e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:06/Issue:07/July-2024 Impact Factor- 7.868 www.irjmets.com

FAKE LOGO DETECTION USING MACHINE LEARNING

Yadunandan Yadav TRC*1, Mrs. Swarnalatha*2

*1P.G. Student, Department Of Master Of Computer Applications, University B.D.T College Engineering, Davanagere, Karnataka, India.

*2Assistant Professor, Department Of Master Of Computer Applications, University B.D. T College Of Engineering Davanagere, Karnataka, India.

ABSTRACT

False products cause financial losses and reduced quality by undermining brand trust and misleading consumers. We describe a machine learning and Python-based logo identification and recognition application as a preventative measures against this. By analyzing logos to confirm their authenticity, this technology assists firms in preserving their reputation while assisting customers in avoid fake objects.

The application is resistant to partial occlusions and made to handle a variety of image circumstances, such as geometric and photometric modifications. Additionally, it can identify little alterations and tampering with emblems, guaranteeing precise identification of genuine companies. Admins and normal users are the two user roles available in the system. Regular users can validate logos and access support material, while admin can examine registered users, manage user accounts, and update the FAQ section. This program uses cutting-edge logo verification technology to improve online safety and trademark protection.

Keywords: Logo Detection, Machine Learning, Convolutional Neural Networks (CNN), Logo Recognition.

I. INTRODUCTION

The spread of fake goods presents a serious risk to customers and brands, resulting in large financial losses and harming the standing of reputable businesses. Not only can counterfeiting damage firms' reputations, but it also puts customers at risk of making unsafe or subpar purchases. The challenge of telling authentic products from fakes has increased with the popularity of online shopping since counterfeiters are using online platforms to trick foolish customers. We suggest a logo detection and recognition tool that uses machine learning to recognize and confirm the reliability of logos as a solution to this expanding issue. The goal of this innovative approach is to give consumers looking to confirm the legal status of the goods they buy a dependable and effective option.

A machine learning model that has been trained to identify and verify trademarks against an extensive collection of real brand images forms the basis of the program. The system is resilient to partial occlusions and efforts at tampering, and it can handle a wide range of image circumstances, including various geometric and photometric modifications. Maintaining high accuracy in real-world circumstances, where logos may occur in a variety of contexts and with variable degrees of distortion, requires this adaptability.

The application also has a dual-role structure to accommodate various user requirements. Administrators possess sophisticated abilities to control system operations, manage user accounts, and update data, guaranteeing that the platform stays efficient and easy to use. On the other hand, regular users may make better purchasing selections by using the system to verify logos and access support resources.

This system seeks to protect brand integrity in an increasingly digital economy, minimize financial losses, and increase customer safety by tackling the serious problem of counterfeit items with advanced logo detecting technology.

II. LITERATURE SURVEY

1. (M. Iswarya, 2022)This study aims to create and test a system that uses the Darknet framework and YOLO algorithm to identify phony product logos and determine how similar they are to real ones. The project tries to obtain high accuracy in detecting fake logos by utilizing a library of copyrighted logos. Practical uses for this research include social media product brand management, copyright violation identification, and brand visibility monitoring.

2. (Vivek Tanniru, 2023) Using machine learning techniques, the Online false Logo Detection System's primary goal is to reliably discern between real and false logos, thereby effectively identifying and preventing their use on the internet.

3. (P. Vanitha, 2024)This work aims to create and assess a reliable system that uses deep learning algorithms including CNN, Efficient Net, Mobile Net, and ResNet50 to identify bogus logos and assess their legitimacy. The system builds an extensive dataset of authentic and fraudulent logos with the goal of achieving high accuracy in spotting counterfeit logos under various scenarios. To gauge the correctness of the model, performance metrics such as recall, precision, and F1 score will be used. In resource-constrained contexts, our research offers an efficient method for logo detection that ensures both brand integrity and trustworthy visual data.

4. (K. Patel, 2020)This project's goal is to examine and assess several machine learning algorithms that are used to identify spam, bots, duplicate accounts, and phony profiles on social networking sites. The project is to identify efficient techniques for identifying and reducing the impact of phony profiles, which contribute to spam, harmful actions, and the propagation of incorrect information, by reviewing the literature in this field. The goal of this evaluation is to strengthen privacy regulations and raise social network communities' general security.

5. (T. Bhattacharya, 2023)This research aims to build and assess a Context-dependent similarity algorithm-based technique for false logo detection. The technique attempts to reliably detect phony logos and improve the trustworthiness of online material by taking attributes out of logos and using that information to train a machine-learning classifier. By safeguarding brand identity integrity and addressing the growing problem of logo fabrication, this study evaluates the suggested approach's efficacy using a large dataset of authentic and fraudulent logos.

6. (K. Paleček, 2019)This research aims to create a deep learning system utilizing the Faster R-CNN framework for automatic logo detection in real-world photos, and evaluate its performance against existing mode ls such as Mask R-CNN and Retina Net. This work focuses on examining design decisions that affect detection accuracy and conducts a thorough performance comparison of the model on several widely-used datasets, such as FlickrLogos-32, TopLogo-10, and QMUL-Open Logo. The goal is to attain cutting-edge advancements in logo recognition, specifically for the Red Bull brand in online content and photos.

7. (Prof. R. M. Shaikh, 2023)This study aims to provide a machine learning-based method for identifying counterfeit trademarks so that consumers and businesses can tell real from phony goods. The method attempts to strengthen consumer trust, defend brands, and automate the detection process by examining visual traits and patterns in logo images. It also aims to lessen the economic effects of counterfeiting and promote legislative frameworks, all of which contribute to the creation of a more secure and reliable marketplace.

8. (S. S. P, 2023)This research aims to detect counterfeit trademarks in real time using Single Shot MultiBox Detector (SSD) so that customers can distinguish authentic products from imitations. The research tries to improve the accuracy of logo verification by tackling issues including viewpoint variation, occlusion, and cluttered backgrounds. The ultimate objective is to provide customers the ability to spot fake products, safeguarding their financial investments and lowering the frequency of fakes on the market.

9. (Bhattacharya, 2023) In order to address the growing problem of online fraud, the purpose of this study is to provide a machine learning-based solution for identifying phony logos. The study tries to assess the efficacy of this method on a curated dataset by extracting characteristics from logos and building a classifier to distinguish between authentic and counterfeit logos. The ultimate objective is to offer a reliable method for spotting phony logos, improving customer confidence, safeguarding private information, and tackling the rising problem of online deceit.

10. (Swamy, Yamsani, Kumar, Kumar, & Marrikukkala, 2024)The goal of this article is to create a Logo Detection app that will enable manufacturers and customers to recognize authentic products and successfully fight counterfeiting. The software attempts to achieve high accuracy by using a CNN-based logo recognition algorithm, with confidence levels of 97% for legitimate logos and 99% for counterfeit ones. This product contributes to a more trustworthy marketplace by raising consumer awareness, preventing fraud, and safeguarding brand integrity.

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:06/Issue:07/July-2024 Impact Factor- 7.868 www.irjmets.com

III. METHODOLOGY

We used an organized approach that combines machine learning, image processing, and user interface design to create a successful logo identification and recognition application.

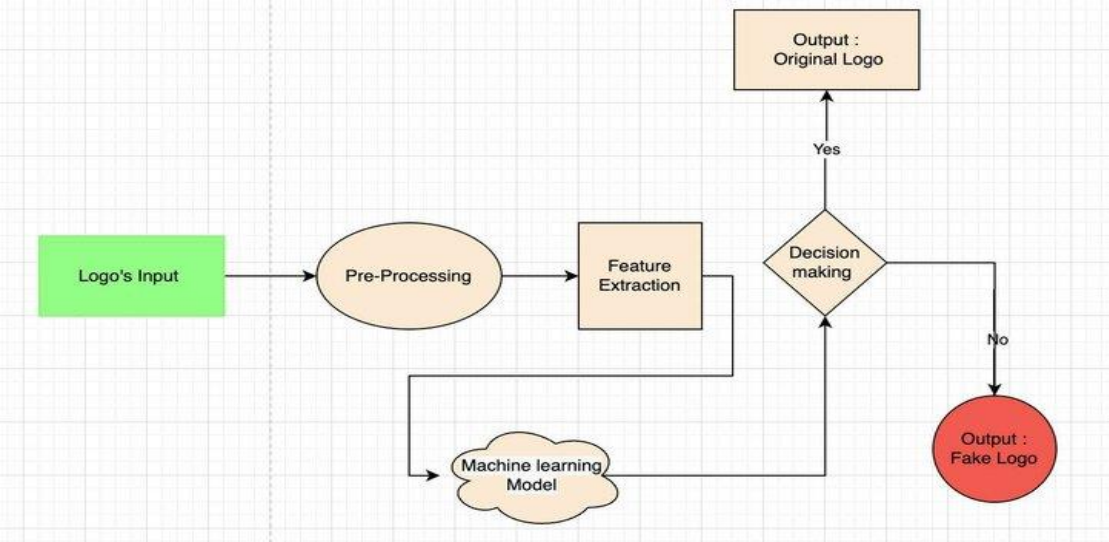

Figure 1: data flow of fake logo detection

The following is an outline of the methodology:

3.1 Data Collection and Preparation

A varied collection of logos is essential for efficient logo identification and recognition. This entails gathering pictures of real and fake logos from multiple sources, making sure there is a variety of styles, dimensions, and attributes. Preprocessing is done after the dataset is put together to get the photos ready for analysis. This involves performing augmentation techniques such rotation and cropping, normalizing pixel values to standardize the data, and resizing the photographs to a consistent size. These actions improve the model's capacity to recognize and categorize logos correctly in a variety of scenarios.

3.2 Model Development

Convolutional Neural Networks (CNNs) are a common choice for machine learning models in the model construction phase because of their superior performance in image categorization tasks. CNNs are good at identifying patterns and spatial hierarchies in images. Next, we use our generated dataset of logos to train this model. Transfer learning is a common technique used to improve a pre-trained model such as VGG16 or ResNet. This method shortens the training period and improves the model's performance. We assess the model's performance using metrics like accuracy, precision, recall, and F1-score after training. In order to prevent overfitting and guarantee reliable performance across a range of logo pictures, we further tune the model by adjusting the hyperparameters and using cross-validation approaches.

3.3 Identification and Detection of Logos

Using object detection frameworks like YOLO (You Only Look Once) or SSD (Single Shot MultiBox Detector), we create algorithms to find logos within photos during the logo detection phase. These frameworks have the ability to recognize logos at various scales and places. After logos are identified, the trained Convolutional Neural Network (CNN) model is used to classify them in the recognition phase. This approach determines the authenticity of identified logos by comparing them to a database of legitimate logos, making the distinction between real and fake logos.

3.4 System Integration

System Integration Backend Development: Utilizing Python, create the application's backend to manage database interactions, model inference, and picture processing. To enable communication between the frontend and backend components, implement API endpoints.

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:06/Issue:07/July-2024 Impact Factor- 7.868 www.irjmets.com

Frontend Development: Provide an intuitive user interface that enables users to browse results, add photographs, and get help. The frontend should have tools for submitting logos for verification, signing in, and accessing FAQs in order to create a smooth user experience.

3.5 Roles for Users and Access Control

- **Admin Role:** Provide features for admins to edit the FAQ area, manage user accounts, and keep an eye on system activity. Administrators have more rights in order to guarantee efficient management and upkeep of the system.
- **Regular User Role:** Provide functionality that allows regular users to examine verification results, validate logos, and get help from the FAQ section. Make that people with different degrees of technical experience can easily understand and utilize the system.

IV. RESULT

The work for logo detection and recognition produces a number of significant outputs when it is operated. The main output, which the user sees, is a determination of whether the logo in the uploaded image is real or fake. The technology also offers detection data, such as bounding boxes that show where the logo is located in the image. The program additionally generates confidence scores for each recognized logo, which represent the model's level of assurance with its categorization. The system might offer information on the matching logo from the database if it is determined that the logo is authentic. Users can access FAQs and support resources for additional help, and they receive a verification report that summarizes the findings. The technology helps admins give and keep an eye on the program by producing logs of user activity and performance metrics. When taken as a whole, these outputs give consumers lucid insights regarding the validity of logos and give administrators the means to effectively monitor the system.

V. CONCLUSION

False products undermine consumer trust and deceive them, which has a substantial negative impact on brand reputation and financial stability. We have created a Python and machine learning program for logo identification and recognition in order to tackle this problem. With the proactive solution this program offers, businesses can safeguard their brand integrity and customers can steer clear of fake goods.

The system's architecture ensures that it can withstand partial occlusions and adjust to various image situations, such as alterations in geometry and photometry. Furthermore, it is also capable of accurately identifying authentic logos by spotting even the smallest changes and manipulations. Regular users can validate logos and access help resources using the program, while admins can manage user accounts, keep an eye on activity, and update FAQs. This program offers a useful tool for reducing the hazards connected with counterfeit items, improving online safety and trademark protection through the use of sophisticated logo verification technologies.

VI. REFERENCES

[1] M. Iswarya, S. Arun Shankar and S. Abdul Hameed, "Fake Logo Detection," 2022 1st International Conference on Computational Science and Technology (ICCST), CHENNAI, India, 2022, pp. 998-1001, doi: 10.1109/ICCST55948.2022.10040325.

[2] Vivek Tanniru, T. B. (2023). Online Fake Logo Detection System.

[3] P. Vanitha, T. Mohana Priya, P. Navasakthi, V. S. Rakshana Devi and R. Aarthi, "Identification of Fake Logo Detection Using Deep Learning," 2024 3rd International Conference on Artificial Intelligence For Internet of Things (AIIoT), Vellore, India, 2024, pp. 1-6, doi: 10.1109/AIIoT58432.2024.10574589.

[4] K. Patel, S. Agrahari and S. Srivastava, "Survey on Fake Profile Detection on Social Sites by Using Machine Learning Algorithm," 2020 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO), Noida, India, 2020, pp. 1236-1240, doi: 10.1109/ICRITO48877.2020.9197935.

[5] T. Bhattacharya, V. Tanniru and S. T. Veeramalla, "Online Fake Logo Detection System," 2023 Congress in Computer Science, Computer Engineering, & Applied Computing (CSCE), Las Vegas, NV, USA, 2023, pp. 2339-2346, doi: 10.1109/CSCE60160.2023.00380.

[6] K. Paleček, "Deep Learning for Logo Detection," 2019 42nd International Conference on Telecommunications and Signal Processing (TSP), Budapest, Hungary, 2019, pp. 609-612, doi: 10.1109/TSP.2019.8769038

[7] T. Bhattacharya, V. T. (2023). "Online Fake Logo Detection System," DOI: https://doi.org/10.21203/rs.3.rs-2492597/v1, Research Square

[8] Swamy, P. K., Yamsani, Y. N., Kumar, V. M., Kumar, B. V., & Marrikukkala, R. K. (2024). Fake logo detection using CNN. AIP Publishing. AIP Conf. Proc. 2971, 020049 https://doi.org/10.1063/5.0196697.