A Project Report on

SOIL MOISTURE PREDICTION

Submitted in partial ful llment of the requirements for the award

of the degree of

Bachelor of Engineering

in

COMPUTER SCIENCE

by

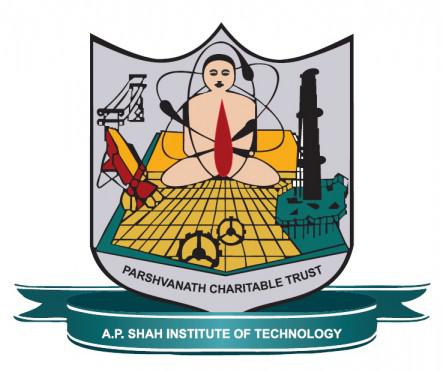
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Approval Sheet

This Project Report entitled SOIL MOISTURE PREDICTION Submitted by SHUBHAM PADTE(16102058),PRADIPT KALAMKAR (16102028),PANKIT KHIMASIYA (16102034), is approved for the par-tial ful llment of the requirenment for the award of the degree of Bachelor of Engineering in Branch Name from University of Mumbai.

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CERTIFICATE

This is to certify that the project entitled \Title of project" submitted by \Name of student1" (Student ID),\Name of student2" (Student ID),\Name of stu-dent3" (Student ID),\Name of student4" (Student ID) for the partial ful llment of the requirement for award of a degree Bachelor of Engineering in Branch Name.,to the University of Mumbai,is a bona de work carried out during academic year 2017-2018.

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Declaration

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, We have adequately cited and referenced the orig-inal sources. We also declare that We have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsi ed any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Abstract

Prediction of soil moisture in advance is useful to the farmers in the field of agriculture. In this paper we have used machine learning techniques such as multiple linear regression, support vector regression and recurrent neural networks for prediction of soil

moisture . These techniques were applied on datasets collected from different online repositories.

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List of Abbreviations

SVR: SUPPORT VECTOR REGRESSION

RNN: RECURRENT NEURAL NETWORK

MLR: MULTIPLE LINEAR REGRESSION

ANN: ARTIFICIAL NEURAL NETWORK

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Chapter 1

Introduction

India is a country where majority of the population is dependent on agriculture for their livelihood. Indian soils are less fertile especially in case of micronutrients . In recent years, it has been seen that soil health is somehow related with the sustainability in the field of agriculture and also the current crop yield levels can be improved by maintaining the fertility of the soil. Agriculture needs decision support system in variety of ways such as type of crop to be cultivated .By monitoring soil moisture, water usage can be optimized to a large extent as the water table is lowering day by day.

Recurrent neural network (RNN) :-

These are neural networks which are suitable for

modeling sequence of inputs, like speech data, natural language dataetc. They have the same structure as that of a feed-forward neural network or artificial neural network (ANN), but unlike the acyclic nature of ANN, RNN has cyclic connections also. The neurons in a layer can be connected to one another and can even be connected to itself which was not allowed in ANN. Because of this cyclic

nature, previous inputs are used to compute outputs at each step and thus, RNNs have a memory of previous events by using which it can make further

predictions.

Support Vector Regression(SVR):-

The support vector regression is based on the concept of vectors and since it depends on some data points it is less prone to outliners. For regression task, the loss function is defined such that it ignores the error for the data points which are within a certain distance from the true values

*Multiple linear regression*

It is a commonly used regression technique in a wide variety of problems. Multiple linear regression assumes linear relationship between the variables and

tries to fit all the given data points with a straight line minimizing the residual error. Itis an extended version of the linear regression. As it takes all the data points into account while finding the optimal line, it is more prone to outliers.

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Chapter 2

Literature Review

Data mining techniques plays a significant role in the field of agriculture .Good crop yield prediction results have been achieved by many researchers after applying data mining techniques under different climatic scenario .Data mining techniques were used in order to estimate tea yield analysis of four regions of Assam using the multiple linear regression .Nowadays machine learning is

one of the state of art techniques for predicting unknown values. This paper deals with the prediction of soil moisture using machine learning. RNN is a powerful tool for learning sequential data, like time series data, natural language data, etc. It predicts the output not just on the basis of present inputs but also remembers previous inputs and outputs to better learn the interdependence of inputs .In recurrent neural network an echo state network for the prediction of seed moisture content is used and compared with Elman network .Other neural network techniques can also be used for the prediction purpose

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Result

We concluded the result based on Mean Squared Error (MSE). MSE is the mean of square of errors, i.e. the difference between the true values and the predicted values. It is one of the most commonly used prediction parameter to compare various regression models. Hence it is observed from the tabulated results that multiple linear regression shows better predictive capability in comparison to the other two methods. It is also observed that recurrent neural network is not a good predictive model as its results are inferior to both multiple linear regression and SVR.

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Chapter 6

Conclusions and Future Scope

In this paper, we introduced machine learning techniques for prediction of soil moisture in advance. We have used multiple linear regression, support vector regression and recurrent neural network for the prediction. From the results it is concluded that multiple linear regression is superior to the support vector regression and recurrent neural network. The prediction results are pretty good for 1 day ahead. This will help the farmers to adjust their management strategy beforehand. refers to the amount of water within pore spaces found in a volume of soil. Water is essential for photosynthesis, the process essential for plant growth and, therefore, soil moisture is an important agricultural consideration. The data provided by our prediction can provide farmers with useful information to help maximise crop productivity and yield. are a tool used to estimate crop yield by inputting relevant data, and so soil moisture measures provided by our predicted moisture can be entered into these models. It reduces the rate of root proliferation as well as air and water mobility in the soil. This means less water is available to the plant, and therefore growth rate decreases. High soil moisture increases the potential for compaction, so the data provided by can be vital in determining when farmers can use heavy machinery on their fields without soil degradation.

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Appendices

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