

International Research Journal of Modernization in Engineering Technology and Science (Peer-Reviewed, Open Access, Fully Refereed International Journal)

Volume:06/Issue:03/March-2024 Impact Factor- 7.868

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AGRIAI: REVOLUTIONIZING FARMING PRACTICES THROUGH MACHINE LEARNING-ENABLED CROP GUIDANCE AND YIELD ESTIMATION

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ABSTRACT

The growth of the agricultural sector is based in the different soil parameters that can include nitrogen, phosphorus, potassium, crop rotations, soil moisture, pH, temperature and weather aspects such as temperature, rainfall, and so forth. Technology will be very useful for the agricultural sector enabling it to increase crop productivity and yet the farmer will gain more from the improved yields. The proposed project is a good answer for Smart Agriculture in that it ensures accurate field monitoring which can help the farmers to enhance their output to a very reasonable degree. This job includes a website form as a platform which deals with the machine learning techniques taking a step ahead and predicting the most profitable crop to grow at the present during the weather and soil conditions. Such a model can be utilized in not only projecting the yield of the crop factor through weather parameter, soil parameter and existing crop yield but also forecasting the crop output. Hence, the project is a target to develop a system that make integration from different data source with data analytics, prediction analysis which are major keys for higher marginal income and for loss prevention for the farmer' for a longer period of time.

I. INTRODUCTION

Predicting crop yields in agriculture is a difficult task. It plays a key role in decision-making at the global, regional and sectoral levels. Crop yield predictions depend on soil, climate, environmental, and crop data. Decision support models are widely used to extract important crop traits for forecasting. Precision agriculture focuses on crop monitoring (sensing technologies), information management systems, rate-shifting technologies, and responses to changes in cropping patterns in crops systematic and substantive Benefits of precision agriculture include increased crop productivity and crop quality, as well as reduced environmental impact. Grape yield simulations help to understand the cumulative effects of water and nutrient deficiencies, pests, diseases, crop yield fluctuations, and other field conditions during the growing season Machines learning can be a subset of computer science (AI). Machine learning aims to learn about design issues in general and to match that data with models that people will understand and use. While machine learning may technically work, it differs from traditional methods. In classical computing, algorithms are explicitly programmed instructions that a computer uses to calculate or solve. Machine learning algorithms instead train computer knowledge and use statistical analysis to change output values that fall within a certain range knowledge into manipulate the decision-making process supported by knowledge inputs and predict the crop.

II. LITERATURE REVIEW

[1]Title: Crop Yield Forecasting Using Machine Learning Systems

D. Jayanarayana Reddy; M.Sc. Written by Rudra Kumar

Agriculture underpins the Indian economy, with more than 50% of the population engaged in agriculture. Environmental changes, environmental changes and other environmental variables are affected in every direction Agricultural Welfare. Machine learning (ML) plays an important role as a tool for independent crop yield prediction (CYP) guidance.

[2]Title: Crop Yield Forecasting in Precision Agriculture Dr. Dr. Miklos Nemenyi



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Crop yield predictions are based on soil, weather, environmental, and crop factors. Decision support models are widely used to extract important crop traits for forecasting. Precision agriculture includes analytics (sensing technologies), control systems, mass conversion technologies, and inter- and. Intervisibility crop system.

[3]Title: Crop Recommendation System Using Machine Learning Method Shilpa mangesh pande; Prem Kumar Ramesh; expensive; b. Raishwarya, et al.; Written by Karun Rohil

There is no doubt that agriculture and industry are connected with the work of country Indians. This is one theory why remote cattle rearing in India ends everything

[4]Title: Agricultural Advisor: Intelligent Crop Recommendation System Using Machine Learning Systems Zeel Doshi; Subhash Nadkarni; Written by Rashi Agarwal

Horticulture is an important promise for the Indian economy. A large number of individuals reside in India depending on how they live in the vicinity of the 12 gardens. Many Indian farmers acknowledge that plants can be cut and planted at any time.

III. METHODOLOGY

Architecture



Fig 1: Flow chart of Methodology

Data Processing is the process of converting data from a given format to a more usable and desirable format, ie. more understanding and information. Using machine learning algorithms, statistical models and statistical expertise, this entire process can be automated. The result of this whole process can be anything desired such as images,

We also have videos, charts, tables, images and much more depending on the task at hand and the requirements of the equipment. It sounds simple but when it comes to really big organizations like Twitter, Facebook, agencies like parliament, UNESCO, and health field offices must conduct this entire process in a systematic manner.

The most important step to start with ML is to have high-quality and accurate data. Data can be collected from any hosted source like data.gov.in, Kaggle or UCI dataset repository. For example, students preparing for competitive exams learn learn from the best available study materials in order to study effectively for better results Similarly, high quality and accurate information will provide the model's learning strategy has been simplified and improved at the same time experimentally, the model would yield novel results.

Data collection takes a lot of money, time and resources. Organizations or researchers must decide what kind of data they need to conduct their activities or research.

Example: Working on Facial Expression Recognizer requires the creation of a large number of images containing different human facial expressions. Good data ensure that the results of the model are valid and reliable.



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Preparation:

The stored data may be in raw form which cannot be directly transferred to the device. Thus, it is the process of collecting data sets from various sources, analyzing these data sets and then generating new data sets for processing and further analysis. This preparation can be done manually or automatically. The data can also be numerically modeled so that learning of the model stops.

Example: An image can be converted to a matrix of N X N dimensions, the value of each cell will indicate image pixel.

Processing:

This is the stage where algorithms and ML methods become essential for providing guidance over large amounts of data with accuracy and optimal estimation.

Output:

At this point, the machine produces reasonable results that can be easily calculated by the user. Output can be reports, graphs, video and more

Data Preprocessing for Machine learning in Python

Data Preprocessing for Machine learning in Python



- Pre-processing refers to transformations that are applied before our data is fed into the algorithms.
- Data Preprocessing is the process of converting raw data into clean data. In other words, whenever data is collected from different sources, it is stored in a loose format that is not subject to analysis.

Need of Data Preprocessing

- For achieving better results from the applied model in Machine Learning projects the format of the data has to be in a proper manner. Some specified Machine Learning model needs information in a specified format,
- for example, Random Forest algorithm does not support null values, therefore to execute random forest algorithm null values have to be managed from the original raw data set.
- Another aspect is that data set should be formatted in such a way that more than one Machine Learning and Deep Learning algorithms are executed in one data set, and best out of them is chosen. Rescale Data
- When our data is comprised of attributes with varying scales, many machine learning algorithms can benefit from rescaling the attributes to all have the same scale.
- This is useful for optimization algorithms in used in the core of machine learning algorithms like gradient descent.
- It is also useful for algorithms that weight inputs like regression and neural networks and algorithms that use distance measures like K-Nearest Neighbours.
- We can rescale your data using scikit-learn using the Min Max Scaler class.

Binarize Data (Make Binary)

- We can transform our data using a binary threshold. All values above the threshold are marked 1 and all equal to or below are marked as 0.
- This is called binarizing your data or threshold your data. It can be useful when you have probabilities that you want to make crisp values. It is also useful when feature engineering and you want to add new features that indicate something meaningful.
- We can create new binary attributes in Python using scikitlearn with the Binarizer class.

Standardize Data



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- Standardization is a useful technique to transform attributes with a Gaussian distribution and differing means and standard deviations to a standard Gaussian distribution with a mean of 0and a standard deviation of 1.
- We can standardize data using scikit-learn with the Standard Scaler class.

Data Cleansing

Introduction:

Data cleaning is one of the important parts of machine learning. It plays a significant part in building a model. Data Cleaning is one of those things that everyone does but no one really talks about. It surely isn't the fanciest part of machine learning and at the same time, there aren't any hidden tricks or secrets to uncover. However, proper data cleaning can make or break your project. Professional data scientists usually spend a very large portion of their time on this step.

Because of the belief that, —Better data beats fancier algorithms ||.If we have a well-cleaned dataset, we can get desired results even with a very simple algorithm, which can prove very beneficial at times.

Obviously, different types of data will require different types of cleaning. However, this systematic approach can always serve as a good starting point. Steps involved in Data Cleaning

1. Removal of unwanted observations



This includes deleting duplicate/ redundant or irrelevant values from your dataset. Duplicate observations most frequently arise during data collection and irrelevant observations are those that don't actually fit the specific problem that you're trying to solve.

- Redundant observations alter the efficiency by a great extent as the data repeats and may add towards the correct side or towards the incorrect side, thereby producing unfaithful results.
- Irrelevant observations are any type of data that is of no use to us and can be removed directly.

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IV. RESULTS



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V. CONCLUSION

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With this model, we have created a rudimentary model that is able to forecast to a certain extent. Even though the model is not perfect, we have one that can approximate to the past data pretty well. But for new data, we would require more parameter tuning. There exists great potential to improve sales forecasting accuracy in the Ecommerce domain. One good opportunity is to utilize the correlated and similar sales patterns available in a product portfolio. In this paper, we have introduced a novel demand forecasting framework based on LSTMs that exploits non-linear relationships that exist in the E-commerce business. We have used the proposed approach to forecast the sales demand by training a global model across the items available in a product assortment hierarchy. Our developments also present several systematic grouping strategies to our base model, which are in particular useful institutions where product sales are sparse. Our methodology has been evaluated on a real-world E-commerce database from Walmart.com. To demonstrate the robustness of our framework, we have evaluated our methods on both category level and super-department level datasets.

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