

AN EFFECTIVE MACHINE LEARNING TECHNIQUE FOR CROP YIELD PREDICTION

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Abstract: - Machine Minerals can be hard to predict since they contain many minerals, water, organic matter, and untold animals that are fragments of once-living objects that break down. All types of plants may be grown in the media used to hold the soil particles in place. We may state with confidence that soil is an essential in agriculture. The types of soil vary considerably. This means that some can have a different characteristics that fit single-crop growers while others can support a multitude of various types of different crops. it is important that we know which type of soil our soil is well in order to use it. Use of Machine learning techniques to determine the types of soil and determine what crops can grow well.

Keywords: - Series, Land type, Chemical feature, Geographical attribute, Machine learning, KNN, SVM,

I INTRODUCTION

There are many soil series to choose from in India, I've got a lot to choose from. Every soil has its own features; it can be good for a variety of crops and produce a wide range of crops. Farmer's soil is good for most crops, but we know that special crops thrive there in soil as well. The key aim of the ultimate purpose of the investigation is to create viable soil classification models alongside which come valuable recommendations for cultivators and crops. and other chemical characteristics may be used to find and classify different soil types such as temperature, texture, or geographic variables may be used to consider various kinds of properties, such as pH, illumination, soil classification, and colour, which all of soil, Another primary factor in providing farmers with abundant land is agriculture is manure, which fosters the production of fertile soil. Census, scenarios, population density, and subsoil are usually used as being one of the many techniques for soil classification It was found that there is a relationship between land characteristics, including the level of stratification, and samples of the soil and other natural phenomena, such as landscape, all have very distinct properties

II LITERATURE REVIEW

Saroj Kumar Lenka, Ambarish G. Mohapatra, "Gradient descent with momentum based neural network pattern classification for the prediction of soil moisture content in precision agriculture"[1]. Many people are aware that growing food in arid or semi-arid lands will aid in the conservation of water and soil, although some still remain unaware. Using the latest real-time soil and environmental parameters to project future soil moisture conditions can make it possible to be accurate and reliable for future crop irrigation. As far as this paper is concerned, we describe one method of using a neural-network pattern recognition, like Gradient-Descent with Momentum is

concerned, this approach is a variation of that is being employed. Efforts are made to have been able to expand the coverage of environmental criteria to eleven hour lead to greater accuracy by means of an algorithm testing eleven distinct variables around the soil and the fields. In terms of MSE, the errors are calculated (analysed) and reported; and in terms of root mean square error, the predictions (MSE) are. This article covers the proven ability of soil moisture prediction to do well on that, which you will want to see.

Sk Al Zaminur Rahman, Kaushik Chandra Mitra, S.M. Mohidul Islam, "Soil Classification using Machine Learning Methods and Crop Suggestion Based on Soil Series" [2]. Soil is an important ingredient of agriculture. There are several kinds of soil. Each type of soil can have different kinds of features and different kinds of crops grow on different types of soils. 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 agricultural data analysis. In this paper, we have proposed a model that can predict soil series with land type and according to prediction it can suggest suitable crops. Several machine learning algorithms such as weighted k -Nearest Neighbor (k -NN), Bagged Trees, and Gaussian kernel based Support Vector Machines (SVM) are used for soil classification. Experimental results show that the proposed SVM based method performs better than many existing methods.

M van Rooyen, N Luwes, E Theron, "Automated Soil Classification and Identification Using Machine Vision"[3]. Classification of soils, in particular active soils including clay, of base used in the construction of a home. Current soil identification methods are time consuming, often unreliable or

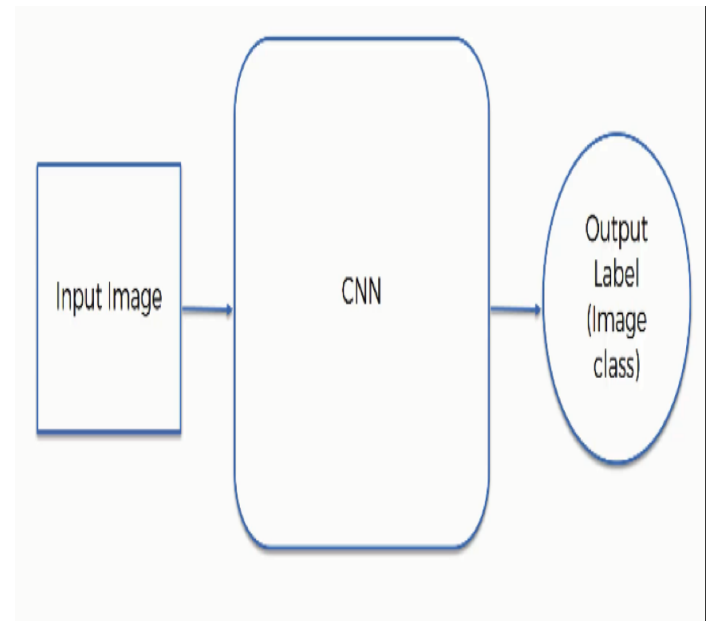
very costly. Inaccurate findings may result in the incorrect foundation form causing foundations to shift and the building to break and become unstable. By using an integrated device applying machine vision, more precise outcomes can be obtained and test durations can be reduced significantly.

Srunitha.k,Dr.S.Padmavathi , “Performance of SVM Classifier For Image Based Soil Classification”[4]. To separate the soil into groups and its soil characteristics is to soil groups, in turn, with characteristic behaviour and method of dissolving the latter. Food exporting is nearly anywhere on product as food as a matter of course: Virtually all countries rely on exporting something related to the farm, which means virtually all of them depend on soil characteristics. Classification and characterization of soil properties are very crucial to soil fertility testing. The soil type has already been identified; now preventing agricultural product loss is unnecessary. the mechanical properties of the material can serve as the principal factor in an engineer's classification This paper discusses how soil type classification is accomplished using the machine learning method known as help vector machines. Soil classification involves things like taking a file, preprocessing it, and extracting features, among other things. Images of different types of soil texture are obtained by passing them through a low-pass filter, Gabor functions, and using colour quantization. Mean amplitude, standard deviation, histogram, and standard deviation are assumed to be statistical parameters.

Sofianita Mutalib, S-N-Fadhlan Jamian,Shuzlina Abdul-Rahman, Azlinah Mohamed , “Soil Classification: An Application of Self Organising Map and k-means”[5]. This paper discusses the application of two unsupervised methods in classifying type of soils. Soils that are suitable for agricultural activities can be classified into four classes which are hill soil, organic soil, alteration soil and alluvium soil. In addition, no specific support system is able to classify the type of soil and retrieve the information for location and suitable plants for local purposes. In this study, we applied self organizing map (SOM) and k-means in constructing the classification model.. The inputs for this study are color, texture, drainage class and terrain. Throughout the process of training and testing, the classification rate for this SOM and k-means are 91.8% and 79.8% respectively.

III ALGORITHM

Convolutional network (CNN) is a deep learning algorithm that can attach variable value to various image features. CNNs have high precision when used for image detection and identification due to their use in medical imaging applications. CNN's concept is similar to a funnel. It first starts at the bottom, then broadens out into a broader range of recipients and is eventually after the time period of time all those participating in the network can all receive the same or same message



IV PROBLEM STATEMENT

It's ideal for a different kind of plant. In this method, we are using machine learning methods, we're classifying the soil with the use of our farms and advising farmers according to it. The expansion of the machine learning techniques used to classify soil and crop, in the context of the multi-variable logistic model, tends to reduce cost.

V OBJECTIVE

- The main goal of this project is to classify soil series.
- As well as to predict suitable crop.

VI PROPOSED SYSTEM

A small amount of soil is an essential to agriculture. The soil consists of many varieties. A given type of soil can support a certain species of plant, or crop, but different types of plant and crop can have different properties. It is important to have knowledge of the characteristics and features of different soil types if we want to know which crops do well in those soils. Conversely, these machine learning methods might be just what is needed here. When it comes to data organisation, it is possible to use the clustering method to first group it, and then classify the data based on soil and locations using the Random Tree algorithm. We can apply priority expansion to find a suitable crops to find an association rule of that helps with soil type When expanding a soil sequence or a soil type, these become soil categories in the database. , the system's ability to accurately forecasts the maximum capacity of an irrigation system has to produce yield the next year (i.e. soil series and land type). Three separate classification approaches are employed: multinomial logistic, kernel tree, and bagged support vector machine.

VII SYSTEM ARCHITECTURE



Explanation:

- (a) Soil dataset as an input.
- (b) Next step is pre-processing on dataset.
- (c) Provide classification of soil and then prediction of crop.(d) SVM classifier is used to detect and classify the soil. Regression is used to predict the crop.

VIII CONCLUSION

There is a mathematical model developed to simulate soil sequence and yield, and recommended for it to aid in making appropriate decisions on what crops to plant in them. The machine learning model has been tested with different classifiers that allow different algorithms to be used. In terms of total bagged trees, BAG and K-NN does have a decent accuracy, but with less time, SVM was the classifier to identify the best soil classification. We are going to gain a better accuracy level of understanding as well as we are going to help farmers

REFERENCE

- [1]<https://www.techopedia.com/definition/1181/data-mining>. [Accessed date:19th August, 2018] .
- [2]http://www.library.arizona.edu/exhibits/swetc/azso/body.1_div.6.html . [Accessed date:19th August, 2018.
- [3] Gholap, J., Ingole, A., Gohil, J., Gargade, S. and Attar, V., 2012. Soil data analysis using classification techniques and soil attribute prediction. arXiv preprint arXiv:1206.1557.
- [4] Ramesh, V. and Ramar, K., 2011. Classification of agricultural land soils: a data mining approach. Agricultural Journal, 6(3), pp.82-86..
- [5] Gholap, J., Ingole, A., Gohil, J., Gargade, S. and Attar, V., 2012. Soil data analysis using classification techniques and soil attribute prediction. arXiv preprint arXiv:1206.1557.
- [6] Devi, M. P. K., Anthiyur, U., & Shenbagavadivu, M. S. (2016). Enhanced Crop Yield Prediction and Soil Data Analysis Using Data Mining. International Journal of Modern Computer Science, 4(6).
- [7] Ramesh, D., & Vardhan, B. V. (2013). Data mining techniques and applications to agricultural yield data. International journal of advanced research in computer and communication engineering, 2(9), 3477-3480.

[8] KNN algorithm, http://www.data-machine.com/nmtutorial/distance_weighted_knn_algorithm.htm.

[9] SVM, <https://www.kdnuggets.com/2016/07/support-vector-machines-simple-explanation.html>.

[10] Bagging, <https://medium.com/@harishkandan95/bagging-the-skill-of-bagging-bootstrap-aggregating-83c18dcabdf1>.