Fake Product Detection using Blockchain Technology

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Abstract

The modern world development of a product or technology forever comes with risk factors like counterfeiting or duplication, which can affect the company's name, Revenue (sales and profit), and client health. Finding the genuineness of a product is the biggest challenge today. Counterfeit or duplicate products are inflicting serious worsening within the world market. As we tend to all grasp, each whole features a pretend copy of them out there. Each in style whole has pretended makers produce identical items at cheaper rates by compromising the particular quality. Even the consultants of the first company might not be able to distinguish between pretend products and real products. During this project, we tend to use blockchain technology to observe the original product and add a QR code to them whereas producing. The QR code of the product is going to be connected to a Blockchain. We can store the product details and generate a QR code of that product as blocks within the information. Now people would be ready to scan the QR code victimization on their smartphones and their smartphones can tell them whether or not the product is pretended or not. It'll compare the scanned QR code against entries within the Blockchain database. If the code matches, it'll provide a notification to the client that the product is original, otherwise it'll provide the notification that the product is pretended.

Keywords: Real-time performance, University Employees and Students, Hybrid Cloud Technology, and Performance Evaluation.

1. Introduction

A Blockchain is a collection of blocks that are linked together and stores information. Blockchain technology is secure technology so any block can't be modified or hacked. Using this Blockchain technology, customers or users do not need to rely on third-party users to confirm product safety. To find the genuineness of the product we can use blockchain technology. Smart contracts which are programs on the blockchain are run only when certain conditions are met. Since all the blocks store their data along with the previous block's hash, it becomes difficult to modify the blockchain with false information. According to the report by ASPA (Authentication Solution Providers Association), "There was a 24% increase in counterfeiting in 2019 over 2018, leading to the loss of more than Rs 1 lakh crore to the overall economy". Counterfeiting is a universal issue and is 3.3% of global trade, according to the OECD (Organizationfor Economic Co-operation and Development) data, impacting social and economic development across the world. The report lists the currency,FMCG(Fast-moving consumer goods), alcohol, pharma, documents, agriculture, infrastructure, automotive, tobacco, lifestyle, and apparel, as the 10 sectors impacted most by counterfeiting. According to the FICCI (Federation of Indian Chambers of Commerce & Industry) CASCADE(Committee Against Smuggling and Counterfeiting Activities Destroying the Economy), the goods sales from counterfeiting are expected to double globally to Rs 119.7 lakh crore by 2022. India has been no exception to the menace. Blockchain supports immutability, meaning that once written cannot be erased or replaced. Immutability implies that no information change of state is feasible inside the network. In this project, a decentralized application system (DApp) has been introduced that uses Ethereum blockchain technology in its architecture. In the proposed system we are assigning a generated QR code to a product and the end customer can scan that QR code to identify whether the product is real or fake.

2. **Literature Survey**

IDENTIFYING COUNTERFEIT PRODUCTS USING BLOCKCHAIN TECHNOLOGY IN SUPPLY CHAIN SYSTEMS, (IEEE - 2022) Counterfeit has spread worldwide and has had huge effects on organizations, manufacturers, and consumers. It affects the influence of the organization and the well-being of the consumers. India is not excluded. This paper introduces a decentralized Blockchain-based application system (DApp) to identify counterfeit products in the supply chain system. Hence, the proposed project here uses this concept to handle the transfer of ownership of products. Every user of the DApp has to be authenticated before logging in. After successful authentication, the manufacturer can add their company to the DApp and enroll products of the company. After a product has been included in the blockchain, it is assigned a QR code for verification. The sellers can buy products from the manufacturer after registration. A seller can pay the minimum fee set by the manufacturer and register for the company. After registering once, the seller can buy any product as well as track its distribution. Product status is set from 'Ready To Go' to 'Shipped' after the manufacturer ships it out to the seller. A consumer can scan the QR code provided with each product and verify the transfer of ownership of the product from the manufacturer to the seller. The consumer can also verify the name of the current owner of the product and check its distribution status. FAKE PRODUCT REVIEW DETECTION USING MACHINE LEARNING, (IEEE-2022) Online reviews play a crucial role in determining whether a product will be sold on ecommerce websites or applications. Because so many people rely on internet evaluations, unethical actors may fabricate reviews to artificially boost or devalue items and services. To detect false product reviews, this research provides a semi-supervised machine learning approach. Furthermore, feature engineering techniques are used in this work to extract diverse reviewer behaviors. This study examines the outcomes of numerous experiments on a real food review dataset of restaurant reviews with attributes collected from user behavior. In terms off-score, the results

indicate that Random Forest surpasses another classifier, with the best f-score of 98%. In addition, the data reveals that taking into account the reviewers' behavioral characteristics raises the f-score and the final accuracy has come out to 97.7%. In the current technique, not all reviewers' behavioral characteristics have been considered. Other low-level features such as frequent time or date dependency, the reviewer's timing for giving a review, and how common it is to deliver favorable or poor reviews will be added further to improve the efficacy of the offered fake review detecting algorithm.

AN IOT-BASED ANTI-COUNTERFEITING SYSTEM USING VISUAL FEATURES ON QR CODE, (IEEE - 2021) Counterfeiting is a global challenge. The amount of single seized fake food reaches 10 000 tonnes and that of fake drinks amounts to one million liters [4]. This article presents an Internet-of-Things (IoT) anti-counterfeiting system that uses visual features combined with the quick response (QR) code. The visual features guarantee the authenticity of a product with the QR code for tracking and tracing. Two visual features, i.e., natural texture features and printed micro features are exploited in the proposed system. The natural texture features use the texture of fiber paper to achieve physical unclonable function (PUF), while the micro features are artificially generated for improved industrial manufacturability and reliability. Features are generated and registered in the production phase when the QR code is printed. In the anticounterfeiting verification phase, the feature obtained through the feature extraction algorithm is compared with the record to calculate similarity, which indicates the verification result. IQA is used to assess the image quality and remove unqualified images that are affected by light conditions or improper user operations. IQA algorithms consist of blind IQA and reference IQA. Such an approach is fully compatible with the QR code-based logistic process without any additional manufacturing cost. A user-friendly application has been developed on a mobile platform that facilitates easy-to-use and affordable devices for verification, such as a mobile phone or a handheld code reader. The experimental results show

99.6% and 99.9% accuracy of anti-counterfeiting verification for texture features and micro features, respectively. The system with corresponding algorithms and software has been demonstrated in real-life products.

A BLOCKCHAIN-BASED APPLICATION SYSTEM FORPRODUCT ANTICOUNTERFEITING, (IEEE - 2020) This paper uses the decentralized Blockchain technology approach to ensure that consumers do not fully rely on the merchants to determine if products are genuine. We describe a decentralized Blockchain system with products anti-counterfeiting, in that way manufacturers can use this system to provide genuine products without having to manage direct-operated stores, which can significantly reduce the cost of product quality assurance. Manufacturer Role: For the seller's part, the provided functions include adding a new seller's address on contracts, adding the number of products that the seller can sell, and retrieving information on sellers so that the latest sales status can be retrieved. On the consumer's part. The design goal of our system. A Basic model of our system. it is possible to inquire about the product the seller marketed to the consumer, and verify whether the product has yet been exchanged or confirm if the current status of the product has yet been verified by the consumer's public key certificate. Seller Role: For the consumer's part, the seller can use the system's functions to encrypt the verification information with a private key, and the consumer can use the seller's public key to verify if the seller is what he claims to be. After buying and selling, the seller specifies the purchaser's address in the contract for the manufacturer to obtain the information. The seller can access information about his products, such as sales lists, and the quantity of his remaining stock. Consumer Role: On the seller's part, the consumer can verify whether the seller has a sales relationship with the manufacturer and also verify whether the seller's stock hasn't been yet sold out. IMPROVING

FAKE PRODUCT DETECTION USING AI-BASED TECHNOLOGY, (E-SOCIETY 2020)

In this paper, we research the possibility to reduce counterfeit products using machine learning-based technology. Image and text recognition and classification based on machine learning have the potential to be key technology in the fight against counterfeiting. The automatic image and text recognition and the classification of product information enable end customers to detect counterfeits precisely and quickly by checking them against trained models. The goal of this paper is to create an easy-to-use application in which the end-user identifies the counterfeit product and contributes to the fight against product piracy. For detection, the end-consumer takes pictures of a product packaging, which contains product text information, logos, and maybe certification marks/logos. These pictures will be sent in a request to the server for processing and verification. Afterward, the detection result will be returned to the end consumer to make a further decision. In the case of fake product detection, the end-consumer report this counterfeit product to the government system, such as the Safety Gate - EU's Rapid Alert System.

3. Problem Description

3.1. Existing Framework

There are a lot of limitations and weaknesses in this scheme, and suggest solutions. So modify the framework to remove the main weakness and extend it to the consumer level so that a consumer can determine the legitimacy of a product. This involves Near Field Communication technology (NFC) which is now widely available in cell phones – the consumer's cell phone acts as an RFID reader and detects counterfeit products. Our solution is completely offline as it does not require a central database for product authentication. It is based on Public Key Cryptography (PKC) and a Public Key Infrastructure (PKI). It offers dual-layer authentication mechanisms to customers, visual and cryptographic, without accessing the supplier's database.

The main beneficiary of the proposed framework is the consumer who uses the Internet for online shopping and can authenticate a product reliably after delivery.

3.2. Proposed Framework

Our proposed system will detect counterfeit products using Blockchain Technology. We can store the product details and generate a Unique QR code for that product with a unique ID as blocks in the database. The Customer who has our DApp can able to scan the QR code of the product. After the completion of the process, a unique code from the customer will compare the code against entries in the blockchain database. If the code matches it shows that the product is the original customer is happy to buy that product otherwise it shows fake it automatically shows the notification to the manufacturer.

4. Implementation

4.1. Create a Unique QR code generator and Scanner

To create a unique QR-code generator and scanner using JavaScript and pyqrcode. We develop a smart contract on QR-code with Ethereum solidity and deploy that contract in Ethereum Virtual Machine (EVM) on Remix IDE.

4.2. Develop a Decentralized Application (DAPP)

To develop a Decentralized Application using Flutter, Solidity, and React in Android Studio and use Ethers JS to interact with the Ethereum Blockchain and its ecosystem. Node JS for backend server connection then uses b3 JS to interact with an Ethereum node remotely or locally. And secondary we develop the Responsive web application by HTML, CSS, JavaScript framework React JS, for compatibility with all screens we use bootstrap.

4.3. Create Blockchain Database

We can use Firebase or Mongo DB for the database to store the product's unique ID and details.

And use the Ethereum Blockchain network to store data as blocks. Then use Node JS to link

the database with Front-end.

4.4. Check the bugs and release the product

Finally check all functions of applications and fix the problems and release the product.
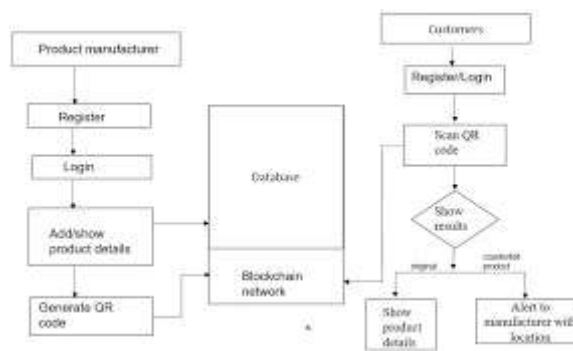

Figure.1. System Architecture

5. Conclusion & Future Work

Counterfeit products are growing exponentially with the enormous amount online. So, there is

a strong need to detecting counterfeit products and blockchain technology is used to detect fake

products. Furthermore, the information is encoded into a QR code. Customers or users scan

the QR code and then they can detect the fake product. Digital information of products can be

stored in the form of blocks in blockchain technology. The data can be stored in the firebase

cloud.

Thus, the proposed system is useful for the customer to detect fake products in the supply

chain. Customers can scan QR codes assigned to a product and can get all the information like

transaction history, current owner based on which end-user can check whether the product is

genuine or not.

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