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Predictive Analysis of IoT Based Digital Agriculture System using Machine Learning

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Abstract:
The proposed project provides a solution for Smart Agriculture by monitoring the agricultural field which can assist the farmers in increasing productivity to a great extent. The concept of IoT in the smart farming system has been developed in many areas of the world. Many researchers have developed monitoring and automation system for different functionalities of farming. The data sensed is related to temperature, moisture, and humidity which are responsible for causing diseases in a crop field, this data is stored on a cloud and then the analysis is performed on this data using Naive Bayes algorithm (Machine Learning algorithm).

Key words: Sensors, Prediction analytics, Internet of Things, Naive Bayes.

1. INTRODUCTION

We all know how mobile phone communications are impacting agricultural communities. IoT will further extend and amplify this impact. With IoT, farmers can monitor and manage every tiny detail from the humidity, temperature, moisture. And as these elements become connected, farmers stand to gain huge insights from Predictive Analytics that enable better decisions. IoT and remote sensing have helped unearth new innovations. For example, Ground Cover uses farm imagery to map and predict potato yields; its Canopy Check app adds geolocation information to farmers using smartphones. Monsanto's Integrated Farming System (IFS) uses science-based analytics tools such as Field Script for advice on planting, precision seeding, and genetic gain. Grow Safe Systems uses sensors and analytics to track the movement and health of cattle and help farmers deal with disease detection and prevention.

2. PROPOSED SYSTEM

In Proposed system data like humidity, temperature, moisture is sensed through sensors then Machine learning algorithm is used for prediction. Data Sensed is compare with data which are stored on past experience, and the result is generated. As per the generated result farmer will take the decision from this system for increasing profit margin.

3. PREDICTIVE MODEL

Naive Bayes classifier is a collection of classification algorithms based on Bayes' Theorem. It is a family of algorithms where all of them share a common principle, i.e. every pair of features being classified is independent of each other.

The fundamental Naive Bayes assumption is that each feature makes an:

- Independent
- Equal

contribution to the outcome. With relation to our dataset, this concept can be understood as:

- We assume that no pair of features are dependent. For example, the temperature being 'COLD' has nothing to do with the humidity or the outlook being 'rainy' has no effect on the winds. Hence, the features are assumed to be independent.
- Secondly, each feature is given the same weight. For example, knowing only moisture and temperature alone can't predict the outcome accurately. None of the attributes is irrelevant and assumed to be contributing equally to the outcome.

Bayes' Theorem finds the probability of an event occurring given the probability of another event that has already occurred. Bayes' theorem is stated mathematically as the following equation:

$$P(A|B) = \frac{P(B|A)P(A)}{P(B)}$$

where A and B are events. Basically, we are trying to find the probability of event A, given the event B is true. Event B is also termed as evidence.

- P(A) is the prior of A (the prior probability, i.e. Probability of event before evidence is seen). The evidence is an attribute value of an unknown instance (here, it is event B).
- P(A|B) is a posteriori probability of B, i.e. probability of an event after evidence is seen.

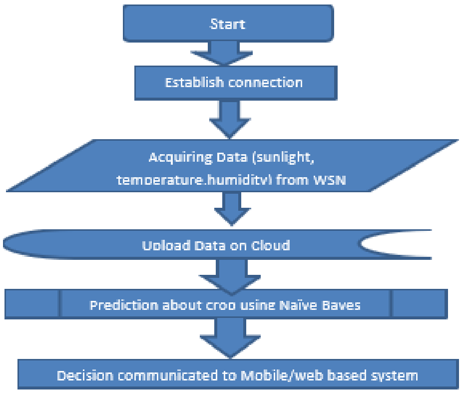
Now, with regards to our dataset, we can apply Bayes' theorem in the following way:

$$P(y|X) = \frac{P(X|y)P(y)}{P(X)}$$

where, y is class variable and X is a dependent feature vector (of size *n*) where:

$$X = (x_1, x_2, x_3, ..., x_n)$$

4. DESIGN:



Step1: Connection will be established between the IoT device and Cloud.

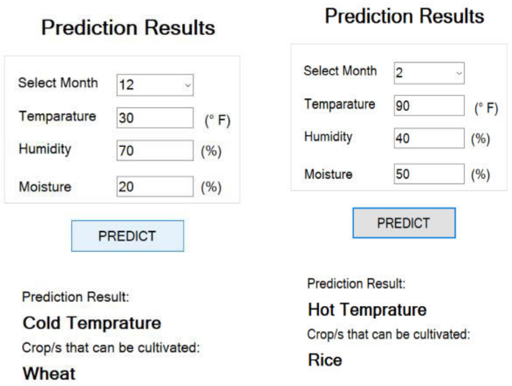
Step 2: Data acquiring from sensors.

Step 3: This data will send to cloud storage.

Step 4: Result will be predicted using Naive based algorithm.

Step 5: Decision made is sent to farmers on their phone through SMS.

5. RESULTS:



6. CONCLUSION

The proposed system provides IoT based smart agriculture solution using Naive base Machine learning algorithm. This system can unleash a range of benefits. It can increase the productivity of agricultural workers by automating processes such as switching on remote farming equipment, which also reduces travel costs. IoT, along with analytics, can reveal new insights into the seasonal planning of crops, and thus increase food safety and mitigate crop failure risks.

7. ACKNOWLEDGEMENT

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