

# Artificial Intelligence Based Recommendation System For Farmers



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## ABSTRACT

Soil is an important ingredient of agriculture. There are several kinds of soil. Each type of soil can have different kinds of features and kinds of crops grow on different types of soil. We need to know the features and characteristics of various soil types to understand which crops grow better in certain soil types. Machine learning techniques can be helpful in this case. In recent years, it is progressed a lot. Machine learning is still an emerging and challenging research field in agriculture data analysis. In this, we have proposed a model that can predict soil with land type and according to prediction, it can suggest a suitable crop. Several machine learning algorithms are used for the prediction.

**Keywords—** Data analytic, Sensors, Machine Learning

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## I. INTRODUCTION

Agriculture is one of the most important occupations practiced in our country. It is the broadest economic sector and plays an important role in the overall development of the country. Thus, the modernization of agriculture is very important and thus will lead the farmers of our country towards profit. Data analytics (DA) is the process of examining data sets to conclude the information they contain, increasingly with the aid of specialized systems and software. Earlier yield prediction was performed by considering the farmer's experience in a particular field and crop. However, as the conditions change day by day very rapidly, farmers are forced to cultivate more and more crops. Being this as the current situation, many of them don't have enough knowledge about the new crops and are not completely aware of the benefits they get while farming them. Also, farm productivity can be increased by understanding and forecasting crop performance in a variety of environmental conditions.

The processing part also takes into consideration two more datasets i.e. one obtained from the weather department, forecasting the weather expected in the current year and the other data being static. This static data is the crop production and data related to the demand for various crops obtained from various government websites.

To measure the weather as well as soil parameters different sensors can be used to give accurate readings.

From sensors, we can get the soil results whenever it's needed. This will reduce the farmer's work. Depending on the numerous scenario and additional filters according to the user requirements, the most producible crop is suggested. The proposed method efficiently estimates soil parameters based on the sensor network that helps in predicting suitable crop for the soil under the test.

## II. PROBLEM STATEMENT

To propose a model that can suggest the crop by analyzing the soil parameters as well as environmental conditions.

## III. OBJECTIVES

- 1) To evaluate the scope and suitability of machine learning methods.
- 2) To analyze the performance of the model developed.
- 3) To predict crop before sowing seeds.
- 4) To reduce production costs and increase income.

## IV. SOFTWARE DESIGN

Data mining means identifying hidden patterns from large data sets and establishing a relationship among them to solve the problem through data analysis. The introduction of data mining in the agricultural field has made benefits in the research field. Classification is very important in any field of science to establish the fundamentals. It can help to find diversity between the objects and concepts. It also provides necessary information through which research can be made systematically. Soil is one of the key components in agricultural yielding crops. Soil classification philosophies follow the existence of knowledge and practical circumstances.

The machine learning methods used to find the soil type and land type. There are two different methods are used: weighted K-NN, Gaussian kernel-based SVM.

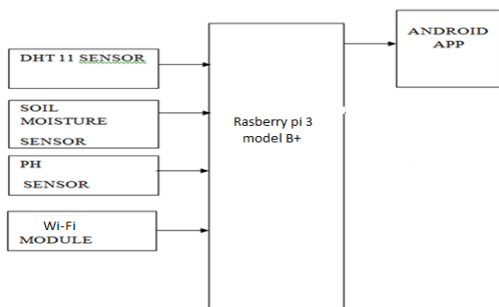
a) Weighted K- NN

A refinement of the K-NN classification algorithm is to weigh the contribution of each of the k neighbors according to their distance to the query point xq, giving greater weight wi to closer neighbors

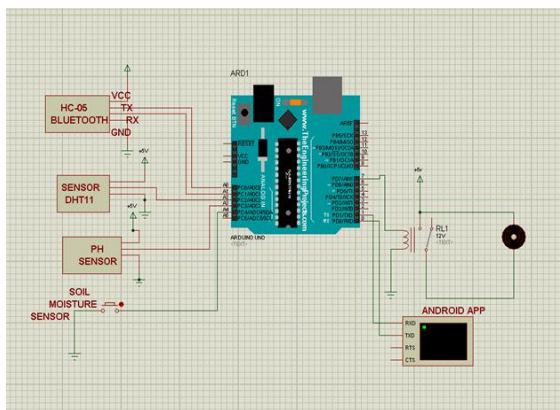
b) SVM

SVM is a supervised machine learning algorithm that works based on the concept of decision planes that defines decision boundaries. A decision boundary separates the object of one class from the object of another class. Support vectors are the data which are nearest to the hyper-plane. The kernel function is used to separate non-linear data by transforming input into a higher dimensional space. Gaussian radial basis function kernel is used.

**V. FIGURE AND TABLE**

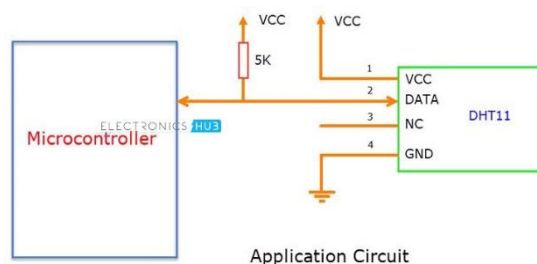


**VI. HARDWARE DESIGN**



1. Types Of Sensors:-

1) Humidity And Temperature Sensors:-



- a) Supply voltage:5V DC
- b) Temperature range:0-50deg cel
- c) Humidity:20-90% RH

2) Rainfall Sensor:-

- a) Supply:5V DC
- b) Tilting bucket arrangement
- c) Magnetic material to count the number of tilts
- d) Number of tilts is proportional to rainfall

3) Moisture Sensor:

- a) Wet: The output voltage decreases
- b) Dry: The output voltage increases

4) Ph sensor:-

- a) Measuring range : 0-14 ph
- b) Accuracy : +- 0.1 ph (25°C)

2. Controller:

Raspberry Pi 3 Model B+:-

- a) 1.4 GHz, 64-bit quad-core processor
- b) Dual-band wireless LAN
- c) Bluetooth 4.2 / BLE
- d) Faster ethernet
- e) Power- over Ethernet (with separate PoE HAT)

**VI. CONCLUSION**

The proposed system takes into consideration the data related to soil, weather and past year production and suggests which are the best profitable crops that can be cultivated in the apropos environmental conditions. As the system list out all the possible crops, it helps the farmers in decision making of which crop to cultivate. Also, this system takes into consideration the past production of data which will help the farmer get insight into the demand and the cost of various crops in the market. As maximum types of crops will be covered under the system, a farmer may get to know about the crop which may never have been cultivated.

In the future, all farming devices can be connected over the internet using IoT. The sensors can be employed on the farm which will collect the information

about the current farm conditions and the device can increase the moisture, acidity, etc accordingly. The vehicles used in farms like tractor will be connected to the internet in the future which will, in real-time pass data to the farmers about the crop harvesting and the diseased crop may be suffering from, thus helping farmers in taking appropriate action. Further, the best profitable crop can also be found in light of the monetary and inflation ratio.

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