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Analysis of pesticide by Smart Farming System using machine learning algorithm over AWS Cloud

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ABSTRACT: The purpose of this work is to show the different datasets and data from the original dataset that combine physical, biological and sensory values, as production companies - public or private, large or small - need to maximize profits by reducing costs. , Regularly recording and preparing. Finding the right ways to combine both data may be the right choice for achieving these goals. The "smart form" model is constantly expanding, using the Internet of Things (IoT) model to reflect digital technology and the timely use of environmental and historical information. The focus of this study is to extract and compare various machine learning techniques to guide the practical design and to implement, attempt, and invest, from missing predictions to incorrect sensors to lost or reconstructed information. The results show how there is enough scope for innovation when it comes to the wants and demands of companies that are interested not only in technology, but also in knowledgeable and professional employees, employing sustainable and desirable industrial business businesses.

Keywords: machine learning; sensors; IoT; smart farms; agriculture; data analysis

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I. INTRODUCTION

Today, there are many "smart" sensors and intelligent systems around us that are always interconnected through the Internet and cloud platforms; this is the spectacle of the Internet of Things (IoT), which encompasses all social and productive segments of society. Introduces advanced technology. Given global markets, companies are competing to maximize their profitability and economy by optimizing costs, time and resources while at the same time striving to improve the quality and variety of products offered to customers. The focus of agriculture and production development is also encouraged in agriculture, where production dynamics and resource management influence the type of crops, irrigation and irrigation; the placement of such production pools with automatic control of resources. Causes waste, damaged or abandoned crops and contaminated and weak soils.

Innovative technology can be effective in tackling problems such as environmental sustainability, reducing waste and soil adaptation. The collection and analysis of agricultural data, including many and proportionate variations, is sufficient to establish the potential production strategy for the ecosystem and its resources (soil history and irrigation and irrigation related optimization); Identifying powerful and non-dominant elements, the next step depends on the predictability of the forecast plaza management, the specific technical conditions of the seed and the possibility of adapting the prediction that the failure and replacement of the hardware will maximize technical capacity. Limited analysis.

In this work three separate datasets will be extracted which differ from one source to another; structure; organization and availability of their standards from the Institute of Art, Scientific Research and National Statistics. For example, estimating next-season quantities in regular and publicly available ISTAT datasets has occurred over time, while IoT is missing or misinterpreting and predicting incorrect data related to industrial IoT sensors. , As well as detecting faulty hardware sensors from monitoring stations, using a variety of machine learning methods. Consequently, the National Structure and Public Exception Scientific National Research Council (CNR) dataset has been approached with predictive goals, which introduces an assessment metric for particular culture types.

When confronted with living environments such as agriculture, it is important to treat significant data by examining and characterizing patterns and specific combinations that affect cultivation and production, even within a short time frame. , Based on weekly or annual collections. These research cases arise from practical applications that come from industry projects, providing pilot studies that allow companies to use their data to invest in hardware and software; environmental factors (weather, moisture, Wind (as well as productive and structural factors (such as soil erosion and extension)) are considered and used in five practical applications that include monitoring machine learning techniques such as decision trees, nearest neighbor, nervous. Network and perennial predictive models.

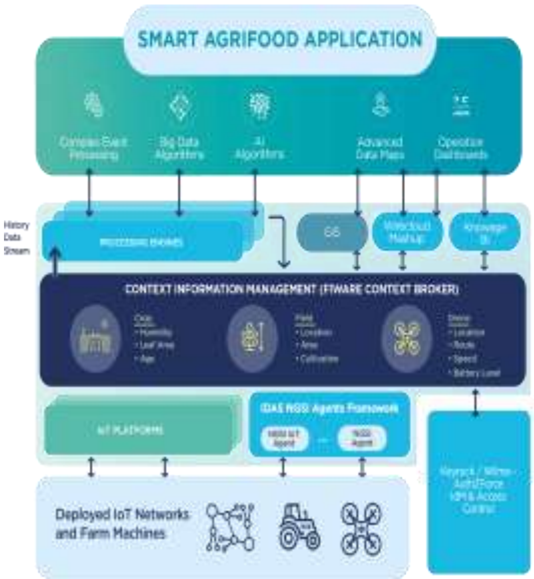


Fig.1: Smart Farming Technology in modern Area

II. RELATED WORKS

Agricultural companies can be classified according to many factors; To understand the classification, one must look at the type of information that can be used to estimate their potential structure and activities required for a particular potential form [1,2], which Can be specified in the following:

- non-permanent arable crops (cereals, vegetables, rice, cotton, forage, legumes)
- permanent crops (grapes, apples, oily and citrus fruits, coffee, spices)
- horticulture (flowers, greenhouses)
- plants reproduction
- support or post-harvest activities (maintenance and soil conservation).

The precise agricultural model is the result of the rapid development of the Internet of Things and cloud computational paradigms that show conditional alert and real-time phenomena [3]; [4] and Barder et al. [] There are studies about the smart firm industry, while multi-component models using IoT sensors have been tested in the work of [, 7].

According to Arman et al. [] Use greenhouse gas analyzes to monitor the oil-rich tree gardens used in biodiesel production, and Amanda et al. [] Propose an expert system to help farmers use physical logic to measure tomato varieties or to set preferences such as height, disease resistance, fruit size, fruit size, yield capacity, adulthood. , And the color of fruits.

The work of Noorulhak and others. [1] IoT hotspots use forest fires as indicators in areas where continuous series can be derived from datasets; Murphy et al. [5] Using wireless sensor network (WSN) technology to monitor bee colonies and gather important information about activities / environment, [12] Authors are authors of solutions that can improve crop quality in agriculture. Join the drones using a raspberry model.

The major agribusiness companies are Monsanto [3], FarmLink [3], and FarmLogus [4], who invest large resources in research and innovation; in terms of environmental sustainability, this is an approach to predictive modeling. It is very useful to manage the risk of failure failure and to increase the efficiency of nutrition in animal production presented in the literature.

Patel and Touret [1 17] developed a surveillance system that detects grapevine in their early stages using temperature, relative humidity, moisture and leaf moisture sensors. [1] uses a machine learning algorithm IoT tool that predicts environmental conditions for the detection and prevention of fungi, using conditions such as air temperature, relative air humidity, wind speed and precipitation; in addition, monitoring of soil quality. In comparison, a series of disease detection and control systems are presented and presented. [4] Grameen Tower is an IoT-based system that provides smart and collaborative agricultural literature for soil moisture level, soil pH value, groundwater (GWL).) And groundwater level (SWL) use sensors [20]; also, plumbing and others. [28] Remote sensing is used to increase yields and provide organic cultivation in fertile cultivars.

III. MATERIALS AND METHODS

3.1. Technical Details of the Project

- Mobile Application - Ionic Framework and AngularJS
- Web Application - HTML/CSS, AngularJS
- Database - Firebase real-time database
- Machine Learning - python, pandas, scikit-learn (Linear Regression), matplotlib and mpl3d
- SMS API - Textlocal
- Server - Host web app
- Training data - https://data.gov.in/node/87630

3.2. Features of the project

- **Easy Navigation**: This application doesn't require any purchases means it is free of cost.
- **No Ads**: This application has no ads.
- **Multi-Platform**: This application can run quickly on fast platforms and provide easy and easy access to the user, who has little or no idea how to use the application.
- **Notification**: Whenever a farmer registers himself on a cell phone application and agrees to cultivate a given crop with him, upon successful

submission, the farmer will be informed of his successful presentation via text message.

- **24X7 Access**: Using a real-time database (firebase), we provide flexibility for farmers to register themselves in their application whenever they want to express themselves.
- **Admin**: The Farmers Administration Dashboard details will be created as the new user registers for the application itself, so the administrator will be able to see all the details of the farmers, including their district, village, land area and in real time. Allow the crop.
- **Predictive Crop Allotment**: Farmers will be able to divide the crops according to the type of soil, average rainfall, soil composition and soil color in their district, and the most important part where the most essential crops can be grown.
- **Real-Time Crop Requirement Updation**: Soon a farmer will be given a crop that will need to be renewed according to the specifications needed, reducing the amount of land they can grow.
- **Interactive Plots**: Administrators will be able to interact with the crop requirements and crop forecasting requirements over the years.

This work is meant to show practical and experimental results, with the introduction of data management and analytics development in small industry companies, and in the local arena, often stopping innovation. Prior to IoT, short-forming quantities were treated economically using multi-adaptive mathematical models based on statistical and numerical theories, and therefore in this context, comparisons between static and known methods (most commonly) Created with spreadsheets), for employee investment. Stay interesting even with the need for new knowledge. Depending on the information sources, there are three main processes for collecting and producing them [14,39,40]:

- **Machine-generated (MG):**Information obtained from sensors and intelligent machines (drones, drone vehicles (UAVs), Global Positioning Systems (GPS)). These represent the IoT spectra, and their structure ranges from simple to complex, but are usually in the precise number of records on which these data are significantly enhanced in volume and speed, and traditional methods for treating them today. Not enough.
- **Process-mediated (PM)**: Referring to business events, such as setting up business data such as purchases and orders from business processes; these are highly structured with different data types and are usually stored in the respective database.
- **Human-sourced (HS)**: The authenticity of the human experience recorded in books, photos, audio and video; they are now almost digitally made, arbitrarily built, and often not legal in digital devices and social networks. The management, analysis and storage of this information is problematic and open to investigation.

3.3. Data Sources

For this study, separate sources of information are considered (Figure 1) that are each complementary and useful for the design and testing of machine learning methods:

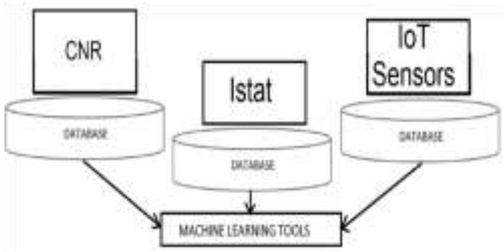


Fig 2. The datasets used for this study: National Research Council (CNR) scientific dataset, Istat statistical dataset, and the industrial Internet of Things (IoT) Sensors dataset.

Machine Learning Task Design

With so much information that technical forms can extract valuable information, business-based work is designed and carried out to look for profitable business and procedural practices.

3.3.1. Task 1—Forecasting Future Data (Istat Dataset)

The complete and systematic historical series of the Istat dataset on the annual volume of Italian chapters is very useful in predicting future data (as well as forecasting) as well as employing and comparing various monitoring machine learning techniques.

The supervised machine learning method is based on labeled examples that are used to train and test models that learn to create biases or new instances based on what they have already seen by themselves to adjust these internal parameters and After absorbing damage activity. The first models that will be used are the feed-forward neural network and the perennial regression model.

The neural network (or multi-stage prestron) requires high-quality training data and internal parameter fan-tuning processes to achieve optimal performance; for this purpose, it employs a fully integrated feed-forward structure. Hoping it would be stronger, faster, and cheaper to manage.

3.3.2. Task 2—Comparison between Machine Learning Algorithms on Missing Data (CNRScientific Dataset)

In this process, the predictive objective is to extract and estimate the qualification of the LAI (indicator of area), which uses scientific and biological data in cultivation and harvest.

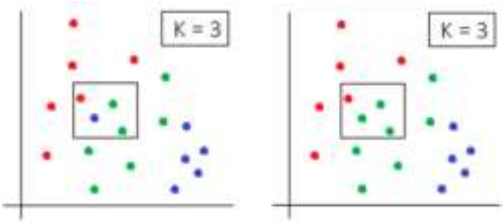
This test is interesting because for each plant type, the value of LAI is recorded in a separate and non-fixed manner and linear / perennial regression and nerve structures as a problem of self-elimination at different time points. Adjusts (1997–1998 or 1999–2000 ,etc.). Organize and configure appropriate data for network model extraction.

3.3.3. Task 3—Reconstruction of Missing Data from Monitoring Stations Exploiting Neural Network, and Linear and Polynomial Regression models (IoT Sensors Dataset)

The task will be to use standard and distributed datasets from smart sensors and IoT devices. Since this information is expensive and extremely expensive, it is useful in displaying data recovery (retrieval) of malicious or ambiguous sensors; it is also interesting to know how the training features model performance. Affects.

The solar radiation incident attribute values (r_inc) come from the panels installed at each monitoring station [44,45] and will be used for this test.

The purpose of the work is to consider the "r_inc b" feature and to review its properties at 00:00 (maximum solar event hours), from 173 and 186 monitoring stations, to contribute more features. Evaluate model performance to recover".



(**a**) (**b**)

Fig 3. Two consecutive steps of the K-nearest neighbors (KNN) algorithm (K = 3) in a bi-dimensional feature space; (a): a blue item has ambiguous clustering, (b) the green cluster is assigned to it according to its number and proximity.

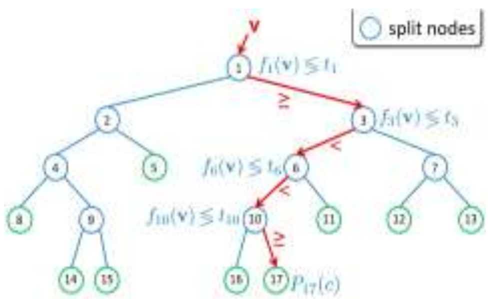


Fig 4. A (binary) decision tree used to classify and predict values with numerical features.

3.3.4. Task 4—Detection of Faulty Monitoring Stations by Sensor Values (IoT Sensors Dataset)

The task is to detect hardware errors, which can occur, for example when data is available with a plasma value, but differ significantly from those collected by sensors at nearby monitoring stations; to avoid future damage, It is important for a business organization to have an unrecognizable identity of this national exceptional change.

A key step is the localization of neighboring observation stations that are photographed by clustering level areas in their altitude, latitude, and latitude geographical properties (Figure 4).

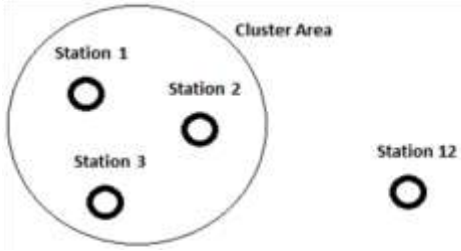


Fig 5. Task 4: the monitoring station clustering brings together geographically close sensors that are expected to record very similar data values.

The purpose of the task is to "perform a geographical cluster of observation stations by a given area dimension and identify all squares as defect stations, considering the marginal value for changing the solar trend characteristic r_inc". Experimental decoration:

- Dataset: IoT sensors
- Algorithms: similarity clustering on the whole dataset
- Training set: no
- Training mode: no

Results: clusters of geographical nearest monitoring stations; estimation of r_incvariation among them.

IV. PROPOSED SOLUTION

- Models Our model is responsible for obtaining information about location, time and weather conditions (most of which are related to rainfall) and the irrigation system will be automated according to soil moisture during breaks.
- When dealing with different types of weather, different weather and season changes, the model makes movement easier.
- This is done in remote areas, even when farmers are reminded about the possibilities.
- Available It is designed to provide a smart water system for users of existing soil systems to take advantage of soil moisture sensors, humanity, temperature and rainfall sensors. All climate

actions will be managed by a rational controller that enables data collection and users to adjust the size and timing of the water supply based on similar lessons.

- We integrate our smart controller users into existing screening systems so that users can remotely control their home watering via the web interface or Android interface.
- The data collected by the sensor is transmitted to a cloud-ready database for predicting and predicting future weather.

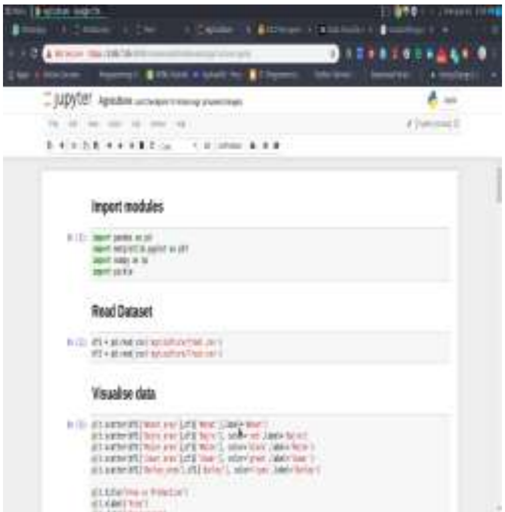


Fig. 6: Read Agriculture Dataset for training ML model

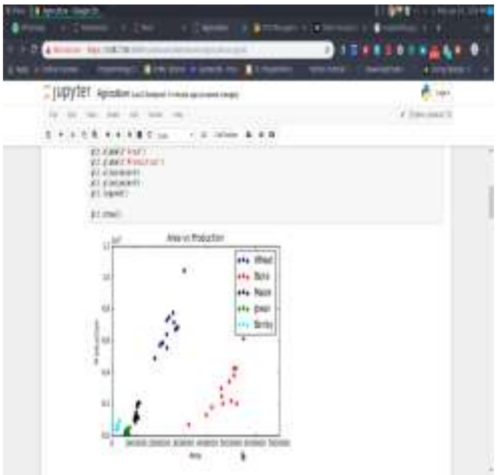


Fig. 7: Visualize Scatter Plot of Area vs Production of various crop type

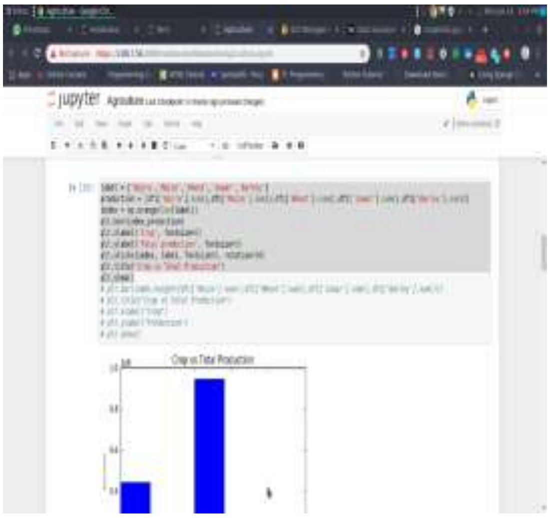


Fig. 8: Visualize Bar graph of Crop vs Total Production

Fig. 9: Visualize Bar graph of Crop vs Total Production of different crops

Fig. 10: Visualize Pie chart of different crop production

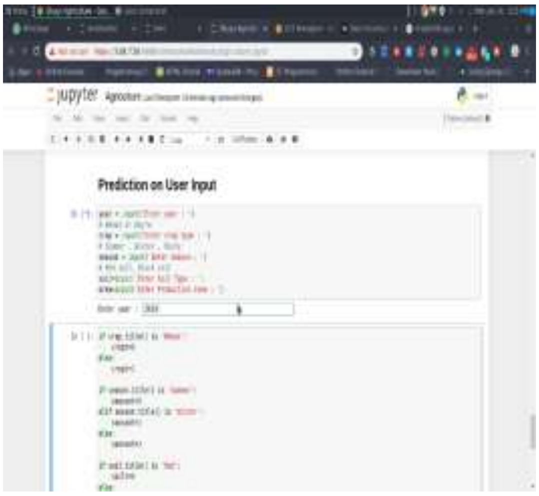


Fig. 11: Getting Year as user input

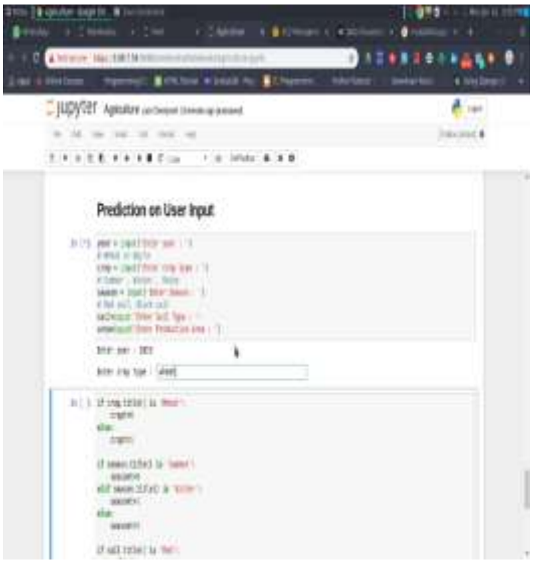


Fig. 12: Getting Crop type as user input

V. CONCLUSIONS

The study presented in this work introduces practical, inexpensive, and sophisticated advanced work that is useful for increasing agricultural company productivity and deepening the study of intelligent company models; technological advances that really require control and optimization can really drive environmental resources. Protect, respect trade and international law, meet consumer demand, and contribute to economic achievement. The specific focus for the IoT sensor dataset was exploited using three separate data sources, machine learning techniques and even other standard statistics.

The solution to this problem will be a new crop management system for farmers and the state. 'In this tool, we predict the average (upper limit) of different crop seasons by machine learning, using crop resources and opening source data for previous years. With the most accurate forecasts we will determine the crop and its size for each farmer, considering the following factors-

1. Soil type of area
2. Average rainfall in the area
3. Soil texture

If the farmers increase the crop attached to the equipment, it will be made available to them at a fixed rate and the crops will be raised to the desired size.

The main reason for the proposed work using different machine learning techniques is that a sophisticated and highly experimental task is employed; data fusion with optimizing methods and results is expected in future work, where new tests and assignments will be made using sensors Design and edit to meet other types and datasets to meet the huge diversity of farm companies and hardware sensor markets. Intelligence systems created by machine learning algorithms (monitored and non-monitored) must handle error tolerance and hardware error prediction, and thus require sophisticated tools, user-centered, and machine-designed tools that can be easily integrated into one. Suitable for several small natural disasters, such as agriculture. Finally, smart systems that offer real-time advice and make long-term predictions based on user preferences and preferences should be studied and tested.

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