IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

ISO 3297:2007 Certified ⋇ Impact Factor 7.39 ⋇ Vol. 11, Issue 6, June 2022

DOI: 10.17148/IJARCCE.2022.11663

CROP GROWTH PREDICTION USING DEEP LEARNING

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Abstract: The agricultural production mainly aims to generate high yield for the crops.Prediction of the crop on a global scale and regional scale is highly important for the agriculture management sector, crop farmers, food trade policies and carbon cycle research. To maintain the high demand and secured level of food chain supply to the people, the prediction of crop yield is a national priority for the government. To get most crop yield at minimum value is one of the primary goals in agriculture. Detecting and dealing with troubles related with crop yield indicators in early stages of the rural field can give benefits in expanded yield and elevated earnings too. By reading weather styles of a specific location, massive-scale meteorological phenomena will have a completely green impact on agricultural production. The crop yield predictions can be utilized by farmers to reduce losses when negative conditions may occur. Also, predictions may be used to maximize crop prediction while there is favourable situation for farming. We are currently developing an automated yield estimation system that optically estimates crop yield in orchards during various stages of growth. Instead of using traditional machine vision, we build on recent advances in support vector machine (SVM) to provide results about crop details with improved accuracy rate.

1.INTRODUCTION

This paper aims at collecting and analysing temperature, rainfall, soil, seed, crop production, humidity and wind speed data (in a few regions), which will help the farmers improve the produce of their crops. Firstly, we pre-process the data in a Python environment and then apply the Map Reduce framework, which further analyses and processes the large volume of data. Secondly, k-means clustering is employed on results gained from Map Reduce and provides a mean result on the data in terms of accuracy. After that, we use bar graphs and scatter plots to study the relationship between the crop, rainfall, temperature, soil and seed type of two regions (Ahmednagar, Maharashtra and, Andaman and Nicobar Islands). Further, a self-designed recommender system has been used to predict the crops and display them on a Graphic User Interface designed in a Flask environment. The system design is scalable and can be used to find the recommended crops of other states in a similar manner in the future.

1.1.OBJECTIVE

A good form design is necessary to ensure the following navigation To keep the screen simple by giving proper sequence, information, and clear captions. Meet the intended purpose by using appropriate forms ensure the completion of form with accuracy. Keep the forms attractive by using icons, inverse video, or blinking cursors etc.

1.2 SCOPE

In coming years, can try applying data independent system. That is whatever be the format our system should work with same accuracy. Integrating soil details to the system is an advantage, as for the selection of crops knowledge on soil is also a parameter. Proper irrigation is also a needed feature crop cultivation. In reference to rainfall can depict whether extra water availability is needed or not. This research work can be enhanced to higher level by availing it to whole India.

2.ANALYSIS

2.1 SYSTEM ANALYSIS

System Analysis is a combined process dissection the system responsibilities that are based on problem domain characteristics and user requirement.

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2.1.1 Existing System

The main objective of this research work is to provide a methodology so that it can perform descriptive analytics on crop yield production in an effective manner. Although, some studies revealed statistical information about the agriculture in India, few studies have investigated crop prediction based on the historic climatic and production data. Classification algorithms accept been acclimated for assorted purposes including classification, clustering, agent quantization, arrangement association, action approximation, forecasting, ascendancy applications and optimization. In existing system implement Principal component regression is a two steps method. Firstly, in PCR method stores the variables and reduces the dimensionality of the data and again stores in the structure of table. It extracts the most variation of data and performs feature selection so that dimensionality could be reduced. And find the first factor in the direction maximizes the dispersion of the observation, and other factor should be also maximizing in the dispersion of diagonal of the first factor. And then we can rotate the factor perpendicular and for more dimensional data we can continue in a combined approach. The result of PCR is the representation of the variation of the sampleles of less dimensional data. Secondly we try to fit a linear regression between the samples on the factors which are mostly correlated with factors. PCR solves the multidimensional space problem and co-linearity problem in an efficient manner.

2.1.2 PROPOSED SYSTEM

Predicting crop yield based on the environmental, soil, water and crop parameters has been a potential research topic. Deep-learning-based models are broadly used to extract significant crop features for prediction. Though these methods could resolve the yield prediction problem there exist the following inadequacies: Unable to create a direct non-linear or linear mapping between the raw data and crop yield values; and the performance of those models highly relies on the quality of the extracted features. Deep reinforcement learning provides direction and motivation for the aforementioned shortcomings. Combining the intelligence of reinforcement learning and deep learning, deep reinforcement learning builds a complete crop yield prediction framework that can map the raw data to the crop prediction values. In this project, we use deep neural networks to predict yield, check yield, and yield difference of corn hybrids from genotype and environment data. Deep neural networks belong to the class of representation learning models that can find the underlying representation of data without handcrafted input of features. Deep neural networks have multiple stacked non-linear layers which transform the raw input data into higher and more abstract representation at each stacked layer. As such, as the network grows deeper, more complex features are extracted which contribute to the higher accuracy of results. Given the right parameters, deep neural networks are known to be universal approximate functions, which means that they can approximate almost any function, although it may be very challenging to find the right parameters.

3.MODULES

3.1 MODULES

- Datasets acquisition
- Preprocessing
- Features extraction
- Yield estimation
- Crop details

3.2 MODULES DESCRIPTION

3.2.1 DATASETS ACQUISITION

In this module, we can upload the crop yield datasets in the form of CSV file format. And also store the data in database for future purpose. The dataset includes the temperature, rain fall, pH value, nitrogen, phosphorus, potassium values. These values are extracted from Kaggle website and values are stored in the form of integer values.

3.2.2 PREPROCESSING

Data pre-processing is an important step in the data mining process. The phrase "garbage in, garbage out" is particularly applicable to data mining and machine learning projects. Data preparation and filtering steps can take considerable amount of processing time. In this module, we can eliminate the irrelevant values and also estimate the missing values of data.

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3.2.3 FEATURES EXTRACTION

Feature selection refers to the process of reducing the inputs for processing and analysis, or of finding the most meaningful inputs. In this module, select the multiple features from uploaded datasets. And train the datasets with various crop labels with multiple attribute values. We can train the datasets to multiple crops such as rice, maize and so on.

3.2.4 YIELD ESTIMATION

In this module, we can implement support vector machine algorithm to classify the uploaded datasets. Support vector machine algorithm is one of the most popular Supervised Learning algorithms, which is used for Classification as well as Regression problems. However, primarily, it is used for Classification problems in Machine Learning. The goal of the SVM algorithm is to create the best line or decision boundary that can segregate n-dimensional space into classes so that we can easily put the new data point in the correct category in the future. This best decision boundary is called a hyper plane.

3.2.5 CROP DETAILS

Appropriate prediction of crop productivity is required for efficient planning of land usage and economic policy. In recent times, forecasting of crop productivity at the within-field level has increased. The most influencing factor for crop productivity is weather conditions. In this module, we can test the datasets by using Machine learning algorithm. Finally provide the details about crops and yield information with improved accuracy rate. The accuracy of the project is calculated in terms of Precision, Recall and F-measure values.

4.RESULT AND DISCUSSION

This paper reinforces the crop production with the aid of machine learning techniques. The technique which results in high accuracy predicted the right crop with its yield. The machine learning algorithms are implemented on Python 3.8.5(Jupyter Notebook) having input libraries such as Scikit- Learn, Numpy, Keras, Pandas. Developed Android application queried the results of machine learning analysis. Flutter based Android app portrayed crop name and its corresponding yield.

5.CONCLUSION

We presented a machine learning approach for crop yield prediction, which demonstrated superior performance in Crop Challenge using large datasets of products. The approach used deep neural networks to make yield predictions (including yield, check yield, and yield difference) based on genotype and environment data. The carefully designed deep neural networks were able to learn nonlinear and complex relationships between genes, environmental conditions, as well as their interactions from historical data and make reasonably accurate predictions of yields for new hybrids planted in new locations with known weather conditions. Performance of the model was found to be relatively sensitive to the quality of weather prediction, which suggested the importance of weather prediction techniques. We trained two deep neural
networks, one for yield and the other for check yield, and then used the difference of their outputs as the prediction for yield difference. This model structure was found to be more effective than using one single neural network for yield difference, because the genotype and environment effects are more directly related to the yield and check yield than their difference. In modern era, the deep neural network is the prominent tool in agricultural industry for providing support to farmers in monitoring crop yield based on multiple parameters. Thus, the machine learning model provides high accuracy in detecting the suitable crop identification compared to other methodologies.

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