A DEEP LEARNER BASED SMART PRECISION AGRICULTURE SYSTEM USING MACHINE LEARNING

[1]W.MERCY M.E, [2]PRATHEEBHA RANI.S, [3]PRAVALIKA.B, [4]SUMITHRA .N

[1]Assistant Professor, [2,3,4]UG Students
Department of CSE,
Agni College of Technology, Chennai.

***Abstract*: This project tries to capture the evolution of Digital Agriculture based on the foundations of precision agriculture. The review of literature around the development of precision agriculture reveals that the data captured in the precision agriculture processes, if effectively used, can support extensive agronomic decision making. Precision Agriculture is the latest trends in the agriculture sector, which makes use of information technology to integrate all the procedures of farming from analyzing the soil-moisture, intelligent irrigation and weather forecasting etc. Our project enhance farming efficiency and increase sustainability through targeted management of agriculture land. Based on the real time field information and decision making, precision agriculture can optimize both farm productivity and profitability, which is the key goal of every successful farmer. This project is implement using machine learning algorithm.**

***Keywords*: Machine learning, Precision Agriculture, SVM, Digital Agriculture, Sci kit learn**

I.INTRODUCTION

Precision Agriculture(PA)(also known as "Precision farming", "site-specific crop management", "prescription farming" and "variable rate technology")has been developing since the 1990s,and refers to agriculture management systems carefully tailoring soil and crop management to fit the different conditions found in each field.PA is an information and technology based agriculture management system(e.g., using remote sensing, geographic information systems, global positioning systems and robotics)to identify, analyse and manage soil spatial and temporal variability within fields for optimum profitability, sustainability and protection of the environment. Precision Agriculture refers to the precise application of inputs with respect to soil, weather and crop name in order to improve productivity, quality and profitability in agriculture. More effective utilization of inputs will bring in more crop yield and quality without polluting the environment and will result in sustainable agriculture and sustainable development. The precision farming procedure can be summarized as follows,

i) Data pertaining to yield and potential yield-affecting factors are initially collected.
ii) Then analyzed to determine which factors are actually affecting the yield.
iii) If yield is being affected, a farm manager decides the type, distribution and amount of treatment to apply.
iv) Remedial measures can then be carried out to ensure that the correct treatment is applied at the required rate and to the appropriate area within the field.

II.RELATED WORKS

In the existing system of agriculture the crops are being monitored with the help of Arduino boards and GSM technology where in the Arduino boards act as a microcontroller but not as a server. It is designed to increase long term, site-specific and whole farm production efficiency, productivity and profitability while minimizing unintended impacts on wildlife and the environment. It is not a technology, it is management philosophy to respond to spatial variability.

Drawbacks:

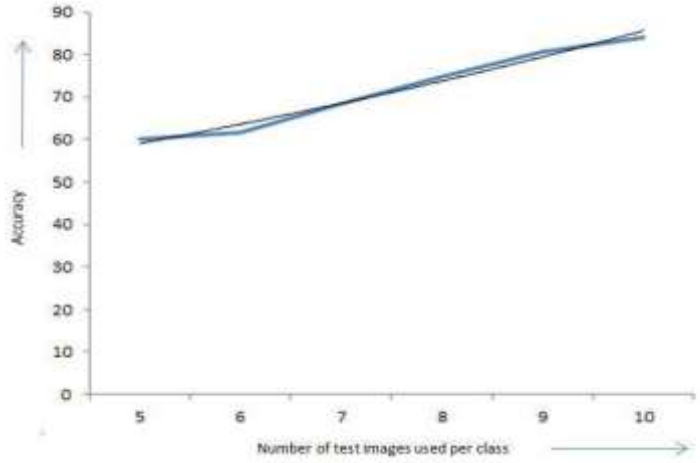
- Precision Agriculture techniques are still underdevelopment and requires expert advice before actual implementation.
- High capital costs may discourage farmers do not adopt this method of farming.
- It may take several years before the actual collection of sufficient data to fully implement the system.
- It is an extremely difficult task particularly the collection and analysis of data.

III.SUPPORT VECTOR MACHINE ALGRITHM

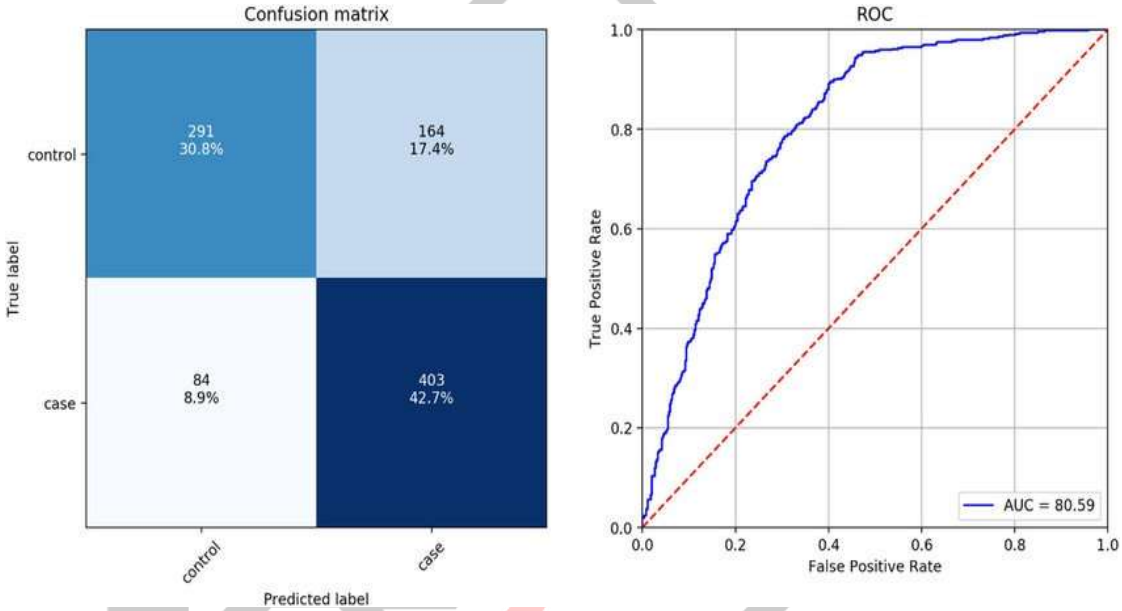
Remote monitoring through smart farming systems enables production yields to increase because farmers have more time to attend to their farms real issues applying their expertise to solving problems with pests, watering in any location, amending soil conditions all through the use of sensing and automation. Smart farming systems reduce waste, improve productivity and enable management of a greater number of resources through remote sensing. The combination of smart irrigation and control being linked to local sensors, as well as sensing for PH and other environmental conditions, including insolation and local temperature. We are adding an additional modules "selling and buying" with precision agriculture. In the proposed system, collecting input data from users such as air temperature, soil humidity and PH value to predicting the suitable crop for that inputs with better accuracy. During analysis we can obtain better results through Support Vector Machine Algorithm.

SVM Scikit learn Classifier: A comparison of a several classifiers in sci kit-learn on synthetic datasets the points of the example is to illustrate the nature of decision boundaries of different classifiers, This should be taken with a grain of salt, as the intuition conveyed by examples does not necessarily carry over to real datasets. Particularly in high dimensional spaces, data can move easily

be separated linearly and the simplicity of classifiers such has Naive Bayes and Linear SVMs might lead to better generalization than is achieved by other classifiers.

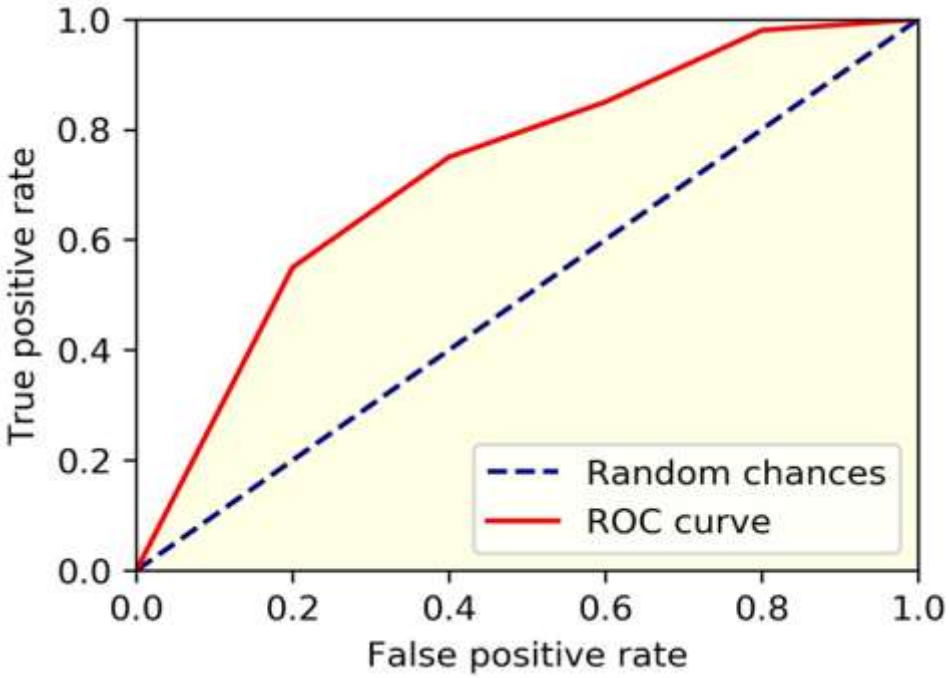


Representation of Accuracy using number of test data(X axis-number of test data,Y axis-Accuracy)



Representation of confusion matrix and AUC-ROC

1. A confusion matrix is a technique for summarizing the performance of a classification algorithm. Classification accuracy alone can be if you have an unequal number of observations-in each class or if you have more than two classes in your datasets. Calculating confusion matrix can give you a better idea of what your classification model getting right and what types of errors it is making.
2. A receiver operating characteristic curve, or ROC curve, is a graphical plot that illustrate the diagnostic ability of a binary classifier system as its discrimination threshold is varied. In this graph X axis should be false positive rate and Y axis should be true positive rate.



Diagrammatic representation of Algorithm results in ROC curve

This ROC curve compares both the results and contrast its accuracy.Where the X axis should be false positive rate and Y axis should be true positive rate.In this graph red line represent ROC curve and dotted line represent random chances.

Advantages of SVM classifier:

- High yields more profitability
- Less waste, better quality produce.
- More cost efficient farming.
- Improve farming procedure.
- Saves time.

IV.LITERATURE REVIEW

Precision Agriculture refers to a suite of technologies that may reduce input cost by providing the farm operator with detailed spatial information that can be used to optimize field management practices (National Research Council 1997).The adoptions of precision agriculture technologies have, so far, mostly been limited to parts of developed countries.

1. Horng et al[159]-Intelligent harvesting system using IOT and smart image recognition(CNN)

Description: This article highlights the potential of wireless sensors and IOT in agriculture, as well as the challenges expected to the faced when integrating this technology with the traditional farming practices.

2. Ebrahimie et al[133]-Prediction of SCM using decision tree algorithm,

Description: In this survey, we investigate the predictive BDA applications in supply chain demand forecasting to propose a classification of these applications, identify the gaps, and provide insights for future research.

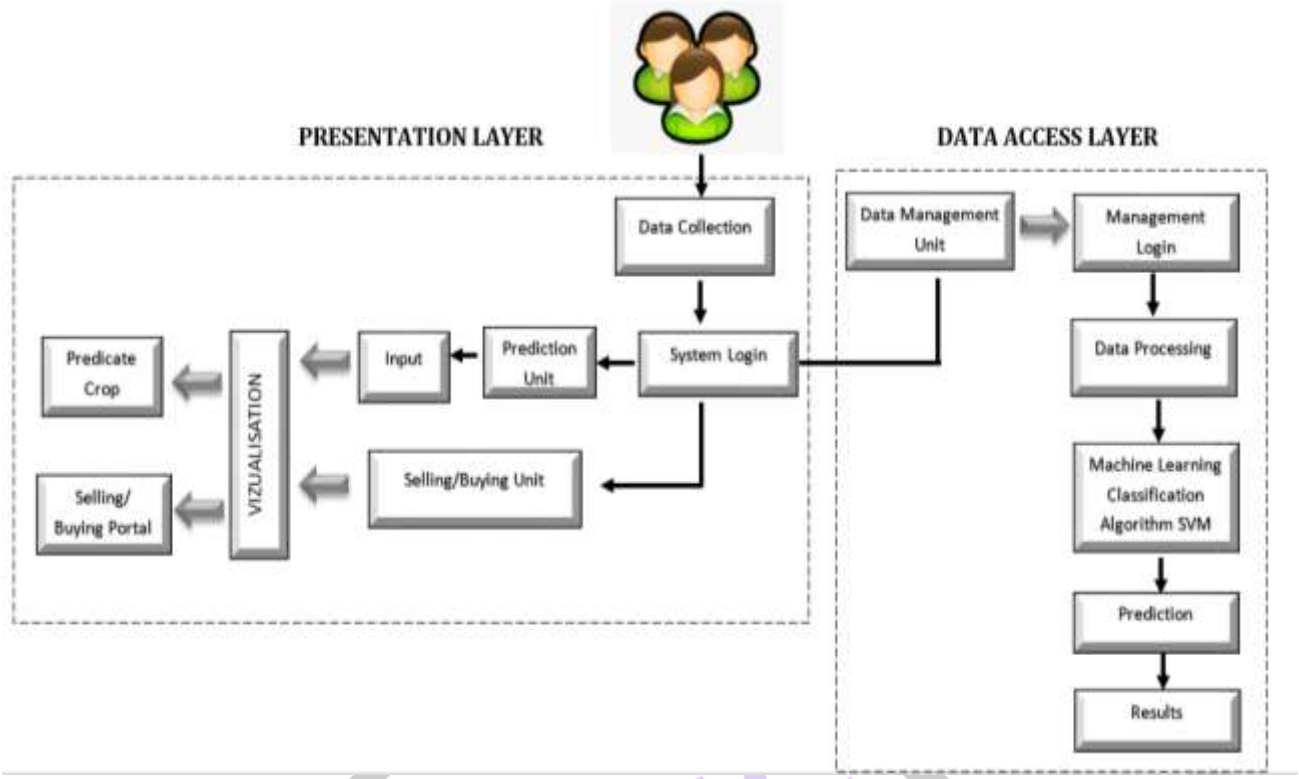
3. Hellin et al [124]-A decision support smart irrigation system based on climate and soil variables.

Description: This paper is aimed at presenting a wireless system architecture for smart irrigation, which adaptively evaluates the irrigation time according to the environmental conditions.

4. Emanuele Pierpaolia, Giacomo Carlia, Erika Pignattia and Maurizio Canavaria-Drivers of precision agriculture technologies adoption.

Description: This system uses the PA tools to identify the key drivers affected in agriculture.

V.SYSTEM ARCHITECHTURE



VI. MODULES

1. LOGIN MODULE

It is a portal module that allows users to type a email id and password to log in. You can add this module on any module tab to allow the users to log in the system.

2. REGISTER MODULE

The Register Module provides a conceptual framework for entering data. In this module user have to enter their name, mail id, mobile number and password. If later the user may forgot the password they have to choose the forgot option after that it will send the reset password to their registered mail id.

3. PURCHASE MODULE

Purchase module is tightly integrated with the inventory control and production planning modules. It often integrated with supply chain management software.

It automates the processes of identifying potential suppliers, negotiating price, awarding purchase order to supplier, and billing processes.

4. SALES MODULE

It is a highly integrated execution module. It draws most of its input from the following modules: Inventory module for verifying available and projected stock. Production module for production schedules and lead time of delivery.

5. PREDICTION MODULE

This software predictors are useful maintain the high quality of software product effectively. Where we can predict the crop which is suitable for the given input factors such as soil humidity, soil pH, rainfall air temperature. The objective of software prediction system is to find many benefits also defects.

VII.METRICS

Evaluating a model is a core part of building an effective machine learning model.There are several evaluation metrics,like confusion matrix ,cross validation,AUC-ROC curve etc.Where we use two types of evaluating metrics such as confusion matrix and AUC-ROC curve.Upto this metrics, we come up with 89% accuracy.

VII. RESULTS

Finally we get the result based on our algorithms and it will be show the predicted crop and better accuracy level through SVM.comparing other classification algorithm,SVM sci kit-learn classifier has a high level of accuracy with better utilization of inputs.Sci kit-learn is simple and efficient tools for predictive data analysis,which is accessible to everybody,and reusable in various contest.A comparison of a several classifiers in sci kit-learn on synthetic datasets the points of the example is to illustrate the nature of decision boundaries of different classifiers,This should be taken with a grain of salt,as the intuition conveyed by examples does not necessarily carry over to real datasets.Particularly in high dimensional spaces,data can move easily be separated linearly and the simplicity of classifiers such has Naive Bayes and Linear SVMs might lead to better generalization than is achieved by other classifiers.

VIII. SUMMARY AND CONCLUSION

Farming is the major source for survival in this world, here the future Farming is also wearing foots towards these smarter technologies with newer improvements in order to increase the productivity within short time. Future agriculture will use sophisticated technologies such as robots, temperature and moisture sensors, aerial images, and GPS technology.

Focus on smarter, better and more efficient crop growing, methodologies is required. In order to meet these demands we added a new prediction term, through that will get a better result. Hence, hereby we conclude that the precision agriculture is about the right thing, in the right place, in the right way, at the right time.

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