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DECENTRALIZED AGRICULTURE TRADE MARKET WITH CONTINUOUS QUALITY VERIFICATION USING IOT AND MACHINE LEARNING

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ABSTRACT- There is a wide range of causes for farmer suicides in India. Profitable commodity management and cultivation is of utmost importance. Using the Internet of Things (IoT) and machine learning to detect crop disease, this article offers a decentralized platform for buying and selling agricultural produce, linking farmers with investors interested in their farms.

Keywords- *Blockchain, IOT, Machine Learning.*

1. INTRODUCTION(HEADING1)

Agriculture is particularly important in India, which ranks second in the world in terms of agricultural output.Agriculture contributed over 20% of India's GDP and employed roughly half of the country's workforce.The farming industry in India is hampered by middlemen, diseases, a lack of storage space, and loans. Because of these concerns, major agricultural producers have lost money, and an increasing number of them have committed suicide. Our solution is a peer-to-peer platform that allows buyers to invest directly in sellers at the start of each month. Sensors and Machine Learning algorithms on this platform monitor crop health and predict disease outbreaks. This strategy allows farmers to sell products directly to clients at a predetermined price while also ensuring quality and regular tracking. This strategy guarantees that crop health is constantly monitored, and it eliminates the need for farmers to borrow money from banks. People solely use cash to pay.

EASE OF USE

Cross Platform Application:

The cross-platform app allows users to select crops directly and connect with the app regardless of platform. If the farmer uploads photographs of the crop's leaves, our technology will determine how likely it is that a disease will spread. All interactions between apps are rapidly transmitted to the cultivator.

Ease of crop health data for the farmer without manual intervention

Sensors on farmland transmit data to a cloud server. Direct contact alerts the farmer immediately if something is amiss with the crop. Farmers can use this technology to monitor food development and improve it with fewer pesticides and fertilizers.

Consumer is Aware of the crop health

Too much fertilizer and chemical use can be reduced by constantly monitoring crop health data.

2.MOTIVATION

Farmers in India die primarily as a result of high agricultural supply costs. Fertilizer, crop

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protection chemicals, and seed prices are rising, increasing farmers' debts. Loan debt is making it difficult to pay for necessities. According to the National Crime Records Bureau (NCRB), 2,474 of the 3,000 farmer deaths in 2015 were caused by failure to pay local bank obligations. Small and marginal farmers are in a difficult position since they cannot benefit from government policy because they lack access to appropriate equipment or cannot read or write. As a result, a peer-to-peer market alternative assists farmers in obtaining the funds required to grow adequate food. This reduces farming losses by monitoring crop health and ensuring that crops reach the correct individuals.

Sensors and devices

The primary sensors monitor temperature, pH, relative humidity, and soil moisture. The data from these devices is collected by the Node MCU and sent to the Firebase Cloud Service.

The amount of water in the earth is measured and reported using earth moisture sensors.

The exact parameters of the air are recorded using temperature and humidity sensors.

A pH reader determines how much pesticide to spray on plants by detecting the acidity of the soil.

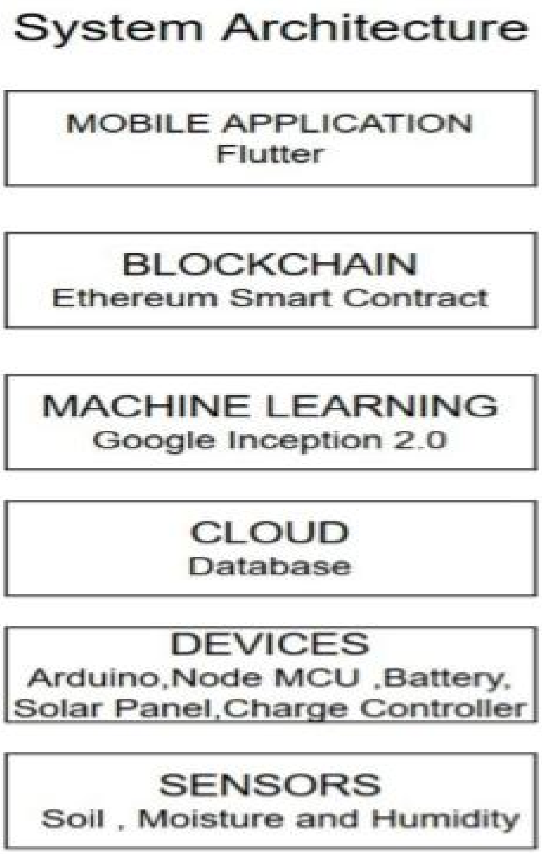

Fig.1. Architectural Drawing Evaluation

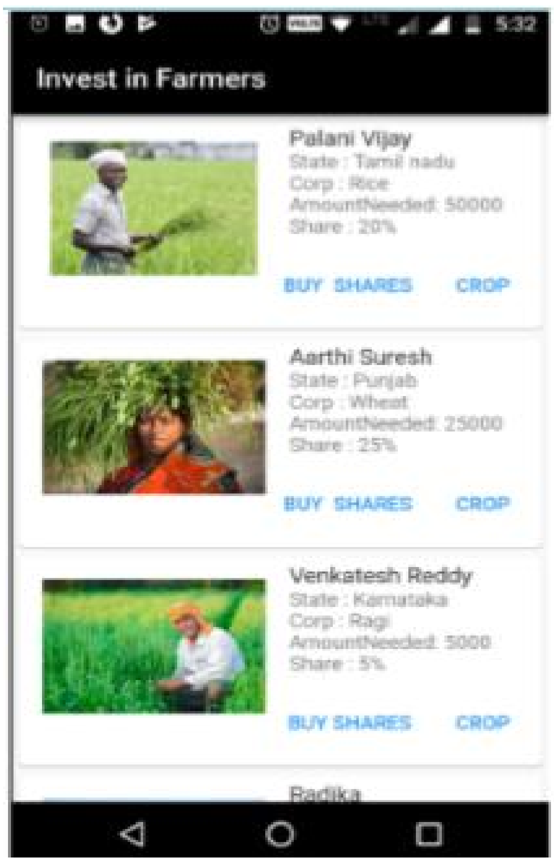

Fig.2. An examination of the user interface of a publicly accessible website.

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Fig3. Farmer is an illustration of a user interface concept..

Fig4. Statistics are available to producers in real time.

Figure 1 depicts this condition.Sections A through F discuss the structure.

Mobile Application: Flutter

Municipalities with decentralized structures Figures 2 and 3 show how a cross-platform Ethereum-based blockchain program facilitates direct communication between farmers and customers. Customers can use the app to find a grower based on their name on the blockchain.Crop pricing, pesticide use, and input from platform users all have an impact on this status.

Blockchain Network:

Buyers and sellers can transmit money directly to one other via an anonymous sale smart contract on the blockchain. Wholesalers can use this strategy to develop connections with manufacturers that allow them to sell all of their product for a fixed price.Smart contracts can be used in auctions to sell items at a fixed price, reducing storage and waste. The smart contract applies business logic to a variety of commodities and services.

Devices:

Farmers can create a maintenance-free system by connecting a solar panel to a battery via a charge controller. This method maintains the Arduino microcontroller powered at all times, allowing sensor data to be delivered to a variety of cloud-based programs.

Cloud Database:

Sensor data with timestamps is transmitted to the cloud. Heroku sends time series data to Firebase Cloud Firestore with a unique identifier. By comparing the results to the data's healthy crop growth range, the farmer can evaluate variations in value.

Sensors:

Figure 5 depicts how the soil moisture, temperature, humidity, and pH sensors send data to the Node MCU.Node MCU sends this information to Heroku.Firebase receives the information when a time signature is appended.

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Fig.5. Sensor and power supply diagram.

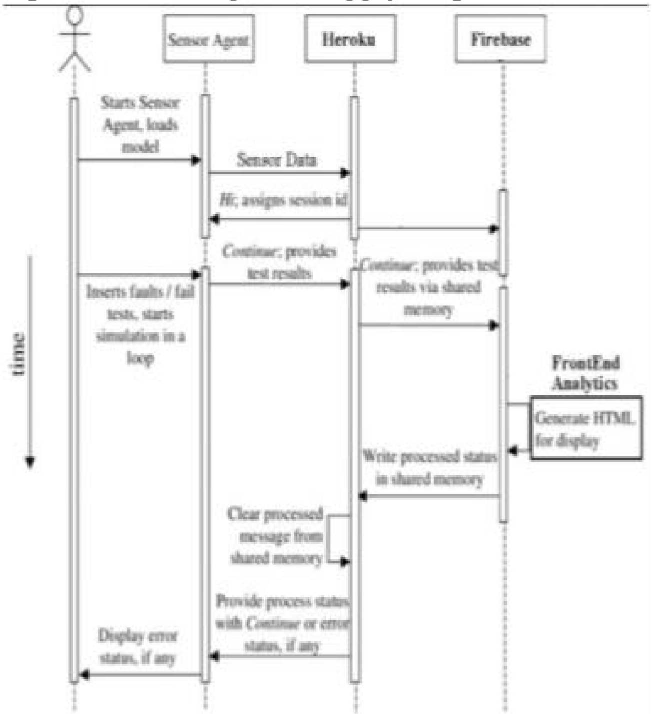

Fig.6. As an example, consider a sensor UML model.

Machine Learning Model:

In this work, the Google Inception v2 machine learning pipeline is used. Transfer learning retrains the last layer using a fresh dataset depending on how the model was trained on a specific job. With Google's modelweight options, the first stage of transfer learning is bypassed.

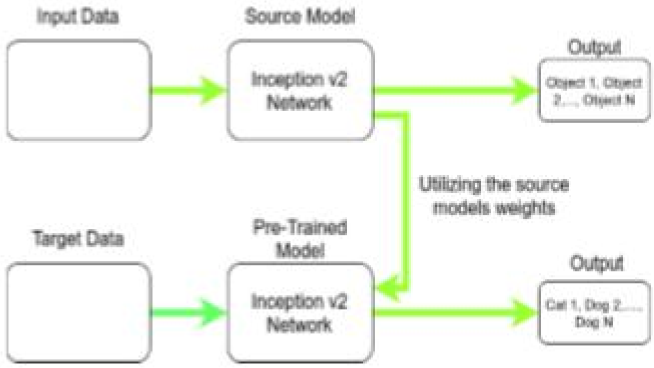

Fig.7. This study investigates transfer learning and demonstrates how it works.Transfer learning occurs when you put what you've learnt to use.

The model was trained using the Plant Disease Dataset. There are 38 distinct groupings for over 90,000 photographs.These images are used for educating 80% of the time and testing 20% of the time.The data contains 14 different types of plants. Apples, blueberries, cherries, maize, grapes, oranges, peaches, peppers, potatoes, raspberries, soybeans, squash, strawberries, and tomatoes are among them. Each plant has a health category as well as various disease groups.

TABLE1 The plants in the collection are classified according to their species.

Plant Name	Data set classes
Apple	Scab,Blackrot,Rust, Healthy
Blueberry	Healthy
Cherry	Powdery Mildew, Healthy
Corn	Cercospora leaf spot, Common rust, Northern leaf blight, Healthy
Grape	Black rot, Black Measle, Leaf blight, Healthy
Orange	Citrus greening
Peach	Bacterial spot, Healthy
Pepper	Bacterial spot, Healthy
Potato	Late blight, Healthy
Raspberry	Healthy
Soybean	Healthy
Squash	Powdery mildew
Strawberry	Leaf scorch, Healthy
Tomato	Bacterial spot, Early bright, Late blight, Leaf mold, Spider mites, Target spot, Tomato yellow leaf curl virus, Mosaic Virus, Healthy

Transfer learning allows the Inception model to perform better on the Plant Disease dataset in this study.The model's final layer is modified. After the data was used to fine-tune the model,

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significant results were discovered.The confirmation accuracy was 0.964, while the training accuracy was 0.968. To improve at forecasting plant illnesses, the computer had to be trained 25 times. Figure 8 depicts the losses for training and evaluating the model.

Fig 8. Validation and teaching are especially crucial. Accuracy in model improvement.

The machine learning model is available on a PC via a Flask and Python API. POST and GET requests are sent to the API server by the gadget. Servers bring in models and store them in memory.

Fig 9. Machine learning relies heavily on training and validation procedures.A dataset is divided into two parts: training and model decline sets.

Figure 11 depicts how API queries are handled. An API conversion mechanism is used to convert the provided image into a tensor.The image has also been reduced to its smallest possible size of 224x224 pixels. After the tensor is entered, the model generates a probability distribution for the future.The expected numbers are used to set up this distribution. Identify the predicted number.

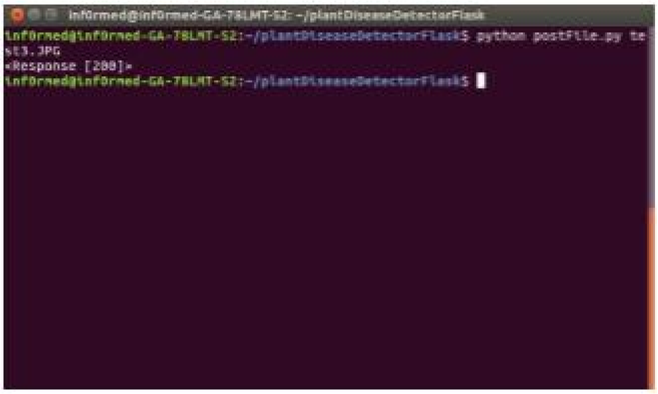

Fig.10. The service receiving the POST.

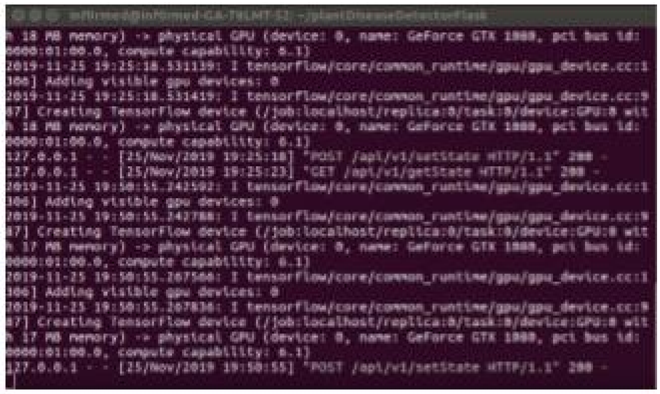

Fig.11. All API queries were recorded as a record. A view request can be made from the server to obtain the plant's output state. Figure 12 depicts the backend server log, post request, transferred data, and view page update.

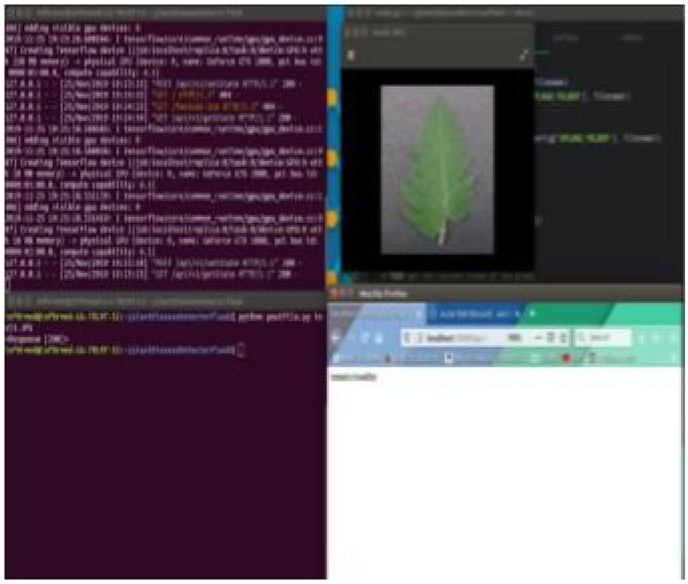

Fig.12. This article discusses API diagrams, backend logs, data transmission, and server updates.

3.CONCLUSION:

Farmers can obtain a predetermined price for their produce.Producers no longer require loans

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because seed money is provided to them.Producers are given real-time data to assist them with their goods. Better agricultural goods eliminate the need for pesticides and additives.Implementing identity on blockchain simplifies the creation and maintenance of the identd database.

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