Fake Product Detection using Blockchain

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Abstract*—The availability of fake product in the Market is one of the biggest challenges of the online retail industry. These products appear to be genuine but they are imitations of the original branded products. Almost 20% of the products sold on online websites are fake. In recent times, block chain is receiving more engagement and various applications are been emerged from this technology. In this paper, to ensure that consumers need not depend on the distributers to know whether their products are authentic or not, we are using the decentralized Block chain technology approach. We describe a decentralization Block chain network with anti-counterfeiting items, which allows producers to deliver items without having to run clear outlets, lowering product quality assurance costs dramatically.

Keywords: Blockchain, IPFS, QR code

I. Introduction

The availability of fake products is increasing in the market so this is adversely affecting the sales and profit of the companies. This create a serious problem for authentic businesses, but too many people are unaware of the fake products available in the market. To ensure the identification and genuineness of products system is needed. To check genuineness of product Ownership history of the product need to be maintain. IPFS (Inter Planetary File System) is useful to maintain ownership of products. IPFS is a distributed file system which has the capacity to store data that are in huge amount in block or file form, which distributes it in a peer to peer distribution method and it is similar to the Blockchain protocol. Also, it is superior to http since downloads data from a single system, but IPFS allows for efficient distribution of large amounts of data. One more important feature of IPFS is that it doesn't allow duplication. Once the product is stored on network hash code is generated of that product and it is possible to maintain all transaction history of the product and its current owner as chain will be generated for that product transactions. Since we are using a decentralized blockchain system, the manufacturers can easily enroll their company history, logo, QR code. With the help of this we can able to eliminate the circulation of fake products and give genuine products to the customers. The main aim is to enhance customer satisfaction as well as to make online shopping reliable. [13]The sentiment analysis for finding the fake reviews can be classified by using Natural-Language-Processing (NLP) techniques. [13]The classification of fake reviews can be identified by applying the deep learning techniques. [14] The security saving structure, uses attribute-based encryption (ABE) for approval. [15] For feature

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extraction, they employed the SFTA method in this system. Approximately 6 components are extracted: pigment, substance, scale, power, shape, and contrast.

II. IMPACT OF FAKE PRODUCT

A. Fake product suppliers imitate other companies copy and offer to the customers. The price of the genuine brand owners of luxury goods are quite expensive in price. Whereas, the fake products are sold in the Market in much cheaper range in price.

B. Fake products in the market adversely affects the process of innovation, profit, sales of the products and damage the brand reputation.

C. Customers look for a product. Then when they find the same product in lower price, they go for the fake product. When the product turns out to be a faulty repaired one they ask for a compensation either through cash, or in replace of a new product.

D. Distributors, Retailers and other partners working with companies might lose their trust in authentic businesses due to the activities of the fake sellers.

E. Authentic Companies themselves caught between trying to avoid wasting resources on the imitations of their products which are available in the market.

III. RELATED WORKS

We have researched several papers related to fake product identification.[1] One of the systems have used the current tracking system for Product delivery. In this manner, the administrator has complete authority over the data, and we must enlist the help of a third-party to provide trust and security. This approach provides a lot of flexibility when it comes to changing the real product before it reaches the user. [2] The system uses Artificial Intelligence technology to detect fake items by analyzing the products color, packaging, material and other key attributes. The major drawback of this system is that recently launched product not in the fake product identification software would be difficult to identify as the system is not exclusive to brands. There is another disadvantage, they have many chances to hack the system and explore the product details to create better copies of original product to upgrade their manufacturing process. This system is used for both recognition and creation of fake items.[3] This system based on data processing and intelligent risk mitigation models. It uses behavioral approach to detect fake product reviews who tries to manipulate the ratings on target products. It tracks the users IP address to observe fake reviews. This system will fail to track the fake reviews, if the social media optimization team users different IP address to send their reviews.[4] This system uses deep learning technology which is very complex than any other technology by collecting several images and compare it with the original product image and then find whether it is fake or real. This system makes the process long and difficult by doing image encoding and several methods.

IV. PROPOSED SYSTEM

Based on existing problems we propose the emerging technology IPFS. The Inter Planetary File System (IPFS), which is simply a protocol and network for storing and sharing data in a peer to peer distributed file system. For connecting all computing devices, IPFS uses unique addressing for each file in a global namespace. It keeps a record of digital transactions which are permanent in a form of database and does not need any central authority for this database to maintain and secure it. Once the product information is stored on network, hash code is generated of that product and it is possible to maintain all transaction history of the product and its current owner as chain will be generated for that product transactions. In our system we are assigning a QR code to a particular product and end customer can scan that QR code to get all information about that product.

Why IPFS Blockchain?

- **Today's Availability of Web is insufficient and higher in price.**

HTTP downloads the files from one computer rather than using and getting pieces of information from multiple computers. IPFS can possibly distribute large data without any duplication and it almost saves 60% of the bandwidth

- **Today's web cannot contain one's History**

The lifespan of the history in Web is 100 days after that the history is gone forever. It's not a fair approach that our Primary medium is this poor and fragile. IPFS stores each file and data in itself. IPFS make a simple resilient network for mirroring data.

- **Centralized and limiting opportunity by Web**

The Internet has powerful innovation by being one of the great equalizers in human history but increasing combining of control threatens that progress. To make that vision a reality uses the delivering technology which stays true to the original vision of an open and flat web.

- **Web today are addicted to the network connectivity**

IPFS can also work when their is no internet connectivity. IFPS works with or without internet and network connectivity.

Distributed ledger is defined as any transaction or contracts which are maintained on a decentralized system. The use of this system eliminates central authority which means that even from people across the globe can able to access and keep an eye on manipulation.

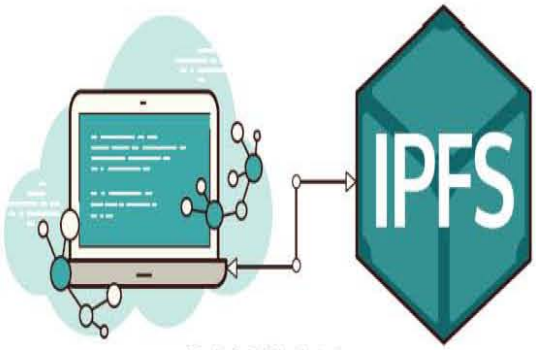

Fig1: Ipfs Blockchain

- ***Blockchain based E-commerce platform and its advantages:***

Blockchain provides the best outcome to the E-commerce businesses to overcome the imitation of fake products-commerce platform also have a payment option in them. Managing this payment transaction ledger is a at most important task in any E-commerce platform. Some of the Transactions like registering orders from customers, payment details, tracking the order through the logistic journey, delivering the item to the customer, return or refund of product, etc that have to be securely recorded in ledgers to maintain a history of every small or big event throughout the process.

Advantages of blockchain in E-commerce:

- High level of security
- Hacking threat reduced
- Transparency of transactions increased
- No payment for intermediaries' services
- Different level of accessibility
- Faster transactions

Automatic reconciliation of accounts

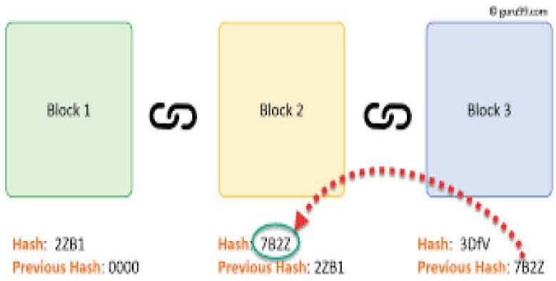

Fig2: Transactions of blocks

How Blockchain works?

Blockchain is the technology that support digital currency. This blockchain system only allows digital information to be distributed but not copy that means there will be no duplication of any data. This means each data can have only one owner. Blocks are groups of transaction. A series of transactions is called a block and each block is connected to it's previous block. Each Transactions are secured with unique hash value. As the blocks are connected with previous hash value will present in the connected blocks. Here the validation process takes place for the transactions to consider it a valid one. When expending their compute resources by a group of nodes, Mining is something to create a block of valid transactions. If any node on the network announces itself as a miner, it can attempt to produce and validate a block. To be included to the primary blockchain, a node must demonstrate that it is quicker than some other miners in the system. A proof of work is the process which ask for a mathematical proof that are provided by miner for validating each block. A miner will be rewarded with a certain amount of value who validates a new block for doing this work.

The below process will explain how blocks are created and the transaction process.

- **Step1***:* The customer requests a transaction.
- ***Step 2:*** The customer requested transaction has a peer-to-peer network which has computers in it and those are referred to as nodes.
- ***Step3:*** Now, the verification process that the transactions are verified by the participants of the blockchain.
- ***Step4:*** Once the process is been verified, this new transaction is joined with other transactions on the network to form a new data block for ledger.
- ***Step5:*** This new block of data is been added to the existing blockchain. These are added in a way that is permanent and cannot be duplicated.
- ***Step6:*** Finally, the transaction is completed.

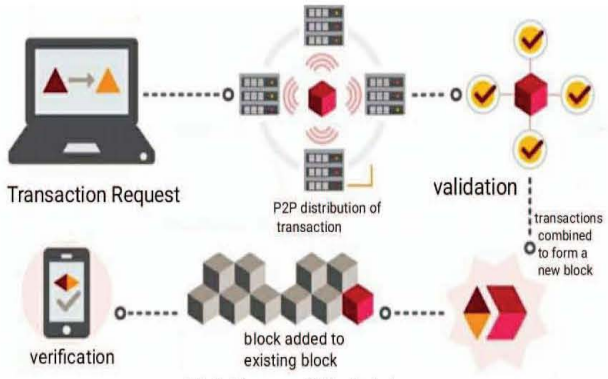

Fig3: Process of Blockchain

Software Requirements:

- **NetBeans**

An application that is integrated i.e. coordinated development environment of java. modules are a set of modular software components which are developed from these NetBeans applications. It can easily be run in Windows, macOS, Linux and Solaris. Here we are using *NetBeans* to build web application for manufacturer site.

- ***JDK 1.8***

The JDK is abbreviated to Java Development kit. JFK is an implementation of either Java platform or standard edition released by Oracle. This a software development environment. It is used in creating and developing Java application and Applets. In this system, JDK1.8 version is used as they are long term support version than another versions of java.

- ***MySQL:***

MySQL Database is a fully managed database service to deploy applications that are cloud-native. This application is used in wide range of purposes like in e-commerce and the common use of this application is to build web database. Using this application, we are storing meta details about manufacturer and product information in a database which cannot be modified by others.

- ***Android Developer Tools:***

An **Android developer** is responsible for developing application. This application acts as a platform to build our own mobile application. In this system, we built an mobile application for the user access to know the product details.

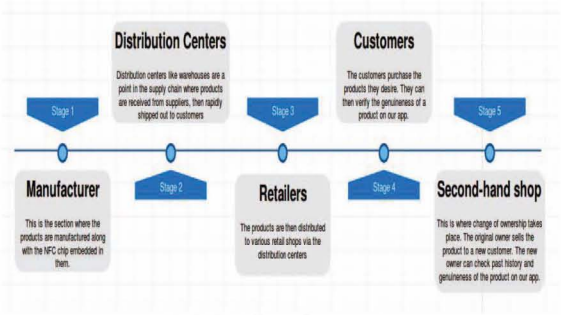

Fig4: Workflow of proposed system

V. WORKING OF PROPOSED SYSTEM

The product, current owner of product, time stamp this status will be maintained by the system. i.e. at what time ownership changed.

- **Online Product enrolment:**

Initially, the first owner of the product will be the manufacturer. For adding the product on network, the administrator is requested by the manufacturer and the QRcode will be assigned to the product at the same time. If requestor is genuine manufacturer, Admin will enrol product and manufacturer.

- **Shipping product to the Distributor:**

In this, the product will be shipped to distributor by the manufacturer and status is set as shipped which will not change the ownership of product until distributor's acknowledgement is received. Ownership of that product will be given to distributor after receiving the acknowledgement.

- **Shipping product to the retailer:**

Here, the product will be shipped by the distributor to the retailer and status is set as shipped and ownership of that product is given to retailer, after receiving acknowledgement from retailer that product received successfully.

- **Product details received by the end user:**

In this stage, An android app will be provided to the customer and buyer can scan product's QRcode using that app and get the detail about product that is manufacturer and current owner of the product and the user can decide whether to buy the product or not.

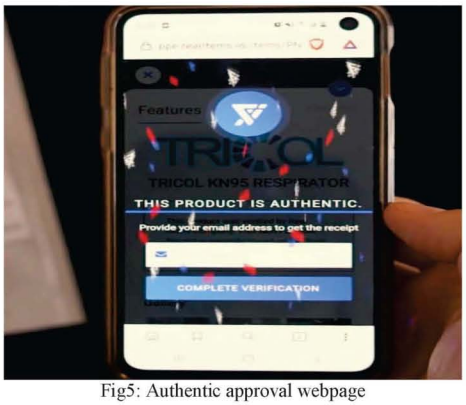

Fig5: Authentic approval webpage

VI. CONCLUSION AND FUTURE WORK

In this *project, we* have *focused* on classifying fake and authentic product. The use of blockchain has helped us in achieving 99% accuracy. Effective results have been produced by this project. This project can be taken into real world applications for detecting and differentiating fake and authentic products. In Future, we can develop this system by including smart contracts that contains a set of rules under which the parties i.e., manufacturer and customer interact with each other through the smart contract for payment details and tracking system can be developed to know about the journey of the product to the customer.

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