International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 05 | May - 2024 SJIF Rating: 8.448 ISSN: 2582-3930

IDENTIFICATION OF FAKE INDIAN CURRENCY USING CNN

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ABSTRACT

The paper presents a new approach to detecting counterfeit Indian currency, based on Convolution Neural Networks, which is superior to previous image processing techniques. The method uses Deep Learning, a technique that has been successful in image classification tasks. The system can help both humans and machines identify fake currency notes in real time. The system can be deployed as an application on smartphones, helping society distinguish between fake and original currency notes. The accuracy of the system can be increased by using original fake notes and images from children's bank Churan labels.

Machine learning, image processing techniques, and tools like Support Vector Machine (SVM) and K-nearest Neighbour (KNN) are utilized to identify fake currency notes.

1.Introduction

Despite technological advancements in colour printing, duplicating, and scanning, counterfeiting remains a significant issue in society. This issue extends beyond traditional printing houses, as anyone can create counterfeit bank notes using a computer and laser printer. To combat this, identifying fake Indian currency is being implemented.

Deep learning is being used to detect if a currency is fake or original through a convolution neural network. This system excels in image recognition and classification over large datasets, primarily used in object category recognition. However, the recent demonetization drive has not addressed the issue of counterfeit currency. Deep neural networks, similar to human brain neurons, work in a similar manner. Identifying fake currency notes through visual inspection is still a difficult task, as average individuals are not fully aware of security features. Equipping an algorithm with low-cost applications to identify fake currency notes through images is a promising direction towards solving this problem. Future work could also involve implementing the same algorithm in smart-phones. The project aims to identify fake Indian currency using deep learning techniques, specifically convolutional neural networks. Various architectures have been used to recognize real and fake currency, achieving good performance. The project aims to provide reliable information on fake and real currency notes. The results of the applied architectures are analysed to determine the technique with the highest performance.

2. LITERATURE SURVEY

Related studies are under taken and worked upon in this domain. The proposed system is built upon those developments and act as the backbone of our mechanism.

[1] S. Gothe, K. Naik, V. Joshi It proposes using image processing and machine learning to detect these counterfeit notes, with an Android application designed to be easily accessible to common citizens.

[2] In the year 2012, Sharma.J and Vikram Kumar proposed an algorithm based on LBP (local binary patterns) which produced good performance for images with low noise with 99% accuracy [3] Mobile currency recognition system using SIFT to recognize partial images was proposed by Paises et al. in the year 2012 states that the system is evaluated using limited sample set with different state which are folded, incomplete or rotated. They used KNN algorithm which has an accuracy 75% for the first model and 93% for the second model.

[4] In the year 2014 Da-Costa developed a bank note recognition system to recognize multiple banknotes in different perspective views and scales. He used feature detection, description and matching which are used to enhance the confidence in recognizing results. But the proposed model is not suitable for smartphone due to high computation power. Whereas the results are robust to handle the folded and wrinkled notes

[5] V. Lalithendra Nadh, G. Syam Prasad. This method used have explored support vector machines (SVM) for currency market prediction, comparing them with traditional models. SVM outperforms other machine learning methods, demonstrating its superiority in foreseeing nonlinear data. [6] S. Shaker, M.G. Alawan, M. Kiran. This paper explores paper currency detection-based image processing techniques, focusing on image processing as a widely effective technique for currency recognition. It compares previous papers and literature, identifying advantages and disadvantages.

3. SYSTEM ARCHITECTURE

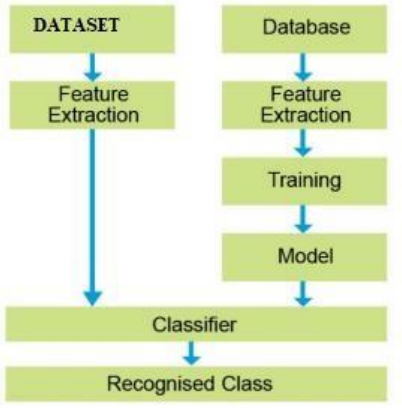

Fig 1: System Architecture

4. METHODOLOGY

Python has been used for the overall development of the proposed system. It makes use of the python library numpy for to perfrom a wide variety of mathematical operation on arrays. It makes uses of the convolutional neural network trained on fake and original currency data sets to predict the authenticity of currency images. The AFCRS project aims to solve an image classification problem by training an artificial neural network on currency image data sets to predict fake or original note classification.

Dataset Preparation

A data-set of paper currency images, collected from Google and Children's Bank of India, was used for training and testing AFCRS models, excluding old currency notes as fake currency. The success of deep learning models depends heavily on the quality and quantity of data used for training. In the case of identification of fake Indian currency using CNN, we obtained currency note from various sources, including public open source such as Google. In-order to create the dataset with the aid of google earth first we need to visit the site and search for the required then capturing screenshots of fake and real currency note by zooming in and out and moving them about the screen in different angle. Since we have collected the large dataset, we good accuracy.

Feature Extraction

Extract the features from the pre-processed images using LBP (local Binary Pattern) and MSD (Mean standard deviation) techniques.

Architecture Design

The CNN architecture should be designed based on the specific requirements of the image recognition task and the characteristics of the dataset.

Model Training

Train the CNN using the prepared dataset. Training is typically performed for multiple epochs (iterations over the entire dataset) to allow the model to learn from the data and converge towards optimal weights **Model Evaluation**

The trained CNN is evaluated using the validation dataset to assess its performance, providing valuable insights and identifying areas for improvement.

Model Optimization

Fine-tune the CNN based on the evaluation results. This may involve adjusting hyper parameters such as learning rate, batch size, and regularization strength. The optimization process is typically iterative, involving multiple rounds of training, evaluation, and adjustment to achieve the best possible performance

Model Testing

The CNN's performance is evaluated on a separate test dataset post-optimization, providing a final assessment of its ability to accurately recognize images in real-world scenarios.

Deployment

After training and optimizing the CNN, it can be deployed in a production environment for image recognition and identification tasks.

5.RESULTS

Fig 2: Interface

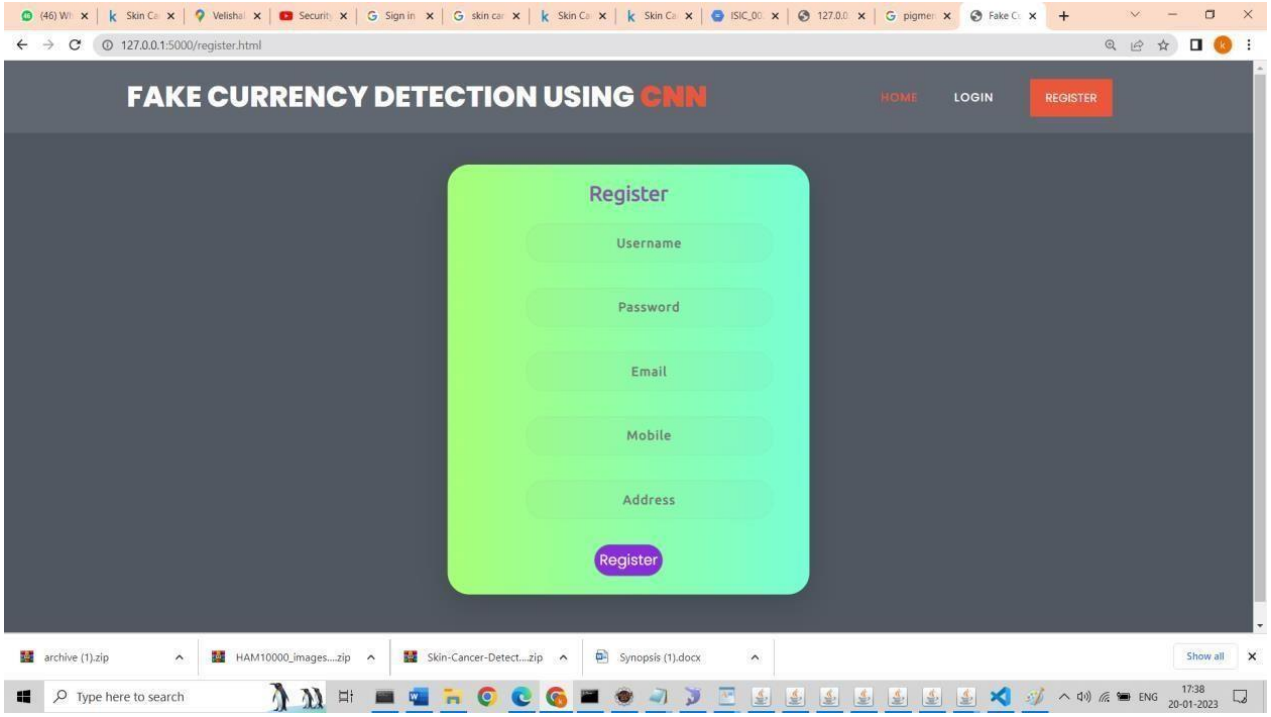

Fig 3: Registration Page

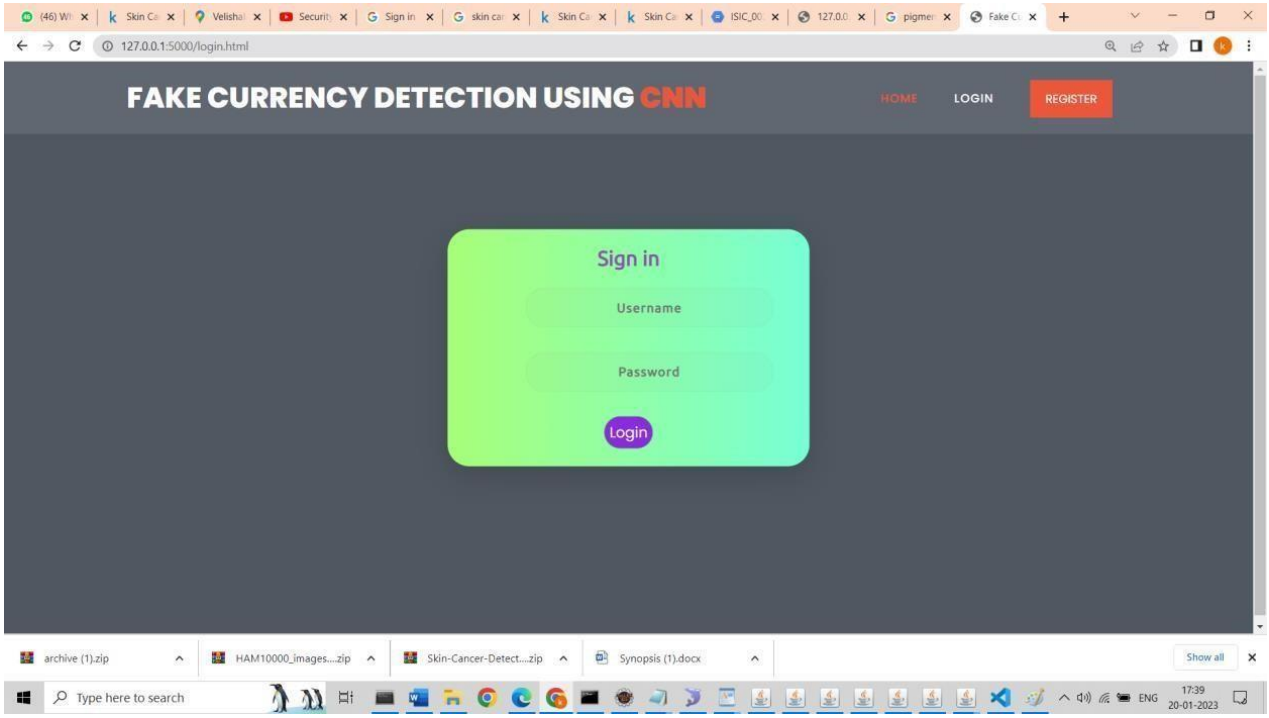

Fig 4: Login page

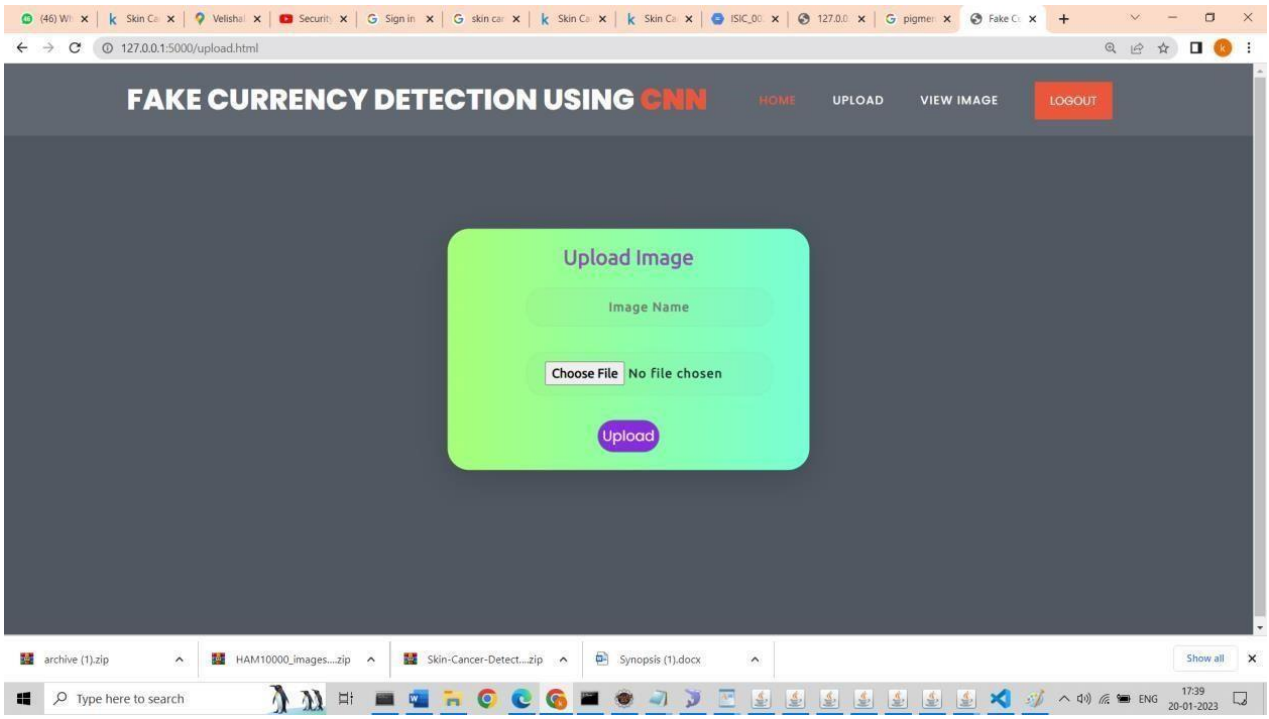

Fig 5: Upload the Image

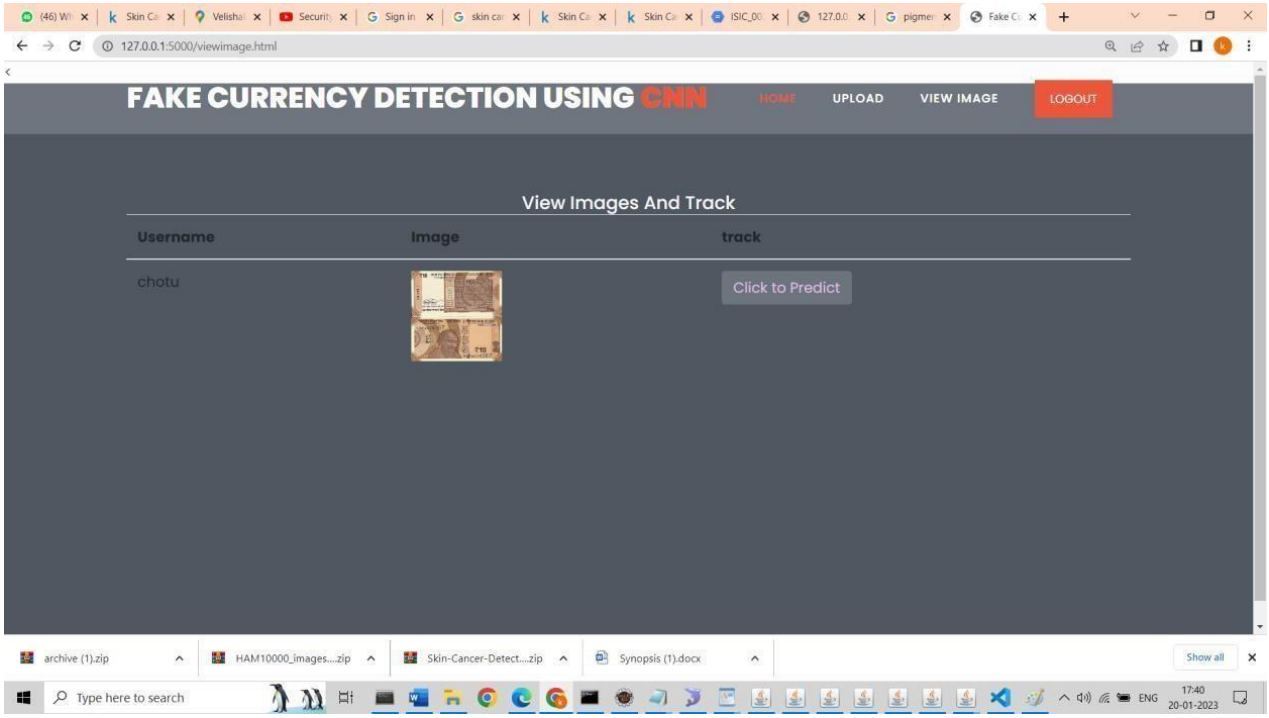

Fig 6: Displays the result

6. Conclusion

The identification of fake Indian currency using Convolutional Neural Networks (CNN) demonstrates significant potential for enhancing the accuracy and efficiency of counterfeit detection. CNNs, with their deep learning capabilities, exhibit high accuracy in distinguishing between genuine and counterfeit currency notes. The model's ability to learn and extract intricate features from the currency images allows for precise classification, thereby reducing human error. One of the strengths of CNNs is their automated feature extraction process. Unlike traditional image processing techniques that require manual feature engineering, CNNs automatically identify and learn important features such as patterns, textures, and intricate details crucial for distinguishing fake notes from real ones.

Moreover, the implementation of CNNs for currency detection is scalable and can be adapted for real-time applications. This is particularly beneficial for banks, ATMs, and other financial institutions where quick and reliable verification of currency is essential. The CNN model also demonstrates robustness to various challenges such as different lighting conditions, wear and tear of notes, and partial occlusions. This robustness enhances its practical applicability in real-world scenarios where such variations are common. Additionally, once trained, CNN-based systems can be deployed using standard hardware, making them a cost-effective solution for counterfeit detection. This increases accessibility for smaller businesses and rural areas where advanced detection tools might otherwise be unavailable.

7. References

[1] Vidhate, Y. Shah, R. Biyani, H. Keshri, R. Nikhare, Fake currency detection application. Int. Res. J. Eng. Technol. (IRJET) 08(05) (2021). e-ISSN: 2395-0056.

[2] A.A. Mandankandy, K.E. Kannammal, Fake currency detection: a survey. Gedrag en Organisatie 33(4), 622–638 (2020).

[3] A.A. Mandankandy, K.E. Kannammal, Fake currency detection: a survey. Gedrag en Organisatie 33(4), 622–638 (2020).

[4] A.Singh, K. Bhoyar, A. Pandey, P. Mankani, A. Tekriwal, Detection of fake currency using image processing. Int. J. Eng. Res. Technol. (IJERT) 8(12) (2019).

[5] G. Navya Krishna, G. Sai Pooja, B. Naga Sri Ram, V. Yamini Radha, P. Rajarajeswari, Recognition of fake currency note using convolutional neural networks. Int. J. Innov. Technol. Exploring Eng. 8(5), 58–63 (2019).

[6] K.D. Sudha, P. Kilaru, M.S.R. Chetty, Currency notes verification and denomination recognition on Indian currency system. Int. J. Recent Technol. Eng. 7(6S) (2019). ISSN: 2277-3878 [7] M. Laavanya, V. Vijayaraghavan, Real time fake currency note detection using deep learning. Int. J. Eng. Adv. Technol. (IJEAT) 9(1S5) (2019). ISSN: 2249-8958.

[7] T. Kumar, T. Subhash, D. Regan, Fake currency recognition system for Indian notes using image processing techniques (2019).

[8] A.Upadhyaya, V. Shokeen, G. Srivastava, Analysis of counterfeit currency detection techniques for classification model (2018).

[9] S. Gothe, K. Naik, V. Joshi, Fake currency detection using image processing and machine learning (2018).

[10] S. Shaker, M.G. Alawan, Paper currency detection-based image processing techniques: a review paper (2018).

[11] V. Lalithendra Nadh, G. Syam Prasad, Support vector machine in the anticipation of currency markets. Int. J. Eng. Technol. (UAE) 7(2), 66–68 (2018).

[12] T. Agasti, G. Burand, P. Wade, P. Chitra, Fake currency detection using image processing, ICSET- 2017. IOP Conf. Ser. Mater. Sci. Eng. 263, 052047 (2017)

[13] Z. Ahmed, Y. Sabina, M. N. Islam, and R. U. Ahmed “Image processing-based feature extraction of Bangladeshi banknotes”, Software, Knowledge, Information 56 Management and Applications (SKIMA), 8th International Conference on IEEE, pp. 1-8, 2014.