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AUTHENTICATION OF PRODUCTS - COUNTERFEIT ELIMINATION USING BLOCKCHAIN

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ABSTRACT

The online retail sites dealing with counterfeit products is a serious problem. It has a negative influence on consumer confidence, brand and also reduces credibility of online marketplaces. This issue will be solved within this project through the development of the machine-learning-based authentication and counterfeit products recognition system in Python. The solution is represented using the techniques of NLP and the supervised Machine Learning algorithms. It processes real-time consumer reviews and the ratings of the products together with product metadata in making this decision on whether a product is authentic or a counterfeit. Raw text data is clean and prepared in the first steps.We utilize three machine learning algorithms, namely Naive Bayes, Support Vector Machines (SVM), and Random Forest, over this curated dataset.

We test these models by using measuring criteria which as precision, F1-score, accuracy, and recall to ascertain that the models are reliable and effective.

Keywords: *E-commerce, Machine learning, Python, Sentiment analysis, Support Vector machine (SVM), natural Language Processing (NLP), Counterfeit Detection, Feature engineering, Random forest.*

INTRODUCTION

The rapid e-commerce since the seventeenth century has already redefined the shopping culture by providing easy access and accessibility to a wide variety of goods to the customer. However, this is also because of this digital transformation makes the quantity of transactions that take place is astounding.

Better or better, which may damage the safety of consumers and kill a brand and diminish the effectiveness of the e-market. The digital versions may provide replicas which bear a semblance of the original products but the quality is lower hence the reason why they want

the customers to feel bad and lose money.

Automatic counterfeits detection tools have aided in this quest. Fake products are identified with the help of Machine Learning, Natural Language Processing, and data analytics and sorted according to the reviews, ratings, metadata, and other useful characteristics. The big-picture idea of the project is to use machine learning to design a system, which will enable users to identify authentic and fake goods. The system identifies classification algorithms to measure authenticity by evaluating the generated reviews and product rating by users and other related mini-scale metadata and provides an insight into the pattern. Besides providing more effective counterfeit detection, this will further reduce the dependence of the method on the manual examination procedure, further enhancing efficiency and scalability of the method.

The original reasons why customers perceive businesses in a certain way are wrong because of the wide usage of the counterfeit products. It will also reduce economic value and put strain on the e-commerce platforms to authenticate the products. The novel form of fraud is too multi-faceted and sophisticated to utilize traditional counter-fraud techniques such as manual checking, bar-coding and brand-specific levels of authentication. Conventional anti-fraud solutions such as manual examination, bar code scanning and brand-specific authentication solutions cannot cope with the level and complexity of the new kind of fraud.

LITERATURE SURVEY

The underlying phenomenon of increased incidences of fake goods has motivated scholars to develop technologically-based mechanisms such as the deployment of machine learning (ML), data mining, and It will use natural language processing (NLP) for prevention of circulation of forged goods. Some of the most important studies present a Variety of ways to identify counterfeits :

Battu, Batchu, Reddy & Mamidi in Predicting Counterfeit Products Using Textual Data (2018): The paper proposes a simplistic approach on how to identify counterfeit products with the help of textual data and text classification. The authors analyse the textual patterns in user-created content, especially customer reviews, that can often include subtle implications of product authenticity or dissatisfaction. They recommend the application of the machine learning models to difference between legitimate and fake products using the review content. The results of the study indicate that it is possible to detect fake products with the

help of a text description before they can be identified using images or physical characteristics only by preprocessing the text data and converting it into numeric features.

Zhang & Wang in the study of the last year, Text Analysis for Fraudulent Product Detection (2020), provide better insight as to how text analytics and sentiment analysis can detect fraudulent behaviour on the online platforms. Compared to previous models, is to identify keywords, this model will incorporate contextual sentimental analysis and topic modeling orderly understand user emotions and experiences. The proposed system utilizes thousands of reviews and seller descriptions, picking up on unusual messages, too-high marks and redundancy patterns--all possible signs of false endorsements.

EXISTING WORK

The existing techniques that are employed to identify fake products consist of manual scanning, barcode/ RFID-enabled tracking, AI-enabled analysis, blockchain-based verification, and community-based reporting. Manual verification is not only time- consuming, but it is also difficult to scale since it is reliable only when used on high end goods. RFID tags and barcodes are more of an automating tool that can be easily copied by counterfeiters. Machine learning and artificial intelligence are good at processing customer re views and product images but they require huge data sets and can give false positives. Blockchain technology assumes verifications that cannot be tampered with, but it is expensive to incorporate and is yet to be adopted on an upscale level. The approach of crowdsourced systems relies on the user feedback that may be delayed and subjective.

- The Bans of the Existing Systems
- Lack of the Real-Time Detection
- The absence of Contextual Analysis.
- Time-Consuming, inefficient

PROPOSED SYSTEM

The suggested system can employ intelligent and data-based identification of product authenticity and identification of counterfeit products in online shopping sites. It consists of an MLmodel based, NLPmodel based and data analytics based product legitimacy judgment tool based on user reviews, user ratings, product metadata among others. This solution is web-based and gathers the information, and processes product related information on online markets. MySQL database are stored by records. In a regulated

learning regime to classification, the ML classification systems have been trained the data which contained annotated labels that will help to differentiate between genuine products and phony products by accepting the labels to pattern reviews, seller behavior, pricing discrepancies and suspicious ratings.

The Proposed System has the following advantages

- ML-powered detection
- Sentiment analysis NLP based
- Graphical interactive real-time virtualization

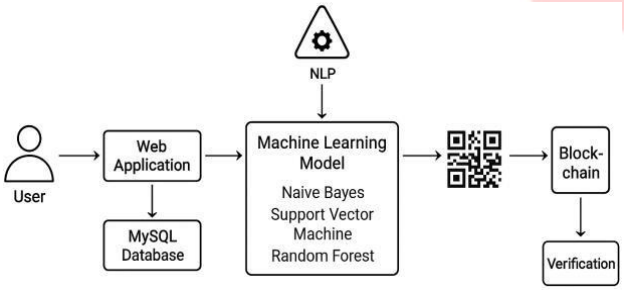

Fig 1. System model architecture

IMPLEMENTATION

Authentication of Products Counterfeit Elimination is a web-based modular system, which, using machine learning, natural language processing, validations via QR code and blockchain, detects and intercepts fake products within electronic commerce. It enables the manufacturer, suppliers and customers to enroll and log in to post their products and scan QR codes, post reviews and check the result of their genuineness.

The backend technology is the Flask Python Data processing and machine learning as encompass in the other types of requests the tool is able to make by using the RESTful APIs.

Its business model encompasses product identification, the creation of QR code, reviewed publishing and verification utilizing NFTs, blockchain payments and logistic industry. This is then transformed into numeric data via TFIDF vectorization and tagging with trained models Naive Bayes, Support Vector Machine (SVM) and Random forest.

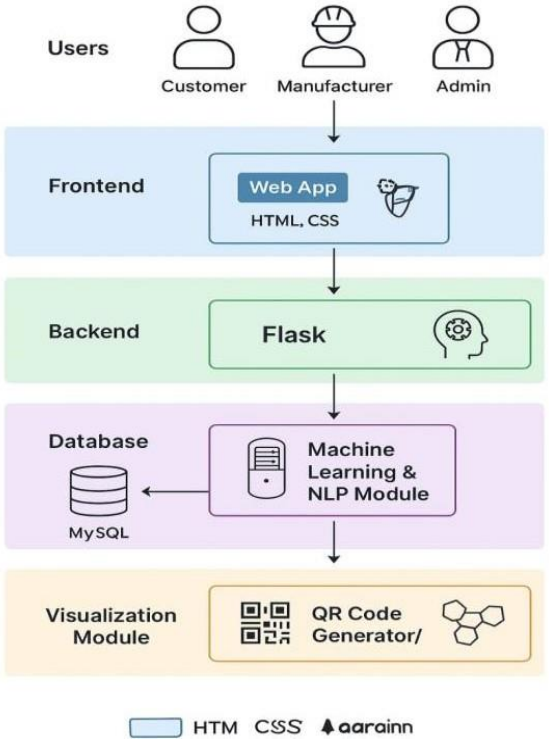

Fig 2. Design of Implementation

RESULTS OF EXPERIMENT

The system offered the potential to rank the products properly according to accuracy of authenticity to fake products due to text reviews and metadata that is related to a review. QR code allows shops and distributors to verify the authenticity of the product and confirm, that it is carrying along with all the track record of the product on the chain of blockchain. It will lead to the creation of openness and credibility. Automated reviews detect-on are executed based on suspicious trends including repeated utilization of the terms, fake or duplicate-postings or extreme negative sentiment. Through such strategy, we will be in a position to detect fraud in advance. The blockchain makes sure that no verification and classification records can be altered further and therefore keep them tampered and maintains the trust within the verification process. This is a smooth user interface with a web interface and interactive dashboards in real time. The system is fast in processes with large bodies of data, numerous users simultaneously, and real-time classification, which is suitable to large e-commerce systems. It is the merging of AI, blockchain, and QR technology in the project that has allowed the speeding up of the work done involving inspections and the reduction of manual work inspections as well The cleaned data set in the column of customer examine and product metadata were transferred to the training tools in machine learning particularly naive Bayes, the support vector machine and random forest. The two models have shown stable outcomes on the performance and precision, recall and F1-score; thus, a significant drop in false positive and false negative outputs.

Fig 3. Proposed System Analysis

CONCLUSION

The idea Counterfeit Elimination of Products Authentication gives a clear light to such a huge burden presented by the modern day online business: The suggested undertaking would present a strong platform to intercept and block the spread of fake goods through QR codes, the machine learning natural language processing and a block block chain based validation of goods.

Those customer reviews will be labeled by the given models based on the Naive Bayes, SVM and Random Forest sentiment classification algorithms. It will be able to ascertain authenticity of products based on user response.

given that QR codes, customers and suppliers can be able to check items amiably.In the meantime, the block chain replica would maintain that all the product transacts and the identification of a transaction by block chain is clearly and properly identified.Such a system safeguards the consumers against being misled but also allows the manufacturers as well as e-commerce sites to retain brand confidence and prevent fraud. It is highly flexible and scalable, which makes it possible to introduce improvements in the future and integrate with the platforms used in the real world.

In brief, the project demonstrates that one can bring all these aspects of data science, principles of cybersecurity, and commercial web technologies to infuse a reliable but efficient solution. It prepares the way to further developments such as mobile applications, implementing of the blockchain and the application of image recognition to remove counterfeits.

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