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Digital Agriculture System for Crop Prediction & Disease Analysis Based on Machine Learning

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Abstract

Agriculture is the number one source of livelihood for approximately 58 percent of India's population and is the most crucial part of GDP. Indian farming is based totally on economic advantages from crop yields, but now day's agricultural generation has failed to verified satisfactory crop choice techniques and to boom crop yield in all over India. So, lower in crop yield will increase the trouble in farmer's monetary health situations. So, it will become the maximum trending hassle for our agricultural region to invent such noble technique to advocate super appropriate crop for a particular region. To reap high-quality appropriate crop desire for areas primarily based on parameters like soil conditions, rainfall and weather we have got applied gadget studying method. Secondary hassle is lack of understanding or absence of steering even as farming. Lack of guidance in Indian farmers may follow incorrect farming strategies or inefficient traditional strategies. Most of farmers are uneducated and non-technical backgrounds so they'll be relying on conventional crop choice and farming techniques which falls them into reasonable loss. With the assist of disorder assessment tool, we predict the crop disease prediction and propose the precaution from the ones illnesses. Last and most essential hassle isn't any right marketplace assessment at the equal time as cultivation of any unique crop, which can also reason a cheap lack of farmers.

Keywords-*Crop Selection, Disease analysis, Prediction, SVM*

I. INTRODUCTION

Indian farming is based on financial advantages from crop yields, but now day's agricultural technology has didn't demonstrated high-quality crop selection strategies and to growth crop yield in throughout India. So lower in crop yield increases trouble in farmer's economic fitness conditions. So it becomes most trending hassle for our agricultural area to invent such noble approach to suggest excellent appropriate crop and need of on-line market place. Crop recommendation is absolutely based totally on environmental factors like soil, weather and rainfall for particular region. So there's want of device mastering techniques like guide vector gadget and Convolutional neural community for classification and clustering dataset. We recommend excellent suitable crop for precise location based totally in this nearby parametric environmental facts. Our contribution will solves crop choice hassle and ultimately boom the price of yields and allows improving monetary health of our farmers. As properly as we are going to provide guidance by technical strategies from cultivation to yields by way of helping out dynamic queries of farmers whilst farming. We are going to provide E-mart for on line promoting of farmer's product that allows you to help to farmers to get more little expensive benefits than present marketplace charge.

II. LITERATURE SURVEY

Miss.Snehal S.Dahikar, Dr.Sandeep V.Rode et. al, introducing through considering completely dissimilar conditions of climatologically marvels influencing neighbourhood weather conditions in several items of the planet. These climate conditions directly have an effect on harvest yield. Completely different examines are finished investigation the associations between scale climatologically wonders and harvest yield.

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Counterfeit neural systems are shown to be integral assets for demonstrating and forecast, to make their viability.

Saeed Khaki and Lizhi Wang et. al, proposed that crop yield is associate degree exceptionally puzzling quality determined by various parts, for instance, genotype, condition, and their cooperation's. Precise yield expectation needs essential comprehension of the helpful association among crop and these intuitive variables, and to uncover such relationship needs each thorough datasets and wonderful calculations.

Rakesh Kumar et.al, Proposed agriculture composing assumes an enormous job in financial development and nourishment security of agro-based nation. choice of yield may be a important subject for business enterprise composing. It depends upon completely different parameters, for instance, generation rate, and showcase price and government arrangements. varied analysts contemplated expectation of yield pace of harvest, forecast of climate, soil order and harvest arrangement for husbandry composing utilizing measurements methods or AI systems.

Pritam Bose et.al, state that Convolutional neural networks (CNNs) for remote detection spatiotemporal investigation of image time arrangement that utilize the exceptionally parallel and low-control avid xenomorphic hardware platforms doable. This technique delineates this idea with the presentation of the first CNN process model for harvest crop estimation from standardized distinction vegetation record image time arrangement. It introduces the advance and testing of a method structure that uses the spatial accumulation of your time series of Moderate Resolution Imaging Spectra-diameter 250-m resolution knowledge and historical crop yield knowledge to organize a CNN to form auspicious forecast of harvest yield.

Francisco Yandun et.al ,states that Farming advent have to twofold by way of 2050 so one can fulfill the normal nourishment need because of populace improvement. Exactness horticulture is the way to improve profitability and efficiency within the usage of belongings, eventually engaging in this objective under the extraordinary difficulties as of now regarded by way of agribusiness mainly because of ecosystem modifications, land corruption, accessibility of farmable land, paintings energy lacks and expanding prices. To confront these difficulties, accuracy agribusiness uses and creates detecting structures that supply information approximately the harvest improvement and wellbeing guidelines.

Prof. K. A. Patil and Prof. N. R. Kale et. al., introducing Atmosphere changes and precipitation has been capricious over the previous decade. Attributable to this in late time, atmosphere good techniques known as as shrewd business enterprise is received by varied Indian ranchers. good farming may be a robotized and coordinated information innovation dead with the IOT (Internet of Things). IOT is growing quickly and loosely applied in each single remote condition.

II. OBJECTIVE & GOALS

Agriculture is the main base of Indian economy. The agriculture era is the most important economical sector in our county. The farmers are totally depends on the crops and their farms for economical gain. The yield gets based on climate conditions as rainfall structure highly influences agriculture steps. So there is need of farmers and agriculturalists require spontaneous guidance proposition in predicting future reaping instances to maximize crop yield.

III. EXISTING SYSTEM APPROACH

Agriculture is the principle base of Indian financial system. In India, farmer used crop selection method is only conventional technique. The agriculture technology is the most vital and powerful financial quarter in our county. The farmers are absolutely relying on the vegetation and their farms for least expensive gain. The yield obtained generally relies upon on climate situations as rainfall patterns largely influence cultivation methodologies. So, want of farmers and agriculturalists require a spontaneous recommendation

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proposition in predicting upcoming reaping times to maximise crop . In traditional manner on machine gaining knowledge of and agriculture analysis we came throughout the truth that traditionally crop choice techniques is not pleasing the farmers cost effective delight. We are confronted such a lot of issues in present paintings. Due to incorrect or flawed crop choice approach GDP is likewise low.

IV. METHODOLOGY

- **DATASET GATHERING**

There are two data sets used for the our model. The first contains historic district-wise rainfall data for Pune districts of Maharashtra. The gathering period spans to 10 years from 2010 to 2018. Rainfall is measured in millimetres and the labelled volume for a District is the mean of values recorded at all the weather stations in the District. The other data set contains a detailed description about the soil properties recorded in Pune District of Maharashtra recorded over 10 years. Soil properties include the concentration of Nitrogen, Phosphorous and Potassium (NPK) in the soil (all in tones), the scales of pH of the soil, amongst others. Every row of values is labelled with a corresponding Yield value expressed in tones per hectare. The trained model proposed in this paper curates results of the model trained on rainfall data with the machine learning model trained on other soil properties.

1] Climate and Rainfall

At the Western Ghat and hill area is cool and eastern area having hot and dry climate. The maximum temperature of pune district ranges between 34 and 410C in April-May, while the minimum temperature varies between 50C to 100C in the months of November to January. The average annual rainfall at the district is 675 mm, most of which is receive through South-West monsoon. However, medium rainfall region at district having on average rainfall of 900 mm, eastern region have an average between 600 to 700 mm while western region have an average of 1171 mm5. The regularity in occurrence in recent years has not experienced in the district.

2] Soil and Topography

Pune region possesses mainly three types of soils, viz. black-fertile, brown and mixed type. In western region soil, type has brown and low quality whereas eastern region having fertile and plain type. The richest alluvial soil track found in the Valley of Bheema River. The rivers Velu, Ghod are left side of Bheema and Indrayani, Bhama, Mula-Mutha etc. are at right side. Each tahsil of the district have minimum one river6. Therefore, the agro-climatic condition of region is favourable.

SUPPORT VECTOR MACHINE

SVM finds its place in this work for training the Recommendation system with training set. It is also used after the classification using yields data based on environmental factors. Algorithm works as follows:

Because of this undesirable information existing in the input data, both during training and classification, the pre-processor fails to identify the exact accuracy, thus failing to perform with improved efficiency. The parameter for the crops like climatic factor, moisture and past dataset can be used to predict the yield of the crop. Collection of more valid details of soil class, latitude, longitude and suitable crop can greatly accelerate the efficiency of work. The pre-training unit could hence be improved and a lot more features can be extended, thus significantly contributing towards the agricultural welfare worldwide[7 8].

Input of training set containing appropriate crops for given soil class and rainfall data. Output will in the form of crop recommendation for current region.

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V. PROPOSED SYSTEM APPROACH

Agriculture is the serious issue of economy in India. In current years because of industrialization; excessive use of insecticides the electricity of soil is getting affected. Many of the methods observed through agriculture aren't enough to growth the productivity. The commonplace problem gift the various Indian farmers are they don't have any data regarding the correct crop primarily based on their soil requirements so it impacts the productivity. Thus, we try to prove the current crop selection technique influences on farmers within your means ability by using degrading yield boom. So, we invent the effective crop choice technique primarily based on machine learning (SVM). We advise the first-class appropriate crop for the regions thinking about environmental conditions. Agriculture is the backbone for a growing economy like India and there is a sizable need to preserve the rural sustainability. We are going to offer one solution for all make our system smart and virtual vicinity for agriculture.

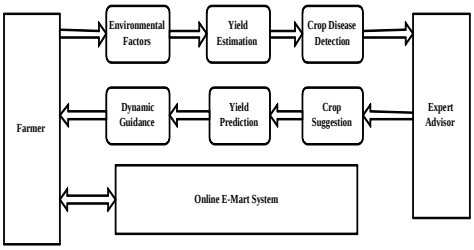

Fig.1 Block Diagram of Proposed System

In the proposed work we are going to invent: -

In proposed system consist of 4 modules:-

- **Farmer -**

  Register, login, enter environmental details, view yields prediction and crop suggestions, ask runtime queries.

- **Admin -**

  Register, login, view farmer's details, view all crop details, update crop details and monitor system.

- **Expert Advisor -**

  Register, login, upload blogs videos, success stories, help farmers, solve queries, and provide dynamic assistance.

- **E-Mart System (Farmers & Merchants) -**

Register, login, upload products, view products, buy products, sale products, pay to farmers, and give feedback.

By taking into consideration of right crop choice techniques and steering improves yield of farmers. As properly supplying help of experts enables to farmers by using progressive techniques. We additionally offer disease prediction of crop and suggest how to prevent the crop from disorder. After all we provide online marketplace on the market their merchandise online by comparing current marketplace prizes. All those efforts without a doubt grow up farmers financial situations which might be our predominant purpose.

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VI. RESULT

In our experimental setup, In table 1 describe our system modules and respective generated output.

Sr. No	No of Input Parameters	Output Generated
1	Soil samples of all regions in pune	NPK summarization of all regions
2	Average rainfall dataset	Generated vector average rainfall
3	Temperature parameter	Average temperature class
4	All Environmental parameters	Best suitable Crop suggestion list
5	All area of farm	Crop Yield prediction
6	Crop and yield details	Current market evaluation

Table 1 Modules of System

We proposed assistive system for economical welfare of farmers. The existing problem is economical down condition of farmers due to wrong crop cultivation, lack of current market sense, lack of guidance and market place unavailability. The farmers select crops based on traditional methods. There is not any current market evaluation consider while cultivation of crops. There is also lack of guidance to farmers from cultivation of crops to uprooting of crops. And the last one most important fix market place unavailability.

We are creating support vector machine algorithm for classifying environmental factors. The environmental factors are like soil types with NPK values, 10 years rainfall dataset, and temperature dataset. The trained model is constructed based on temperature, soil types and rainfall data. The trained model gives us best suitable crop selection which solves existing crop selection problem. The average yield dataset for all crops is used from Google source for prediction of yields.

VII. CONCLUSION

The proposed system we invented effective crop selection technique mainly based on Machine learning approach. We suggested the great suitable crop selection technique for the local environmental situations. We are evaluated diseases of plants at runtime for higher yield cultivation additionally enables for farmer in crop disease prediction system. Hence it gives important contribution closer to the economic and agricultural welfare of the international locations the world over. In future work we are going to consciousness on greater detailed observe and developed android apps for e-commerce of product.

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