

Survey on Soil Classification and Crop Profit Determination Using Machine Learning

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Abstract— Soil is very important natural resource necessary for agriculture. There are various types of soil. Each type of soil can have different kinds of features and different kinds of crops grow on different types of soil. It's very important to know the feature and characteristics of various kinds of soil and to understand which crop grows better in correct soil types. Machine learning techniques can be useful in this case. In this paper we have proposed a model that can predict soil series with various kinds of input with profit prediction. And according to prediction it can advice which crop is profitable. Data analytics is playing very important role in transforming data and information to a concrete decision in the field of agriculture. Machine learning algorithms are applied to convert data from unstructured to structured one in transformation. This paper presents a survey on soil behavior, prediction of crop yielding and application of data mining techniques to analyze the soil for agricultural purpose. Finally the crops are analyzed using ongoing crop details and then which tells us whether a crop is profitable or not.

Keywords— Soil types, Prediction, Transformation, Data analytics, Profit

1. INTRODUCTION

In the Indian economic growth agriculture is one of the important aspect. But in the past few years, Agriculture in India has lost its power over world Agriculture development. There are many reasons for the downside of agriculture in India. The main reason is that most of the farmers in Agriculture are illiterates and unaware of the recent communication technologies.

Data mining in agriculture field has made benefits in research field. Classification is very important in any field of science to establish the fundamentals. It is useful to find the difference between the objects and concepts. It also provides necessary information through which research can be made in consistently. We all know that soil is key element of agriculture field for yielding crops. Soil classification is the separation of soil into classes each having similar characteristics and potentially similar behaviour.

In Bangladesh there were almost 500 soil series which are identified by Soil Resources Development Institution (SRDI). Soil series means a group of soils with similar profiles developed from different parent materials under comparable climatic and vegetation conditions. Each series consists of pendons soil colour, soil texture, soil structure, soil pH, consistence, mineral and chemical composition and arrangements in the soil profile.

Each of the soil has different names and it is named after its locality. In Bangladesh it is a starting point of classification to create a platform for its correlation with international soil classification systems. Soil series names are given after their locality for having a convenience of that particular series can be differentiated with another.

The aim of the project is to build a system which will predict the suitable crop to the farmer so that farmer can increase his profit. It gathers information about the cultivable crops in locality of farmer, so it is helpful to farmer to choose the best crops. The system considers various environmental factors such as soil, water content and so on that helps the farmer to choose the crop area. Crops cultivated in different places around states so that the farmers can come to know about the ongoing crop details and predict the best crop that allows him to get more profit. The system uses various criteria such as place, crop type, soil type, season, number of farmers cropping the same crop, crop duration etc.

In this project we need to know the features and characteristics of various soil types to understand which crops grow better in certain soil types. The role of data analytics in transforming data and information to concrete decision in the field of agriculture has been gaining importance. Machine learning also has its stake and especially in agriculture sector as well like in education, banking, healthcare and retail field.

2. RELATED WORK

There are many reasons for the downside of agriculture in India. Considering the facts that most of the farmers in Agriculture are illiterates and unaware of the recent communication technologies have also became the reason for downside of Agriculture. Different algorithms and techniques which would help the farmers to increase the yields and earn profit are required.

With an increasing world population and changing climate, has come the necessity to secure the world food resources. Farmers are faced with having to make difficult decisions as to how remain productive and sustainable with changing climates and market economic pressure. The provision of accurate and timely information such as meteorological, soil, use of fertilizers, use of pesticides, can assist farmers to make the best decision for their cropping situations.

Administrator is responsible for overall functioning of the system and provides area, crop, and stock information to the system. Farmers will get the list of best profitable crop of their area.

3. EXISTING SYSTEM

It is hard to farmers to get back the inversed money from the crop because of the market value of the crop when it comes to the market. Farmers will not know the market value until they bring their crop to the market which makes the farmer to struggle a lot.

4. METHODOLOGY

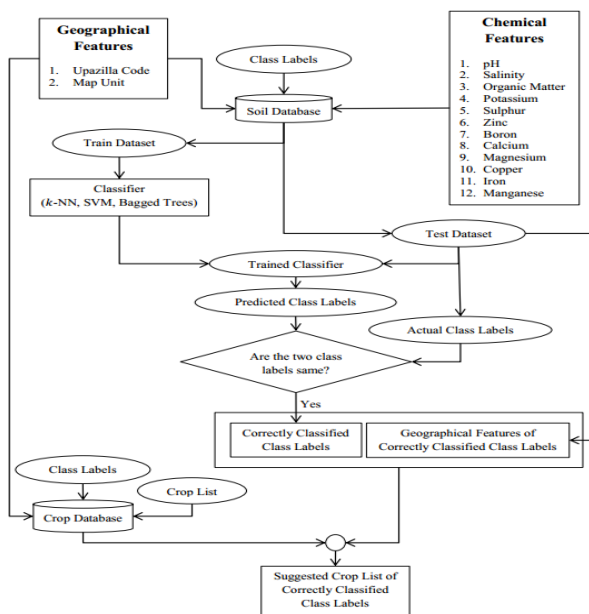


Fig. 1: Proposed System Architecture

The crop rates can be controlled if there is a system which helps the farmers to know about the crops planted around his location with prediction to suggest the farmers about the crop to be cultivated to maximize profit. This proposed system will gather information about all the crops that are cultivated from different places around the states. Farmers can use this system to know about the ongoing crop details and to predict the best crop that allows him to get more profit. This system uses various criteria such as place, population, crop type, soil type, stock, current requirement, season, number of farmers cropping the same crop, crop duration etc to predict crop for farmers.

A. Product Functions

- Proposed system defines a model that can predict the best profitable crop and according to prediction it can suggest suitable profitable crops using machine learning approach.
- System is trained with stock, area and crop datasets to know the features and system will predict the best profitable crop based on stock level, population, number of farmers growing the same crop in that area, season etc.

B. Data intelligent platform

A data analytics platform for intelligent agriculture is proposed. This platform consists of four phases such as Data discovery phase, Data preparation phase, Data analytics phase, Visualization phase. Data can be collected from multiple heterogeneous databases. The data source may be internal sources, external sources or other intelligent sources. The pre-processing includes handling noisy data and removing irrelevant data. The analytics phase offers set of machine learning algorithm that would be getting executed for specific objective functions.

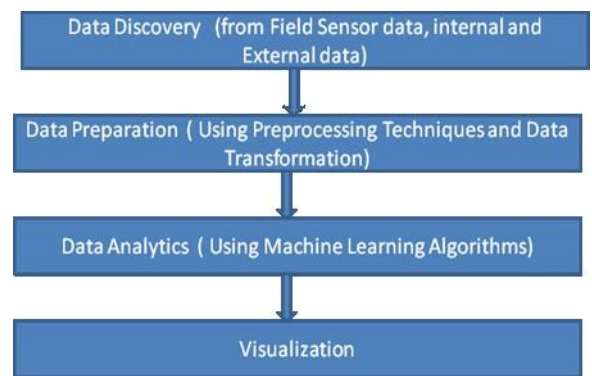


Fig-2 Data Analytics platform for intelligent agriculture framework

C. Algorithm: ID3

In decision tree learning, ID3 (Iterative Dichotomiser 3) is an algorithm invented by Ross Quinlan wont to generate a choice tree from a dataset. The ID3 algorithm is precursor to the C4.5 algorithm and is typically used in the machine learning and tongue processing domains. Throughout the algorithm, the choice tree is made with each non-terminal node (internal node) representing the chosen attribute on which the information was split, and terminal nodes (leaf nodes) representing the category label of the ultimate subset of this branch.

5. CONCLUSIONS

Our proposed system presents a technique to select sequence of crops to be planted over season. This method may improve the financial status of a farmer by predicting the best crop that can be cropped.

The proposed method resolves selection of crop based on prediction yield rate influenced by parameters (e.g. weather, soil type, population, stock, crop type and ongoing crop). It takes ongoing crop details, stock details, plantation days and area as input and finds a crop whose production returns maximum profit to farmer.

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