International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 02 Feb 2024, pp: 291-294 www.ijaem.net ISSN: 2395-5252

Survey on Identifying counterfeit product using Deep learning

[1]Chethan, [2]Madan A M, [3]Pannaga G N, [4]Sharanya Murali, [5]Dr.Niharika P Kumar

Department of Information Science and Engineering
R V Institute of Technology and Management,Bengaluru, Karnataka

Date of Submission: 15-02-2024 Date of Acceptance: 22-02-2024

ABSTRACT: The Identifying counterfeit product project aims to develop a system that can identify fake logos and distinguish them from the original product. The project will use machine learning and deep learning techniques to build a fake logo detector website and assess how much they resemble the original product logo. The project's goal is to help consumers verify whether a product is original and to help brands combat logo piracy. Counterfeit products can harm a brand's reputation and sales, and consumers can be cheated out of their money. The logo detection system will help brands protect their brand identity and prevent fraud by detecting and eliminating e-commerce listings containing fake logos. The project is beneficial for both consumers and brands.

KEYWORDS: Python,SVM,CNN

I. INTRODUCTION

In an era marked by rapid technological advancements and globalized commerce, the proliferation of counterfeit products has emerged as a formidable threat across industries worldwide. The confluence of sophisticated technologies and increased interconnectedness has facilitated the production and distribution of fraudulent goods, posing significant risks to both companies and consumers.

As reported, counterfeit incidents witnessed a staggering 24% increase in the country in 2021 compared to the previous year, creating a colossal over Rs 1-lakh-crore hole in the economy. Globally, the World Economic Forum estimates that the illicit market drains a staggering $2.2 trillion from the global economy, accounting for over 3% of the global GDP.

The complexity of distinguishing between genuine and counterfeit items has reached unprecedented levels, necessitating innovative and effective solutions. The research project aims to harness the power of deep learning techniques to develop a robust system capable of identifying counterfeit products with heightened precision and efficiency.

The urgency of such technological interventions is underscored by the prevalence of counterfeiting across various sectors, with almost 25-30% of all products sold in the country being spurious. Notably, the apparel and fast-moving consumer goods (FMCG) sectors bear the brunt of this issue, with 31% and 28% of counterfeit products, respectively. Automotive and consumer durables follow closely, making up 25%, while pharmaceuticals account for 20% of the counterfeit market.

To illustrate the real-world impact of counterfeiting, we delve into the case of the iconic Mysore Sandal Soap, a century-old legacy confronted with a substantial challenge from counterfeit manufacturers. The Karnataka Soaps and Detergents Limited (KSDL), the state-owned entity behind the Mysore Sandal Soap, faced an estimated loss of □ 500 to □ 600 crore over the past decade due to the illegal production of counterfeit soaps. The recent raid on a fake manufacturing unit in Hyderabad brought to light the magnitude of this issue and highlighted the critical need for advanced technological solutions.

PROBLEM STATMENT

The contemporary landscape of e-commerce and online marketplaces has witnessed a surge in the importance of visual content, specifically product images, as a primary driver influencing consumer purchasing decisions. However, the reliance on visual information introduces a critical challenge—ensuring the correctness, authenticity, and quality of product images. The lack of standardized mechanisms for evaluating and verifying the accuracy of these images poses a substantial risk, potentially leading

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 02 Feb 2024, pp: 291-294 www.ijaem.net ISSN: 2395-5252

to issues such as misleading representations, altered visuals, and mismatched product details.

Simultaneously, the proliferation of counterfeit or knockoff brands has become an escalating threat, undermining the integrity of well-established trademarks across diverse industries. These unauthorized logos, meticulously designed to mimic legitimate brands, serve as conduits for the distribution of fake or substandard products, thereby posing significant risks to consumers and eroding the reputations of authentic brands.

The magnitude of this challenge is exacerbated by the global trade in counterfeit goods, estimated to reach alarming figures annually, thereby demanding immediate and strategic attention. Despite advancements in technology, legal frameworks, and awareness initiatives, persistent challenges include the dynamic evolution of counterfeit practices, economic ramifications for genuine brands, and the expansive scale of illicit trade.

This research endeavours to address the dual challenge of ensuring image correctness on e-commerce platforms and combating the proliferation of counterfeit brands. By adopting a comprehensive and integrated approach that combines technological innovations, robust legal frameworks, and heightened consumer awareness, the research aims to contribute to the establishment of a secure, transparent, and trustworthy environment for both businesses and consumers in the dynamic realm of online commerce.

EXSISTING SYSTEM

In the current landscape of product authentication technologies, both QR codes and low-cost RFID tags have been widely employed to enhance transparency and combat counterfeiting. However, each method faces distinctive challenges that compromise their effectiveness in ensuring the integrity of product information.QR codes on products to prove the validity of the product. But the QR code can be copied and used to label counterfeit products. In the RFID based system that low-Cost RFID tags can be used for auto identification of products, but due to cloning of RFID tags, this method is not suitable.Implementing and maintaining a blockchainnetwork for image-related data could be costly and complex. Compliance with regulatory standards, especially concerning data protection is also difficult based on regions.

PROPOSED SYSTEM

The proposed method for detecting Counterfeit products combines NLP techniques, feature engineering, and classification algorithms. The method consists of the following steps:

1. Data Pre-processing: The initial step involves pre-processing raw data to eliminate noise and irrelevant information, involving the removal of stop words, stemming, and lemmatization.
2. Feature Engineering: It involves feature extraction from the pre-processed data, incorporating aspects such as sentiment polarity, word frequency, and review length.
3. Classification: In the supervised learning algorithm employed for the classification of reviews as either fake or genuine, various classifiers were experimented with, including Support Vector Machines (SVM)and Convolutional Neural Networks (CNN).
4.Evaluation: The performance of the proposed method is evaluated using a dataset of products. Metrics such as precision, recall, and F1-score are employed to assess the method's effectiveness.

II. LITERATURE SURVEY

The paragraphs provided discuss various research and development efforts aimed at fake product identification using blockchain and deep learning.

One project described in [1] The research on logo detection using deep learning encounters notable challenges. The small size of logos proves difficult for accurate detection within complex backgrounds, as early-layer feature maps in deep learning architectures struggle to capture the necessary high-level semantic information. Diverse backgrounds associated with logos, exemplified by brands like "Nike," add complexity, making it challenging to design a robust logo detector that considers image statistics from the entire scene. The introduction of sub-brands further complicates the task, resembling fine-grained classification challenges. K-nearest neighbours (KNN) is applied for classification, it introduces drawbacks related to sensitivity to irrelevant features and computational inefficiencies, potentially impacting the overall performance of the logo detection system.

[2] The effectiveness of the Blockchain-Based Product Ownership Management System, designed to counter counterfeit products, hinges on accurate manufacturer verification. Any shortcomings or compromises in this verification process may allow counterfeit products to infiltrate the blockchain. Furthermore, the reliance on retailers to promptly activate QR codes introduces a potential vulnerability, potentially undermining the system's real-time authentication capabilities. Widespread user adoption, involving manufacturers, retailers, and customers, is

imperative for success, posing a significant challenge in convincing all stakeholders to actively embrace the technology.

[3] The fake review detection that uses Random Forest classification exhibits high accuracy, its complexity may result in longer training times and increased computational demands. The model's interpretability may be a challenge, making it less suitable for applications where transparency is critical. Random Forests can be prone to overfitting, especially when dealing with noisy or imbalanced datasets, impacting the generalization of the model. Furthermore, the sheer number of trees in the ensemble may hinder the interpretability of individual decision trees, posing a potential disadvantage in certain contexts.

[4]While the proposed fake note detector machine offers an affordable solution, potential drawbacks must be considered. Accuracy may vary based on the complexity of image processing techniques, posing challenges in detecting sophisticated counterfeit notes. The system's adaptability to evolving counterfeit techniques and dependency on image quality could impact its reliability. Moreover, limited features and a user skill requirement may present hurdles, emphasizing the need for continuous refinement to ensure effectiveness in tackling counterfeit currency challenges.

[5] focuses on Blockchain technology, it has been used extensively to ensure high data trust ability and security, from the operation of Bitcoin to BaaS (Blockchain as a Service), a cutting-edge blockchain model that functions as a form of pall-based community for organisations that expand blockchain-based apps. Significant apps outperformed the use of the blockchain, which is increasing popularity.

[6] The effectiveness of the decentralized blockchain system in countering counterfeit products is hindered by several challenges. Widespread adoption is critical for success, yet limited awareness and understanding of blockchain among manufacturers and consumers pose obstacles. Additionally, the integration of blockchain and IPFS introduces technical complexities, demanding specialized expertise for seamless functionality. The high initial implementation costs associated with establishing a decentralized network may present financial challenges, particularly for smaller businesses.

In [7],The blockchain technology that underpins cryptocurrencies like Bitcoin and others has gradually gained attention in recent years due to their popularity. Following the approved launch of Facebook's cryptocurrency project Libra and the release of the Libra white paper, Libra sparked extensive discussions across the globe. The public's awareness of open finance has increased under Libra, and the traditional financial system is being significantly affected. Through a comparative analysis of Libra, Bitcoin, and Ethereum, we fully evaluate and discuss blockchain technologyin this article and highlight Libra's innovations in agreement algorithm, performance, and operation script. Finally, we present the difficulties that Libra willrun into in the future.

Another project, presented [8] in Current anti-counterfeiting force chains plan tofight bogus goods from a centralised location. Similar problems to single point processing, storeroom problems, and failures are caused by this armature. Blockchain technology has emerged as a potential solution for problems of this nature. In this work, we propose the block- supply-chain, a novel decentralised force chain that utilises blockchain and Near Field Communication(NFC) technologies to identify counterfeiting attempts.

[9]The paper responds to the global counterfeit goods issue, estimating $1.2 trillion in damages in 2017, projected to reach $1.82 trillion by 2020. It advocates for consumer involvement in addition to regulatory measures. The proposed solution involves machine learning for image and text recognition, creating user-friendly applications for end-users to identify and combat counterfeit products effectively.

[10] This paper introduces Discriminative CNNs (D-CNNs) to enhance remote sensing image scene classification. Utilizing a novel discriminative objective function, D-CNNs address challenges of within-class diversity and between-class similarity. The method incorporates metric learning regularization, ensuring images of the same class are closer and those of different classes are farther apart in feature spaces. Evaluation on three benchmark datasets with standard CNNmodels shows D-CNNs outperform existing methods, achieving state-of-the-art results.

REFERENCES

[1]. Sujuan Hou, Jiacheng Li, Weiqing Min, Qiang Hou, Yanna Zhao, Yuanjie Zheng, and Shuqiang Jiang. 2023. Deep Learning for Logo Detection: A Survey. ACM Trans. Multimedia Comput. Commun. Appl. 20, 3, Article 72 (March 2024), 23 pages. https://doi.org/10.1145/3611309

[2]. S. G, S. R, A. R and H. A. P, "Fake Product Detection using Anonymity and Supply Chain in Blockchain," 2023 2nd International Conference on

Advancements in Electrical, Electronics, Communication, Computing and Automation (ICAECA), Coimbatore, India, 2023, pp. 1-6, doi: 10.1109/ICAECA56562.2023.10200718.

[3]. M. M. Hassan Sohan, M. M. Khan, I. Nanda and R. Dey, "Fake Product Review Detection Using Machine Learning," 2022 IEEE World AI IoT Congress (AIIoT), Seattle, WA, USA, 2022, pp. 527-532, doi: 10.1109/AIIoT54504.2022.9817271.

[4]. R. M. Colaco, R. Fernandes, Reenaz and S. S, "Efficient Image Processing Technique for Authentication of Indian Paper Currency," 2021 International Conference on Computer Communication and Informatics (ICCCI), Coimbatore, India, 2021, pp. 1-8, doi: 10.1109/ICCCI50826.2021.9402428.

[5]. Yildiran Yilmaz, Viet-Hoa Do and Basel Halak, ―ARMOR: Ananti-counterfeit security Mechanism for lowcost Radio frequency identification systems‖, IEEE Transactions on Emerging Topics in Computing (Volume: 9, Issue: 4, 01 Oct.-Dec. 2021)

[6]. P. M. Lavanya et al., "Fake Product Detection using Blockchain," 2021 4th International Conference on Computing and Communications Technologies (ICCCT), Chennai, India, 2021, pp. 133-137, doi: 10.1109/ICCCT53315.2021.9711899.

[7]. Wenzheng Li and Mingsheng He, ―Comparative Analysis of Bitcoin, Ethereum, and Libra‖, IEEE 11th International Conference on Software Engineering and Service Science (ICSESS), 2020.

[8]. Naif Alzahrani, Nirupama Bulusu, ―Block-Supply Chain: a New Anti-Counterfeiting Supply Chain Using NFC and Blockchain‖, CryBlock‘18, Munich, Germany, June 15, 2018.

[9]. Daoud, Eduard, et al. “Improving Fake ProductDetection Using Ai-Based Technology.” Proceedingsof the 18th InternationalConferenceon e-Society(ES2020),2020,doi:10.33965/es2020_202005l015.

[10]. Cheng, Gong, et al. “When DeepLearning Meets MetricLearning: Remote Sensing Image Scene Classificationvia Learning Discriminative CNNs.” IEEE Transactionson Geoscience and Remote Sensing, vol. 56, no. 5, 2018, pp. 2811–2821.,doi:10.1109/tgrs.2017.2783902.