes are computed. And then the final prediction of algorithm is concluded as the highest votes predicted target. The fact which the random forest algorithm can efficiently handle is about the missing values and which a classifier can never over-fit into the model and these are the huge benefits for using the Random-Forest algorithm.
3) *Neural – Network:* Neural-Network systems usually does progressive improvements in their performance by eroding through the examples. Based on the collection of connected nodes they are called as neurons. Then signals are transmitted between the neurons by using connections. As neurons and connections have weights associated to them, which is then updated and adjusted as the erudition moves.
4) *Decision – Tree:* Decision tree is a sort of supervised learning algorithm where the attributes and class labels are emblematized using a tree. Here, hereinafter the root attributesare compared with the record's attribute and then depending on the comparison, a new node is previewed. And so thisprocessof comparison persists until a leaf node with a predicted class value is observed. Hence, a archetypal decision tree is a very efficient way for the prediction purposes.

Now, to ensure whether Agro-Consultant has the highest possible accuracy by out of all the four algorithms which we implemented individually. The performances of all thefour algorithms are then compared, and then the one with highest accuracy will then get selected for the model.

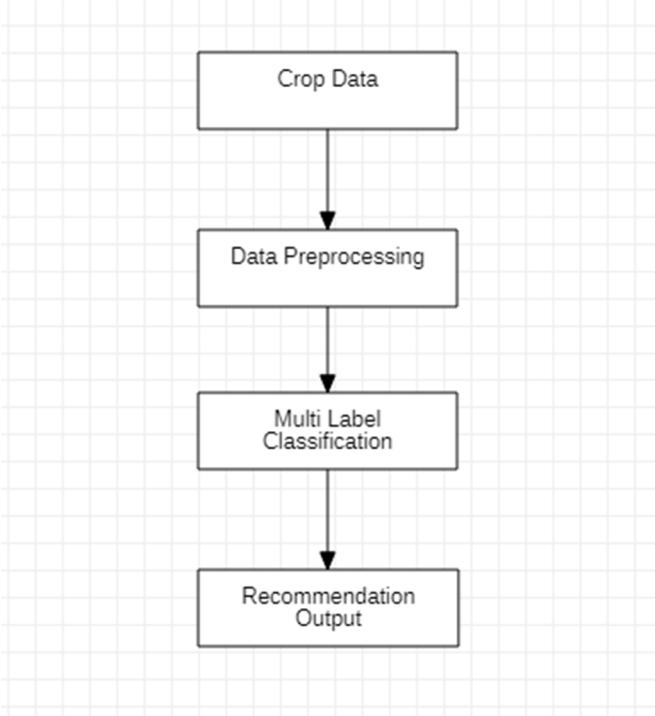
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B. For Deep Learning we use algorithm as follow

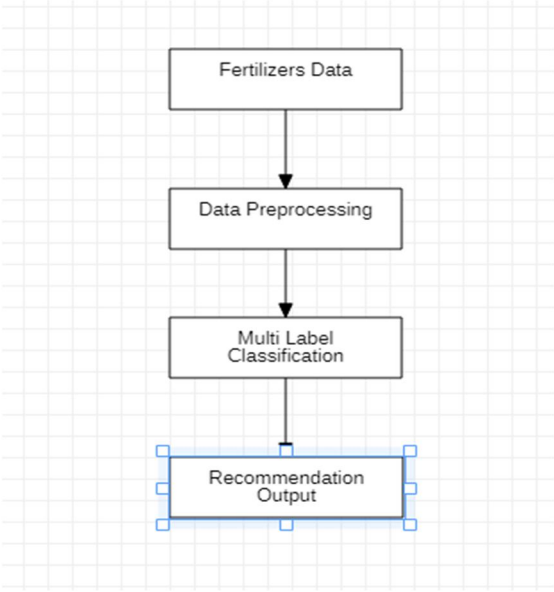
1) *Conventional Neural Network (CNN):* A Convolutional Neural Network (ConvNet/CNN) is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other.

C. Modules

1) *Crop Recommendation:* This module take content of soil and predict which crop isbest.

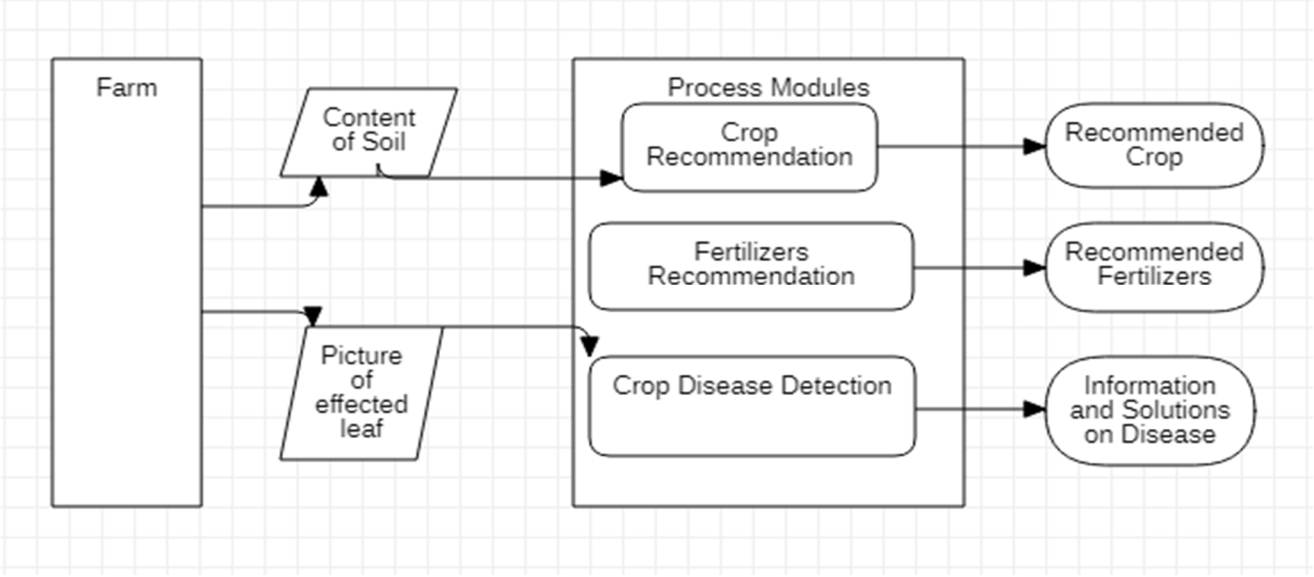


2) *Crop Disease Detection:* This module required one effected leaf image and after processing it provide us a information about crop disease andsolution on that disease.
3) *Fertilizers Recommendation:* This module take content of soil and Recommend which fertilizers are required to put in your farm.



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4) Systems Architecture



VI. CONCLUSION

A. We have proposed and an intelligent crop recommendation system, which can be easily used by farmers all over India. This system would assist the farmers in making an informed decision about which crop to grow and efficient use of the fertilizers.

B. We also have implemented a secondary system, called Crop Disease Detection for the prediction on the type of crop disease based upon the textural similarity of leaves.

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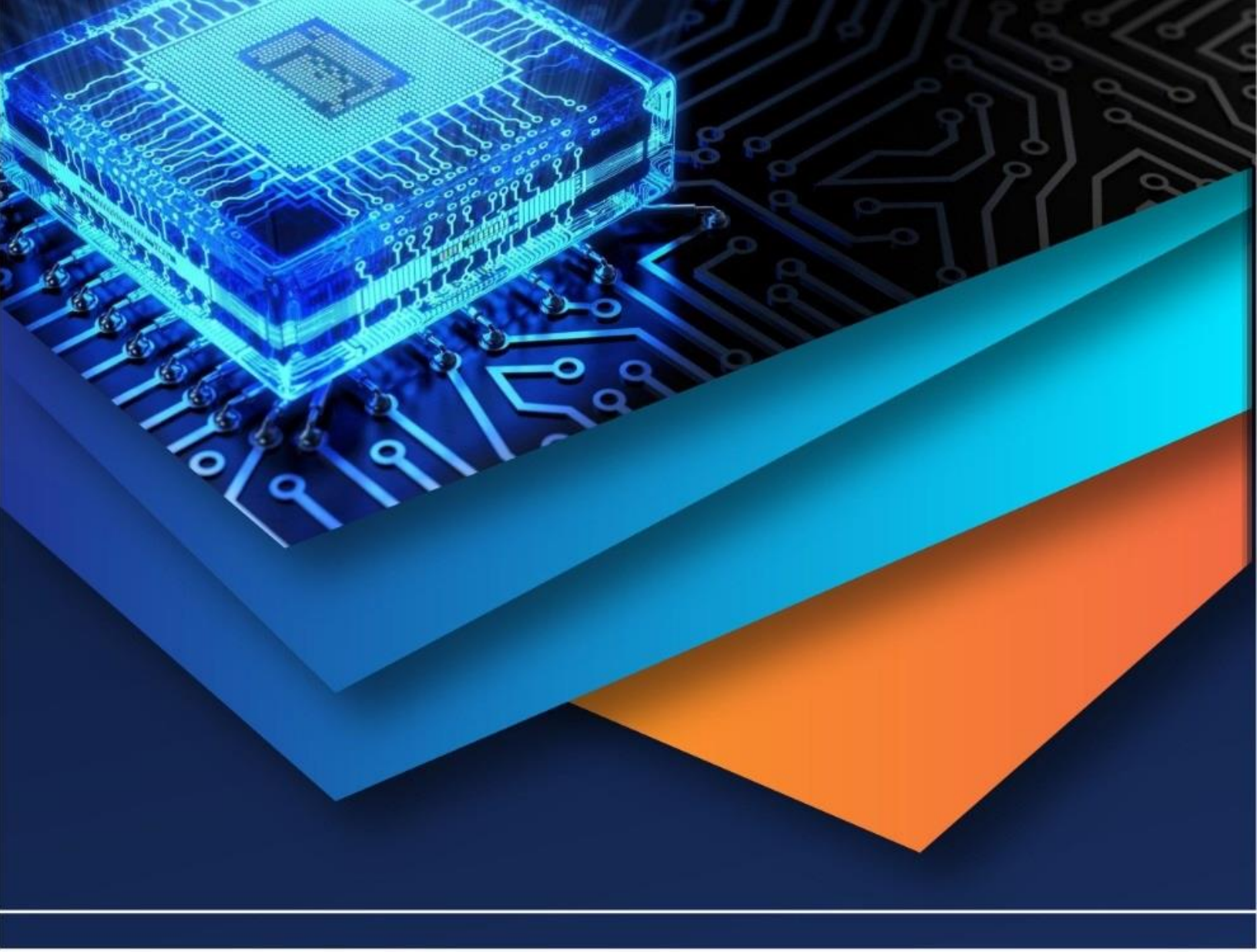
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