DEAGRICHAIN Blochchain-Based Solution for Agriculture

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ABSTRACT

This survey paper explores the use of blockchain technology in agriculture, which has the potential to transform the industry by enabling secure and transparent transactions, tracking the origin and journey of food products, and improving supply chain efficiency. The paper reviews the existing literature on blockchain-based agriculture solutions, including case studies, prototypes, and pilot projects from various regions of the world. It also examines the benefits and challenges of implementing blockchain in agriculture and provides an overview of the technical aspects of blockchain technology. The survey paper concludes by identifying key research gaps and future directions for the adoption of blockchain in agriculture.

Keywords—Blockchain, Smart Contract, Food supply chain, Farmer, Distributor, Retailer.

I. INTRODUCTION

As nowadays there are much more facilities for agriculture purposes but the involvement of third party also increases. So far most of the application cannot track the address or information of product the who buy it? From where it came from? who is the producer for it? Like such questions arises for tracking such address the blockchain technology is used.

Blockchain: Blockchain is a decentralized digital ledger that records transactions and stores data in a secure and transparent way. It is a type of distributed ledger technology (DLT) that uses cryptography to create a tamper-proof, immutable record of data. In a blockchain network, transactions are grouped into blocks and added to a chain of previous blocks, creating a permanent and unalterable record of all transactions that have taken place on the network. Each block contains a cryptographic hash of the previous block, which links the blocks together and creates a secure and transparent ledger. One of the key features of blockchain is its decentralized architecture, which means that it is not owned or controlled by a single entity.

DAPP: the key features of a DApp include its decentralized architecture, its use of smart contracts to automate functions, and its transparent and secure operation on a blockchain platform. One of the key benefits of DApps is that they allow users to interact directly with the blockchain network, without the need for intermediaries such as banks, governments, or other third-party service providers. This enables users to maintain control over their own data and assets, and can lead to increased privacy, security, and efficiency in various applications.

Smart Contract: Smart contracts are computer programs that run on a blockchain network. When a smart contract is created, it is stored on the blockchain, along with the terms and conditions of the contract. Once the smart contract is deployed, it is executed automatically whenever the predefined conditions are met. These conditions are typically coded into the smart contract using if-then statements, which allow the contract to react to specific inputs or events.

II. INVOLVEMENTS

A supply chain is a combination network of individuals, organizations, activities, information, and resources involved in procedure of creating and delivering a product or service to the end customer. It includes all the activities that take place from the raw materials stage to the final product delivery to the customer, including sourcing raw materials, manufacturing, logistics, warehousing, and distribution. As our traditional food supplychain involve the roles such as farmer, distributer, retailer and the consumer for the delivering the goods are participated in it.

Farmer:A farmer is a person who is involved in agriculture, which is the practice of cultivating land, raising animals, and producing food, fibre, and other products. Farmers can work on small or large-scale farms, and they may grow crops such as corn, wheat, and vegetables, or raise livestock such as cattle, pigs, or poultry.

Processing: Food processing refers to the methods and techniques used to transform raw ingredients into food products that are safe to eat, have a longer shelf life, and are more convenient to store, transport, and use. The process typically involves a series of steps such as cleaning, sorting, cutting, grinding, heating, cooling, packaging, and preserving.

Distribution: The distribution of food products refers to the process of getting food from the one point of production to the point of consumption. It involves a series of activities, such as transportation, storage, handling, and delivery of food products. The distribution of food products requires a complex network of logistics and supply chain management. It involves coordinating transportation, storage, and handling of products to ensure that they reach their destination in good condition and on time.

Retailer: Retailers play a critical role in the economy as they facilitate the distribution of goods and services from manufacturers to consumers. They provide convenience to consumers by offering a wide range of products in one place, and they add value to products through services such as customer support, warranties, and promotions.

Consumer: A consumer is an individual or entity that purchases goods or services for personal or household use. Consumers are the end-users of products and services and can be individuals, families, businesses, or organizations.

Consumers play a crucial role in the economy as they drive demand for goods and services, which, in turn, stimulates production and employment. Consumer spending accounts for a significant portion of economic activity in many countries, making it an essential indicator of economic growth.

III. TOOLS AND SOFTWARE USED

VSCode: VS Code is a free, open-source code editor developed by Microsoft. It has become one of the most popular code editors among developers due to its user-friendly interface, numerous extensions and plugins, and its ability to work with multiple programming languages.

Remix IDE: is a web-based Integrated Development Environment (IDE) for building and testing smart contracts on the Ethereum blockchain. It provides a user-friendly interface and simplifies the process of developing, testing, and deploying smart contracts on Ethereum. Some of the key features of Remix IDE include its ability to connect to various Ethereum

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networks, a built-in code editor, debugging tools, and automated contract testing.

Solidity: is a high-level programming language that is used for writing smart contracts on the Ethereum blockchain. Solidity is like JavaScript in its syntax, and it supports object-oriented programming concepts such as inheritance and polymorphism. It also includes features such as libraries, events, and modifiers, which allow developers to write more complex and robust smart contracts.

MetaMask: is a popular web3 wallet and browser extension that allows users to interact with decentralized applications (DApps) on the Ethereum blockchain. It is a non-custodial wallet, which means that users are in full control of their private keys and funds.

ReactJS: ReactJS is open-source JavaScript library used for building user interfaces. It was developed by Facebook, and it is widely used for building web applications and single-page applications.

NodeJS: Node.js is a powerful and flexible tool for building server-side applications with JavaScript, and it has become an essential tool for many developers and companies.

Testnet: Goerli is a testnet for the Ethereum blockchain that is used for testing and developing applications before deploying them on the mainnet. To obtain test Ether (Goerli ETH) on the Goerli testnet, you can use a faucet. A faucet is a web application that can send a small amount of test Ether to your testnet address.

IV. LITERATUREREVIEW

1]. This paper, "AgriOnBlock: Secured data collection for the agriculture industry using the term "blockchain technology" was first used on July 13, 2021. The authors of the study are Hiren Patela and Bela Shrimalib, who argue that blockchain technology is a suitable substitute to address these problems and build confidence among all of its stakeholders. They secure distributed public ledger technology and a decentralized computing paradigm.
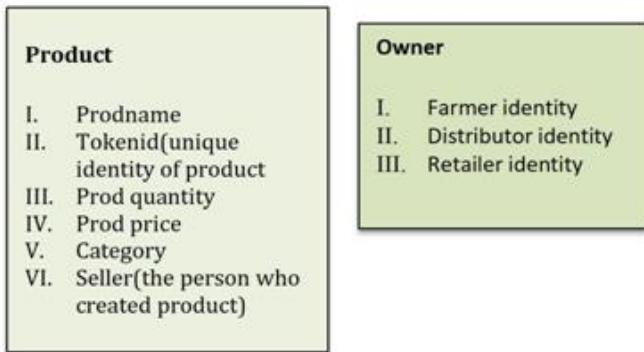
2]. The IEEE released the paper to which we have linked, titled "Blockchain Technology in Agriculture Product Supply Chain," in 2021. Dr. Kasa Chiranjeevi is the author of the study, in which they suggest a framework solution that does away with the need for intermediaries and centralized authorities that can be trusted. It also provides records of the transactions, enhancing reliable and efficient science and safety.

3]. The IEEE released the study to which we have referenced, titled "Blockchain-based method to enhance the Supply Chain Management in Indian agriculture," in2021. Dr. V. Sudha is the paper's author, and they enhanced supply chain management with the required characteristics, including checkpoints at every level of the supply chain management and verification of the condition of the items by both farmers and government authorities.

4]. The study to which we have linked is titled "Blockchain technology in existing agricultural systems: from approaches to applications" and was released by IEEE in 2021. Lai hung yak is the author of a study that uses blockchain technology to show how they might be used. To demonstrate how professionals utilize them to create these agricultural applications, popular platforms and smart contracts are also presented. Thirdly, we explore the attempts and potential solutions being made to address the major issues that many future agricultural systems face to address this issue.

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V. SYSTEM WORKFLOW

Figure 1 The architecture of the proposed system.

1) CLIENT- At first client will load dataset using UI feature provided , function .Which processing are required are managed at that time itself. The Client can give the csv as the input to the system so that the further prcoess can be carried out. The user request and the data is sent as input to the server which is received by the Urls.py file which manages all the urls from the websites.

2) API- api will handle all request which are forwarded by client to server or processor to perform analysis.rendering data in form of html is handled by same to provide functionality of dynamic rendering. through the api call all the request is send through the server to the api's urls.py file to manage all the links. view.py convert that data into the dataframe as it is in the json format. all the preprocessing steps is performed in the api like deleting column from the data or table, deleting missing values, encoding with label encoder, performing normalization, removing outliers, building models with different regressor and classifiers in the applications, after that we perform the prediction and compare the results of the model result and compute our results. the preprocessed data is converted into the .json file which is sent to the media file which is the database of the application for temporary purpose. after that all

the response is sent to the api call of the server and the response is sent to the client as the output.
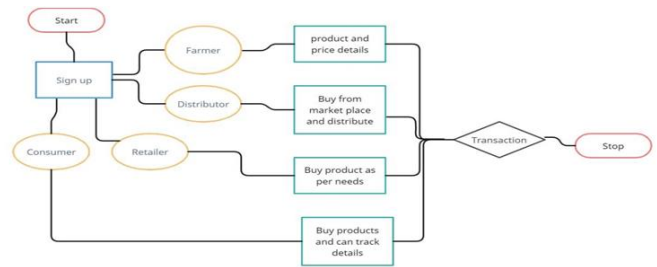
Fig. 1. Workflow of food supply chain

The management of agricultural supply chain logistics and the expansion of farming goods are critical for ensuring product safety. That article on food safety and the possibility of contamination has reemphasized the need for supply chain traceability.

1) **Farmer -> Distributor -> Retailer**

1]. Farmer will add product information or list the information and ownership of product will remain to farmer until someone will take product. Now main idea is Farmer should get profit hence when distributor is buying product, he has to pay 20% more price of product so that farmer will get some profit from there. For example if farmer listed his product price is 100rs then, when distributor is trying to purchase , the product amount will rise to 20% of original price that is 120rs. hence 20rs. will go in farmers hand as his profit income .

2]. After Distributor purchases product from farmer he adds the product in inventory as well as in product's more section (product distributor).

3]. Finally retailer takes the product and remember one thing product ownership changes as It is passed from one seller to another so keep in mind to change the product owner information time to time while selling.

ListItem (Farmer will add item to list)

1]. Check if price is less than 0 if it is then giving error.

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2]. Add product in Farmers inventory. 3]Assign owner of product to sender address that is farmers emit or call Item Listed to list the product.

BuyItem(From farmer to distributor)

1]. Taking unique id of product and fetching product details.

2]. Increasing price of product such that farmer will get profit.

3]. Adding product in distributor inventory.

4]. Deleting product from Farmer inventory.

5]. Storing info of product in productdistributor.

6]. At last calling Item Bought so that it will pass info to frontend.

PurchaseItem

1]. Based on token Id of product fetch product name.

2]. Check if price is valid for product or not.

3]. Now owner will be changed hence we have to delete product information from distributor inventory and variables which store information of previous owner of product.

4]. At last emit Item Purchased so that this updated information will be passed to web UI.

VI. ADVANTAGES

1]. User privacy: the protection of personal information that users share with the application or that the application collects from users. It includes any data that can be used to identify an individual, such as name, address, phone number, email address, or any other sensitive information.

2]. Open source: benefit of open source software is that it can be more secure and reliable than proprietary software. Because the source code is available to anyone, developers can identify and fix security vulnerabilities and other issues more

quickly, and the community can work together to ensure that the software is stable and reliable.

3]. Fault tolerance: the ability of a system to continue functioning properly in the event of a failure or error. In other words, a fault-tolerant system is designed to continue working even if one or more components of the system fail.

4]. Decentralized storage: is a type of data storage system that relies on a network of computers and nodes to store and retrieve data instead of a centralized server or data center. In a decentralized storage system, data is stored across multiple devices or nodes, which can be located in different geographic locations.

5]. Security: Decentralized storage can be more secure than centralized storage because it eliminates the risk of a single point of failure or attack. If one node is compromised, the data can still be retrieved from other nodes.

6]. Transparency: transparent because all transactions and activities on the network are publicly visible on the blockchain. This makes it easier to verify the integrity of the data and to identify and prevent fraud.

VII. CONCLUSION

The proposed method will help the Farmer and other involvement chain members to trace their products and build a trustworthy chain between them. The way Blockchain technology confirms and authorizes transactions is one of the most important features it stores transactional records based on actual transactions. Anyone can see the data, but they can't change it.

VIII. REFERENCES

[1]. Henry Patella and Bela Srimati's article, in which they discuss the secure distributed public ledger technology and the decentralized computing paradigm, demonstrates how Blockchain is a

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suitable alternative to address these problems and build trust among all its stakeholders while also generating profit.

[2]. The framework solution developed by Dr. Kasab Chiranjeevi does away with the necessity for middlemen, centralized authority, and trusted third parties. It also offers transaction records, boosting efficient and effective science and safety. All transactions are registered, then recorded and kept in the immutable ledger of the blockchain with connections to a decentralized le network. In their paper.

[3]. on secure distributed public ledger technology and the decentralized computing paradigm, Henry Patella and Bela Srimati show how Blockchain is a viable solution to handle these issues, foster confidence among all of its stakeholders, and do so while making money.

[4]. Rd. Sudha, where supply chain management was improved, is necessary with the desired qualities, such as checkpoints at every level of the supply chain management and certification of the state of the commodities by both farmers and government agencies. A method that utilizes Blockchain technology is proposed in this study to attain transparency regarding the condition of the commodities which leads to a more beneficial relationship between the producer and the client.

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