

SOIL CLASSIFICATION AND CROP SUGGESTION USING MACHINE LEARNING

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Abstract: *In general, agriculture is the backbone of India and also plays an important role in Indian economy by providing a certain percentage of domestic product to ensure the food security. But now-a-days, food production and prediction is getting depleted due to unnatural climatic changes, which will adversely affect the economy of farmers by getting a poor yield and also help the farmers to remain less familiar in forecasting the future crops. This research work helps the beginner farmer in such a way to guide them for sowing the reasonable crops by deploying machine learning, one of the advanced technologies in crop prediction. Naive Bayes, a supervised learning algorithm puts forth in the way to achieve it. The seed data of the crops are collected here, with the appropriate parameters like temperature, humidity and moisture content, which helps the crops to achieve a successful growth. In addition as the software, a mobile application for Android is being developed. The users are encouraged to enter parameters like temperature and their location will be taken automatically in this application in order to start the prediction process.*

Keywords: *Machine Learning, Raspberry Pi*

1. INTRODUCTION

From ancient days, agriculture is considered as the main source of supply to satisfy the daily needs of human lives. It is also considered a primary occupation, and also one of the India's major industrial sectors. The farmers are ought to follow a traditional naked eye observation and yielded healthy crops without the involvement of chemicals for animals and also to their cultivation land in order to keep healthy diversity. But nowadays, weather conditions are being rapidly changing against the elemental assets to deplete the food and increase the security. In meantime, the GDP in agricultural sector is keep on decreasing, where in 2005 it was about 17.211.1, in 2018 it was 52020 it came down to 2farmers come from rural areas, and if the

revenue from crop production goes down, their lifestyle would be influenced by the farms at industry level.

Motivation

Main motivation is to minimize the time required for the surveying process which leads to delayed insurance claims. Develop a farmer friendly chatbot to ask queries.

2. METHODOLOGY

A. Problem statements

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. Here we can use clustering technique to group data, and then classified the data by the order of soil and places with Random Tree algorithm. Then apply apriority Mining process to generate an association rule for finding suitable crops for the specific soil. Soil series and land type combine represents the soil class in the database.

B. System Architecture

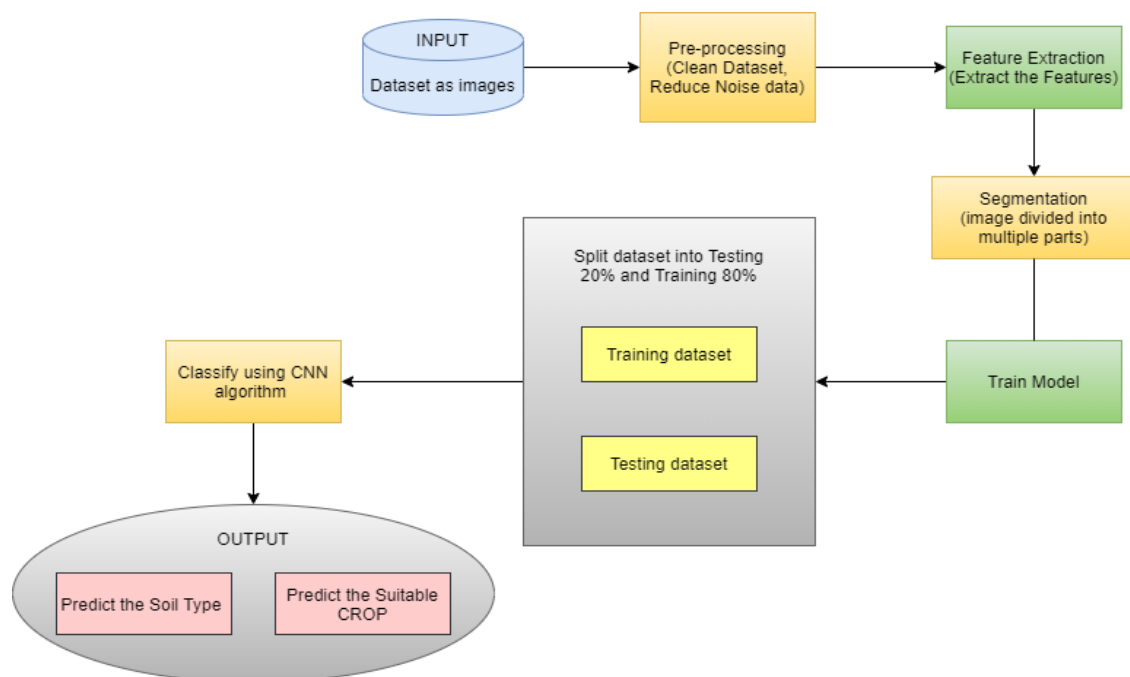


Fig.1: System Architecture

C. Hardware and Software Requirement

1) Software Requirement:

- Python idle/pycharm development environment for Python coding.
- Sublime for html and css coding.

2) Hardware requirement

- Pc/Laptop (4gb Ram/ above i3 processor)

3. LITERATURE SURVEY

Paper Name: Crop Yield Analysis Using Machine Learning Algorithms

Author: Fatin Farhan Haque, Ahmed Abdelgawad, Venkata Prasanth Yanambaka, Kumar Yelamarthi

Abstract: Agriculture is not only a huge aspect of the growing economy, but it's essential for us to survive. Predicting crop yield is not an easy task, as it depends on many parameters such as water, ultra-violet (UV), pesticides, fertilizer, and the area of the land covered for that region. In this paper, two different Machine Learning (ML) algorithms are proposed to analyze the crops' yield. These two algorithms, Support Vector Regression (SVR) and Linear Regression (LR), are quite suitable for validating the variable parameters in the predicting the continuous variable estimation with 140 data points that were acquired. The parameters mentioned above are key factors affecting the yield of crops. The error rate was measured with the help of Mean Square Error (MSE) and Coefficient of Determination (R²), where MSE gave out approximately 0.005 and R² gave around 0.85. The same dataset has been used for quick comparison between the algorithms' performances.

Paper Name: An Analytical Approach for Soil and Land Classification System using Image Processing.

Author: Prof. A. V. Deorankar

Abstract: In the last few decades researchers are interested in land mapping and its classification due to various reasons. The reasons for an increase in the focus of the research community are, the increasing demand for agricultural land and soil health analysis, as the health of the soil, is essential for the healthy production of crops. Image classification is one such approach for soil and land health analysis. It is a complex process having the effects of various factors. This paper has proposed the study of current researches, the problems it addressed, and its prospects. The emphasis is focused on the analytical study of various advanced and efficient classification mechanisms and techniques. Here, it has been attempted to study the factors these approaches have addressed to improve the accuracy of the classification. Proper utilization of the number of features of remotely sensed data and

selecting the best suitable classifier are most important for improving the accuracy of the classification. The knowledge based classification or Non-parametric classifiers like decision tree classifier or neural network have gained more popularity for multisource data classification in recent times. However, there is still the scope of further research, to reduce uncertainties in the improvement of accuracy of the Image classification mechanisms.

Paper Name: Crop Yield Prediction using Machine Learning Techniques

Author name: Ramesh Medar

Abstract: Agriculture is the field which plays an important role in improving our countries economy. Agriculture is the one which gave birth to civilization. India is an agrarian country and its economy largely based upon crop productivity. Hence we can say that agriculture can be backbone of all business in our country. Selecting of every crop is very important in the agriculture planning. The selection of crops will depend upon the different parameters such as market price, production rate and the different government policies. Many changes are required in the agriculture field to improve changes in our Indian economy. We can improve agriculture by using machine learning techniques which are applied easily on farming sector. Along with all advances in the machines and technologies used in farming, useful and accurate information about different matters also plays a significant role in it. The concept of this paper is to implement the crop selection method so that this method helps in solving many agriculture and farmers problems. This improves our Indian economy by maximizing the yield rate of crop production.

Paper Name: A Study on Various Data Mining Techniques for Crop Yield Prediction

Author: Yogesh Gandge

Abstract :India is a country where agriculture and agriculture related industries are the major source of living for the people. Agriculture is a major source of economy of the country. It is also one of the country which suffer from major natural calamities like drought or flood which damages the crop. This leads to huge financial loss for the farmers thus leading to the suicide. Predicting the crop yield well in advance prior to its harvest can help the farmers and Government organizations to make appropriate planning like storing, selling, fixing minimum support price, importing/exporting etc. Predicting a crop well in advance requires a systematic study of huge data coming from various variables like soil quality ,pH ,EC,N,P,K etc. As Prediction of crop deals with large set of database thus making this prediction system a perfect candidate for application of data mining. Through data mining we extract the knowledge from the huge size of data. This paper presents the study about the various data mining techniques used for predicting the crop yield. The success of any crop yield prediction system heavily relies on how accurately the features have been extracted and how appropriately classifiers have been employed. This paper summarizes the results obtained by various algorithms which

are being used by various authors for crop yield prediction, with their accuracy and recommendation.

Paper Name: Crop prediction using predictive analytics

Author: P. S. Vijayabaskar, Sreemathi.R, Keertanaa.E

Abstract: This work is to construct a model for testing the soil fertility. It also suggests the crop which has to be planted depending upon the value obtained from the sensor. It also provides the regional wise information about the crop in the form of graph. We have farmer chat where the farmers can share and get idea from the expert by registering in this application. It also suggests the fertilizer which has to be added to the soil in order to increase the crop productivity. It helps the farmer to analyze the fertility of their yard and plant the better crop to increase their productivity and profit. It also provides the information about the fertilizer to be added in the soil and also provide the information about the nearby fertilizer shop.

Paper Name: Real-Time Monitoring of Agricultural Land with Crop Prediction and Animal Intrusion Prevention using Internet of Things and Machine Learning at Edge

Author: Nikhil R

Abstract: Agriculture is considered as a foundation of life, since it is the primary source of food and other raw materials. It plays a crucial part in the country's economic development. Sadly, many of our farmers cultivate their land using the conventional methods. We should replace these obsolete techniques of farming with advanced techniques. The proposed system describes how the use of the IOT and ML techniques can be combined to make the irrigation smart. The proposed system saves time avoiding problems like constant vigilance over the field by using IOT devices, crop prediction helps the farmers to grow suitable crops depending on the soil parameters by the use of machine learning techniques and it also helps in prevention of the intruders like wild animals into the field. It also helps in water conservation by supplying the plants / field with minimal amount of water automatically through the help of sensors depending on the water requirements. and finally, SMS and Email notifications will be sent to the farmer mobile phone during the abnormal conditions of his farm. The proposed system can be used for taking edge decisions in real time.

Paper Name: Supervised Classification of Spectral Signatures from Agricultural Land-Cover in Panama Using the Spectral Angle Mapper Algorithm

Author name: Javier E. Sanchez-Gal

Abstract: In this article the development of a database of referenced spectral signatures from agricultural land-cover for the Republic of Panama is presented. This database consists of reflectance spectra measured on crops and low vegetation, such as: rice, chili, onion, watermelon, maize and bare soil and of satellite images of their plots. Details of the integration process of the database and software developed for the manipulation of spectral signatures, are described. The Spectral Angle Mapping algorithm (SAM) is used for the supervised

classification of the agricultural coverages in the database. On the one hand, results indicate the possibility of using this classification technique for the automatic determination of crops and even different phenological stages in a crop via a satellite image. On the other hand, results highlight the limitations of using this technique on recently planted crops and soil flooded by rain or with soil cultivated with a low agricultural cover crop. We foresee the use of this methodology and database for agricultural land surveys, crop management or used in the general organization of the territory.

Paper Name: Soil Classification and Crop Suggestion using Image Processing

Author: T. Abimala, S. Flora Sashya and K. Sripriya

Abstract: This paper is intended to support agriculture by classifying 7 different types of soils like Clay, Clayey Peat, Clayey Sand, Humus Clay, Peat, Sandy Clay and Silty Sand, and in suggesting suitable crops that could be grown in those particular soils using image processing. Pre-processing is done by using Low Pass filter. HSV, GLCM, Gabor Wavelet algorithms are used for feature extraction. HSV, GLCM are used to perform colour based feature extraction. Gabor filters are used to perform texture based feature extraction. The features obtained from the test image are then compared with the features obtained from the images in the dataset. Matching of image features is achieved by training the Decision Tree classifier with statistical measurements like mean, standard deviation, skew and kurtosis. Finally the soil is predicted with the help of segmented images that are given as input for simulation using Matlab R2018a and is followed by crop suggestion.

4. APPLICATION

1. It can be used by new comers in agricultural field.
2. Quick information about soil and predicted crop.

5. CONCLUSION

Agriculture is the field which helps in economic growth of our country. But this is lacking behind in using new technologies of machine learning. Hence our farmers should know all the new technologies of machine learning and other new techniques. These techniques help in getting maximum yield of crops. Many techniques of machine learning are applied on agriculture to improve yield rate of crops. These techniques also help in solving problems of agriculture. We can also get the accuracy of yield by checking for different methods. Hence we can improve the performance by checking the accuracy between different crops.

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