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Research Article

E-agricultural system based intelligent predictive analysis and smart farming with digitalized demand and supply utilization to maximize the yield rate of crops using machine learning algorithm

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Abstract. Agriculture is one of the essential supplements of our society. Soil is essential to related agriculture. The composition of soil differs from soil to soil. The Growth of Crops is laid low with those chemical capabilities of soil. Choosing the proper sort of vegetation for that specific sort of soil is likewise essential. Machine Learning strategies may be used to categorise the soil collection statistics this undertaking provides a soil retrieval device which takes enter photograph as a Soil pictures taken from vicinity Using Deep gaining knowledge of set of rules to categorise soil and additionally advise the crop info and offer the weather condition. Many farmers lack cash and want to get rid of their products as soon as possible. This means that even if the harvest is good, farmers may run into trouble if the harvest cannot be delivered outside the town. Your product must also be delivered to consumers within a reasonable time frame at a reasonable cost.

Key word: Crop Prediction, Soil classification, Support vector machine, Machine learning Algorithm, transportation, farmer-Customer-transportation

1. Introduction

Agriculture is the backbone of the country's growth and economy. On the contrary, production has dropped sharply. As an alternative, demand is growing rapidly, and many organizations and governments are striving to meet demand. The project can predict the output. Almost all kinds of plants in India. This allows farmers to use simple parameters (such as state, region, time of year) to predict the yield in the year they want high yields, and helps farmers sell their products directly to farmers. For consumers and businesses in the food industry, the application is intended to be used in farmers' updated information systems. In addition, local languages are also supported to promote exchanges among farmers. The web application treats farmers as sellers and buyers. The purpose of the project is to assist farmers purchase or sell their basic merchandise and agricultural products. The app enables farmers to sell their goods at reasonable prices and even makes transactions fair. Consumers are relative currencies. This huge range enables consumers to choose from a wide variety of products, choose products according to their requirements and apply filters. Transportation plays a vital role in handling cargo. To assess the current situation, a powerful system requires clear forms. Yes. Appropriate transportation and methods of connecting farmers, transportation includes providing online transportation services.

We have set up a website to help farmers, buyers and truck owners connect with each other. Farmers can directly sell products to customers, and customers can also directly negotiate with farmers to purchase products at a production rate. Helping to buy and sell products at affordable prices.

The next important function of the system is the connection between farmers and transportation. Although farmers are willing to sell their products directly to customers, they are fascinated by the choice of affordable transportation methods. Only choose transportation methods at the right time, but directly link farmers and transportation agencies with transportation needs. This will help you both choose the right growth path.

2. Existing system

Information technologies increasingly provide assistance in systematic approach to solving agricultural problems. All agricultural enterprises need professional analysis of their agricultural data, undertaking which is long term and very expensive. The Existing System consists of only few details they are information gathering about seasonal crop and fertilizer. The major drawback in the existing system is that there will be no contacts between the admin and the farmers.

Cone Penetration Testing (CPT) is cheaper alternative for soil classification. In digital images, the color histogram represents the number of pixels that have colors in a fixed list of color ranges.SVM schemes are designed to ensure that dot products may be computed easily in terms of the variables in the original space of soil texture.

3. Proposed system

The Farming system provides its users and researches to urge online information about, the crop, statistical details and new tendencies. the most features of the knowledge system includes information retrieval facilities for users from anywhere. This system helps farmers in much way they can get all the information about agriculture. Farmers can be easily interacting between the admin, they can clarify any doubts they have and also queries can be placed.

Soil texture is a crucial soil characteristic that drives crop production and field management. In proposed system, implement feature extraction approach to predict the soil color and texture. Classify the soil type using machine learning algorithm is named as Support vector machine. Recommend the soil types, crop details and also provide the climate information with improved accuracy rate.

The proposed system constitutes the prediction of crop yield by using Artificial Neural Network algorithm for areas where datasets are easily accessible and by using Convolution Neural Network algorithm through satellite imagery which allows us to predict crop yield in remote areas whose datasets are not easily distinguished. The fundamental objective is to compare the output of ANN and CNN to verify whether the results in crop prediction are accurate. This paper utilizes crop yield prediction strategies to forecast the appropriate crop by identifying diverse soil and atmospheric condition parameters. This paper demonstrates the ability of the artificial neural network to monitor and predict crop yields in remote areas and cities.

This CNN algorithm can also be used for the prediction of drought and other unfavourable climatic that could affect the crop yield prediction. The most practical and difficult issue in agriculture is making sure the crop yield production is maintained on an increasing scale by using ANN and CNN to predict the crop yield and take necessary action if needed to ensure the crop yield is going to give greater profit. This gives a rise in the development in agriculture. It also defines area and problem specific machine learning approach and further consolidates these into a robust machine learning approach.

4. System architecture

4.1. Figure 1 explains the architecture of crop prediction using machine learning algorithm.

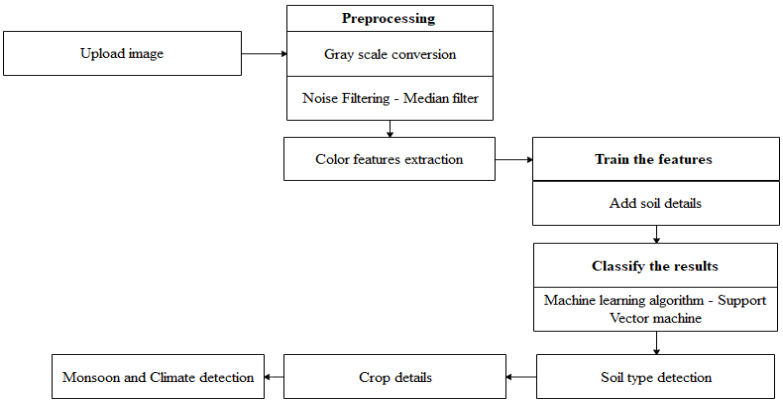


Figure 1 explains the architecture of crop prediction

4.2. Figure 2 explains the architecture of transportation

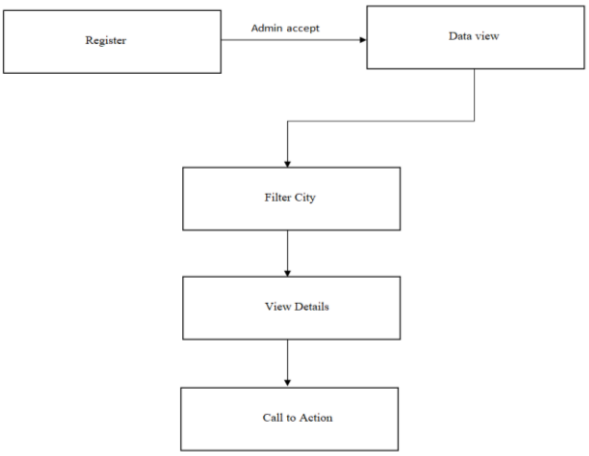
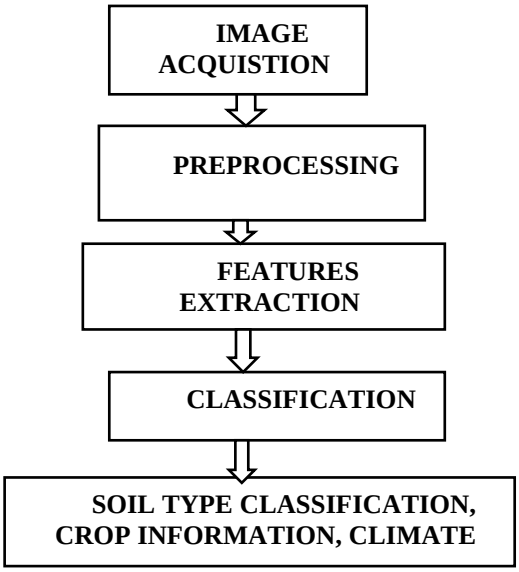


Figure 2 explains the architecture of transportation

5. Work flow



5.1. Modules

- Image acquisition
- Preprocessing
- Feature extraction
- Machine learning algorithm

5.1.1. Image Acquisition

The developed of soil science began with the establishment of modern soil classification, making soil classification and research the most classic and basic research category.

In this module, we can load the soil image data set.

The basic image can be of any type and size. Images of the earth can be obtained from satellites.

5.1.2. Preprocessing

Convert RGB images to greyscale images in this module.

The color of the earth is always green, and various changes in the atmosphere reduce the reliability of this color characteristic.

Then use filtering technology to eliminate image noise.

The purpose of the filter. Used to filter out image noise. A typical filter is designed to produce the desired frequency response.

5.1.3. Features extraction

Feature extraction simplifies the amount of resources required to accurately describe large amounts of data. When performing complex data analysis, one of the main issues is the number of variables involved. Although texture plays an important role in image analysis and pattern recognition, some architectures still implements an extraction algorithm for extracting color, shape, shape, and texture features from preprocessed images.

5.1.4. Machine learning algorithm

Machine learning is part of AI (artificial intelligence) under research, which includes statistical techniques that allow computers to learn from data without explicit programming.

Learning defines the automatic retrieval of structure descriptions. Compared with traditional statistical methods, machine learning does not make any assumptions about the exact structure of the data model that describes the data. This attribute is very useful for describing complex nonlinear behaviours such as performance prediction.

The support vector machine algorithm is used to identify the earth based on the design value of the vector. Including the use of supervised and unsupervised teaching methods and improved teaching methods to predict outcomes.

6. Result

Soil classification is to find the characterization of soil systems and find the name of the soil and also predict the suitable crop for that soil. Based on climatic conditions the crop name may differ. So more number of crops that can be grown in different soil conditions.

In our project we are taking a large dataset therefore we can get the details regarding a greater number of crops. Here we have use the machine learning algorithm for classify the soil. Using machine learning algorithm we

convert the Image as a gray scale image and we train the data set images to classify. Each and every pixel in the images is identified to analyze the soil's characteristics. We made this to farmer for easily accessible and it gives accurate prediction and speedy way of result.

We did easily understandable UI for all farmers and common people as well. Since we are using machine learning model of higher predicting accuracy, and our project gives the best results which is easily understandable for farmer and common people. There are many advanced implementations are done in our project compared to the previous papers. In our project we implement the platform for farmers, in that they can sell their agriculture products. The transporters have the specific login in that platform. Through that the transporters and buyers can interact. We can give feedback and rating for farmer therefore we can buy the product form highly rated farmer, so that it used for all people who have interest with forming and who need agriculture products.

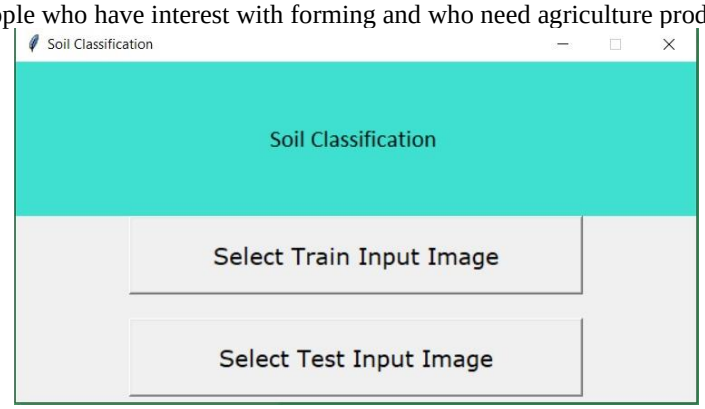


Figure 3 Soil classification

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Python 3.7.5 (tags/v3.7.5:5c02a39a0b, Oct 15 2019, 00:11:34) [MSC v.1916 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
========== RESTART: E:\soil\main.py ==========
E:/soil/Alluvial_22.jpg
Alluvial_22.jpg
Feature Point:[10.139435732644744, 0.19191148735132404, 0.01762931536841258, 0.34796181128840864]
E:/soil/Red_11.jpg
Red_11.jpg
Feature Point:[1.4103601133131258, 0.887198717822066, 0.04548729597511216, 0.687263110493881]
[3]
RED_Soil
You can Plant below crops:- { Cotton,Wheat,Pulses,Millets,OilSeeds,Potatoes }
E:/soil/Red_11.jpg
Red_11.jpg
Feature Point:[1.4102985966901065, 0.8871929779434807, 0.04550458918858944, 0.687315040731178]
[3]
RED_Soil
You can Plant below crops:- { Cotton,Wheat,Pulses,Millets,OilSeeds,Potatoes }
```

Figure 4 Soil classification outcomes

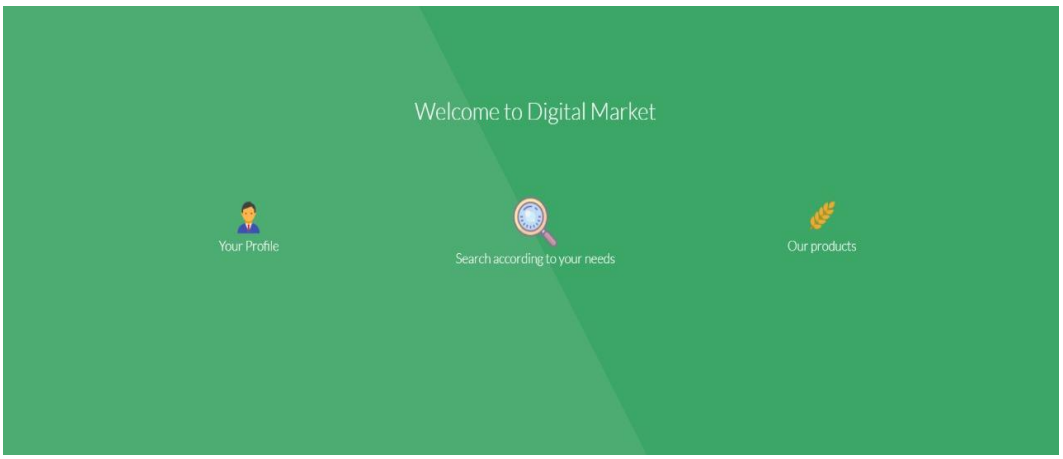

Figure 5 View of user homepage

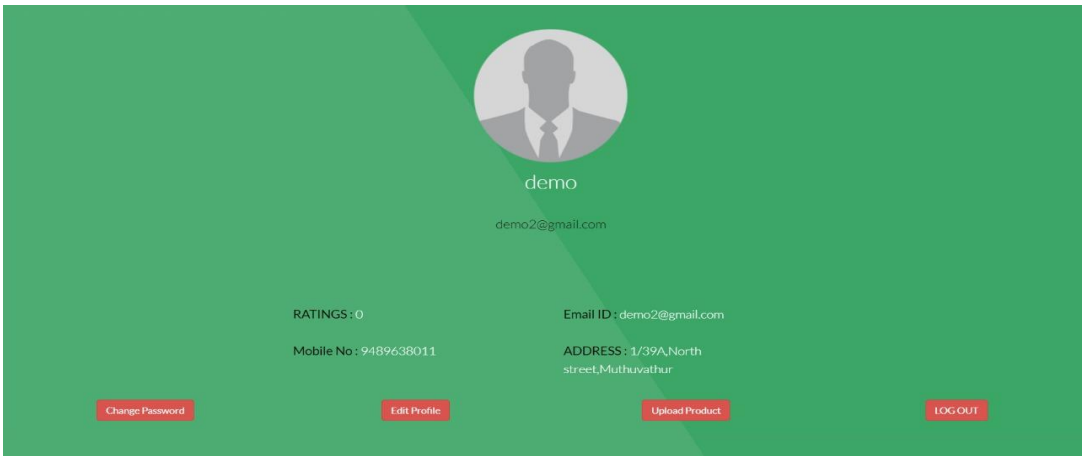

Figure 6 View of user profile

7. Conclusion

The new proposed algorithm based on machine learning (support vector machine algorithm). It is used to segment the image and divided into small image patches. Then the soil features are extracted from the small image patches. Sparse representation is applied; the sparse representation is solved again for the test image pixels and optimized to improve the accuracy of the classification. Through that the algorithm we can analyze the performance analysis by various parameters to ensures the accurate classification done by the proposed algorithm.

8. Further Enhancement

To done a further enhancement in future we can extend the UI frame work to implement new technologies like various neural network algorithms using that we can find various parameters like humidity and using some sensors find the temperature as well. We can add the daily weather report also. Through that the farmers plan the day accordingly. In further we can research the telephoto images such as other planet image. Using that images we can done the soil classification more research about the soil. Each planet has their own characteristics and different weather conditions so that the neural network algorithms are used to research such constrains.

References

1. Srunitha, K., and S. Padmavathi (2016), "Performance of SVM classifier for image based soil classification." 2016 International Conference on Signal Processing, Communication, Power and Embedded System (SCOPES). IEEE.
2. Gurubasava, Mahantesh S.D(2018), " Analysis of Agricultural soil pH using Digital Image Processing." International Journal of Research in Advent Technology
3. Charytanowicz, Małgorzata, and Piotr Kulczycki (2015), "An image analysis algorithm for soil structure identification." Intelligent Systems' 2014. Springer, Cham, 681-692.
4. Priyanka Dewangan, (2018) “Soil Classification Using Image Processing and Modified SVM classifier”
5. Shenbagavalli, R., and K. Ramar.(2011) "Classification of soil textures based on laws features extracted from preprocessing images on sequential and random windows." Bonfring International Journal of Advances in Image Processing1.Inaugural Special Issue , 15-18.
6. Petersen, L. (2018). Real-Time Prediction of Crop Yields From MODIS Relative Vegetation Health: A Continent-Wide Analysis of Africa. Remote Sensing, 10(11).
7. You, J., Li, X., Low, M., Lobell, D., & Ermon, S. (2017). Deep Gaussian process for crop yield prediction based on remote sensing data. In Thirty-First AAAI Conference on Artificial Intelligence.
8. Ghadge, R., Kulkarni, J., More, P., & Nene, S. Prediction of Crop Yield using Machine Learning.
9. Vinciya, P., & Valarmathi, D.A. Agriculture Analysis for Next Generation High Tech Farming in Data Mining.
10. Noureldin, N. A., Aboelghar, M. A., Saudy, H. S., & Ali, A. M. (2013). Rice yield forecasting models using satellite imagery in Egypt. The Egyptian Journal of Remote Sensing and Space Science, 16(1), 125-131.
11. Sengan Sudhakara, Syed Musthafa.A,(2020) “A Fuzzy based High-Resolution Multi-View Deep CNN for Breast Cancer Diagnosis through SVM Classifier on Visual Analysis”, Journal of Intelligent & Fuzzy Systems, IOS Press, 10.3233/JIFS-189174, Page 1-14.
12. Murugan G, Syed Musthafa.A, Mohanraj.B, Priyanga.S, Krishnan.C(2020), “High Security Distributed MANETs using Channel De-noiser and Multi-Mobile-Rate Synthesizer”, International Journal of Advanced Trends in Computer Science and Engineering, Volume 9, No. 2, ISSN 2278-3091, Page 1346-1351.