IJARETY

International Journal of Advanced Research in Education and TechnologY (IJARETY)

Volume 11, Issue 3, May-June 2024

Impact Factor: 7.394

www.ijarety.in editor.ijarety@gmail.com

International Journal of Advanced Research in Education and TechnologY(IJARETY)

| ISSN: 2394-2975 | www.ijarety.in| | Impact Factor: 7.394| A Bi-Monthly, Double-Blind Peer Reviewed & Referred Journal |

|| Volume 11, Issue 3, May-June 2024 ||

DOI:10.15680/IJARETY.2024.1103025

Fake Currency Detection System Using Machine Learning

Aditi Nirmal[*1], Manaswi Aher[*2], Shubham Khadke[*3], Prasad Deshmukh[*4]

Mr.B.B.Vikhe[*5]

Students, Department of Computer Engineering, PREC Loni, India[*1 *2 *3 *4]

Assistant Professor, Department of Computer Engineering, PREC Loni, India[*5]

ABSTRACT: In the market, fake currency is the most important problem that speaks a lot. Due to the growth of technology, fake currency production has been increased which has degraded the economy of our country certainly with the proliferation of advanced printing technologies, the detection of counterfeit currency has become an increasingly challenging task. In response to this pressing issue, this study proposes a novel approach utilizing Convolutional Neural Networks (CNNs) for the detection of fake currency. CNNs, a class of deep learning models, have demonstrated remarkable capabilities in various image recognition tasks due to their ability to automatically learn hierarchical features from input data.

In this research, we leverage the power of CNNs to analyze the intricate patterns and features present in currency notes, facilitating the identification of counterfeit bills. By training the CNN model on a diverse dataset comprising genuine and counterfeit currency images, we aim to enable accurate discrimination between authentic and fake notes. The dataset encompasses a wide range of denominations, variations in lighting conditions, and angles to enhance the robustness of the model.

The findings of this study hold significant implications for the field of currency security, providing financial institutions and law enforcement agencies with a potent tool to combat the proliferation of counterfeit money. By harnessing the capabilities of CNNs, we endeavor to contribute to the advancement of security measures aimed at safeguarding the integrity of currency systems.

KEYWORDS: Image Preprocessing, Convolutional Neural Networks (CNNs), Image classification, Indian currency.

I.INTRODUCTION

Counterfeiting of currency has been a persistent challenge in financial systems worldwide, with counterfeiters increasingly leveraging advanced technologies to produce convincing fake currency. The proliferation of counterfeit currency presents significant economic risks, including loss of consumer confidence, erosion of purchasing power, and potential destabilization of financial markets. Moreover, the ease of access to digital printing and image manipulation tools has made the detection of counterfeit currency more difficult, amplifying the need for robust and reliable counterfeit detection methods.

In response to these challenges, researchers have turned to machine learning techniques, particularly Convolutional Neural Networks (CNNs), for counterfeit currency detection. CNNs have demonstrated remarkable capabilities in image recognition tasks, making them well-suited for analyzing the intricate patterns and features present in currency notes. By training CNN models on datasets comprising genuine and counterfeit currency images, researchers aim to develop automated systems capable of accurately distinguishing between authentic and fake notes.

| ISSN: 2394-2975 | www.ijarety.in| | Impact Factor: 7.394| A Bi-Monthly, Double-Blind Peer Reviewed & Referred Journal |

|| Volume 11, Issue 3, May-June 2024 ||

DOI:10.15680/IJARETY.2024.1103025

II. LITERATURE REVIEW

Sr. No	Paper	Author	Description
01	Fake Currency Detection with Machine Learning Algorithm and Image Processing	Aman Bhatia, Vansh Kedia	This paper deals with the matter of identifying the currency that if the given sample of currency is fake. Different traditional strategies and methods are available for fake currency identification based on the colors, width, and serial numbers mentioned. In the advanced age of Computer science and high computational methods.
02	Efficient Image Processing Technique for Authentication of Indian Paper Currency	Rencita Maria Colaco, Rieona Fernandes	Now a days due to the development in color printing technology the rate of counterfeit notes production and distribution is increasing. This is a massive problem, faced by almost all the countries. It affects the economy, sine it compromises the security of the real economy.
03	Detection of Counterfeit Currency using Image Processing Techniques	Priyanka Dhapar, ,Akash Agarwal	The growth in the number of fake notes in the system has been tremendous over the past few years. The counterfeiters have keep developing new ways to get as close to the real paper currency as possible. This puts the common masses under grave danger of being robbed of their hard earned money.
04	Fake currency detection using Image processing	L.Latha, B.Rajshree	In market fake currency is the most important problem that speaks a lot. Due to the growth of technology, the fake currency production has been increased which degraded the economy of our country. Here the suggested method uses OpenCV to recognize whether the given note is original or fake. It consists of machine learning techniques that are carried out using suitable mechanisms.

III. METHODOLOGY

1. Data Collection: Gather a large dataset of genuine and counterfeit currency images. This dataset should include various denominations and variations of both real and fake currency.
2. Image Preprocessing: Prepare the dataset by resizing the images, normalizing pixel values, and applying any necessary transformations to enhance the training process.
3. Model Training: Train the CNN model to learn the distinguishing features that differentiate real and fake currency.
4. Model Validation: Evaluate the trained model using a separate validation dataset to assess its performance in accurately detecting counterfeit currency. Adjust the model's parameters and architecture as needed to improve its accuracy.
5. Testing and Deployment: Test the trained model on unseen currency images to assess its real-world performance. Deploy the model in a production environment where it can be used to automatically detect counterfeit currency.
By following these steps, a Fake Currency detection system using CNN can be developed to accurately identify counterfeit currency and help prevent financial fraud.

| ISSN: 2394-2975 | www.ijarety.in| | Impact Factor: 7.394| A Bi-Monthly, Double-Blind Peer Reviewed & Referred Journal |

|| Volume 11, Issue 3, May-June 2024 ||

DOI:10.15680/IJARETY.2024.1103025

Algorithm: Convolutional Neural Network (CNN)

CNN stands for Convolutional Neural Network. It is a type of deep learning algorithm commonly used for image classification and recognition tasks. CNNs are designed to automatically learn and extract features from images by applying convolutional layers, pooling layers, and fully connected layers.

1.Input Preparation: The input images of currency notes are preprocessed to ensure consistency and compatibility with the CNN model. This may involve resizing, normalization, and other transformations.

2. Convolutional Layers: The CNN model consists of multiple convolutional layers that perform feature extraction. These layers apply filters to the input images, capturing different patterns and features at various scales.

3. Pooling Layers: Pooling layers are inserted after convolutional layers to reduce the spatial dimensions of the feature maps while retaining the most important information. This helps in reducing computational complexity and extracting robust features.

4. Fully Connected Layers: The output from the convolutional and pooling layers is flattened and fed into fully connected layers. These layers learn the complex relationships between the extracted features and make predictions based on them.

5. Output Layer: The final layer of the CNN model is the output layer, which produces the classification results. In the case of a fake currency detection system, it would typically have two classes: genuine and counterfeit.

6. Training and Optimization: The CNN model is trained using a labeled dataset of genuine and counterfeit currency images.

7. Testing and Evaluation: After training, the CNN model is tested on a separate dataset to assess its performance in detecting fake currency. Evaluation metrics such as accuracy, precision, recall, and F1 score measure the model's effectiveness.

By following this CNN algorithm, a fake currency detection system can effectively analyze currency images and distinguish between genuine and counterfeit notes

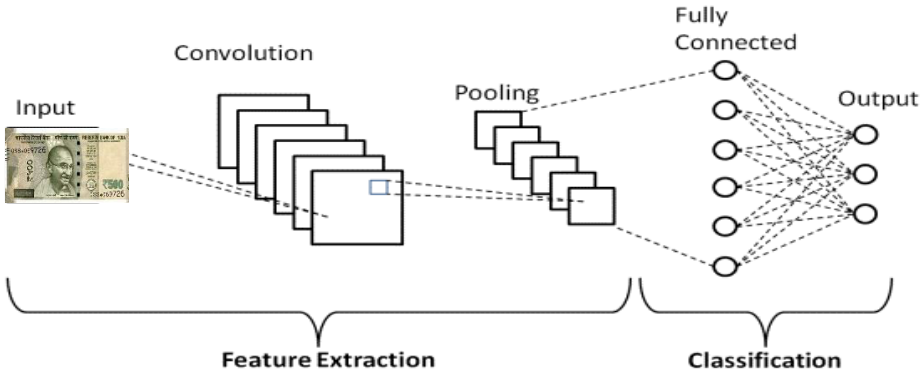

Fig . CNN Architecture

IV. RESULTS AND DISCUSSION

The model classifies Indian currency into fake or real. This study elaborates on the experiments of the proposed model The models were trained and tested on the dataset, with 70% of the data used for training and 30% used for testing. We have demonstrated how we collected our dataset, dataset description, visualization and algorithms we used. Now we discussing about the results we obtained from our experiments upon the implementation of this system. We have divided our dataset into two parts- training and testing dataset. In this chapter we will show the outcome of the training and testing dataset. As mentioned before we have used deep learning algorithms. First, we trained our dataset with these CNN algorithms and then we built a model. Then, we tested our testing dataset in this model. If the test set accuracy is near to train set accuracy then we can conclude that we built a good model.

| ISSN: 2394-2975 | www.ijarety.in| | Impact Factor: 7.394| A Bi-Monthly, Double-Blind Peer Reviewed & Referred Journal |

|| Volume 11, Issue 3, May-June 2024 ||

DOI:10.15680/IJARETY.2024.1103025

Fake currency detection results using Convolutional Neural Networks (CNNs) are generally positive, showing high accuracy in differentiating real from counterfeit bills.

V. CONCLUSION

In conclusion, this study has demonstrated the effectiveness of Convolutional Neural Networks (CNNs) in counterfeit currency detection. Through rigorous experimentation and evaluation, our CNN-based approach has shown promising results in accurately identifying counterfeit currency notes. The developed system exhibits robustness and generalization capabilities, performing well across various lighting conditions, orientations, and denominations of currency notes. The findings of this study have significant implications for enhancing financial security and combating counterfeit currency operations.

By leveraging advanced machine learning techniques, such as CNNs, financial institutions and law enforcement agencies can bolster their counterfeit detection capabilities, thereby safeguarding the integrity of currency systems and protecting against financial losses. While this study has yielded promising results, it is important to acknowledge certain limitations and areas for future research. Further exploration is warranted to address challenges such as dataset diversity, model interpretability, and real-time processing requirements. Additionally, future research could focus on integrating additional features or incorporating multimodal data sources to enhance detection accuracy and reliability. Overall, this study contributes to the advancement of counterfeit currency detection methods and underscores the importance of leveraging cutting-edge technologies in addressing contemporary challenges in financial security.

REFERENCES

[1] D. V. Kapare, S. Lokhande, and S. Kale, "Automatic Cash Deposite Machine With Currency Detection Using Fluorescent And UV Light," vol. 3, pp. 309–311, 2013.

[2] M. N. Rathore and J. Sagar, "A Review on Fake currency detection using feature extraction," vol. 10, no. 11, pp. 407–411, 2019.

[3] K. Santhanam, S. Sekaran, S. Vaikundam, and A. M. Kumarasamy, "Counterfeit currency detection technique using image processing, polarization principle and holographic technique," Proc. Int. Conf. Comput. Intell. Model. Simul., no. Figure 2, pp. 231–235, 2013, doi: 10.1109/CIMSim.2013.44.

[4] P. Ponishjino, K. Antony, S. Kumar, and S. Jebakumar, "Bogus currency authorization using HSV techniques," Proc. Int. Conf. Electron. Commun Aerosp. Technol. ICECA 2017, vol. 2017- January, pp. 179–183, 2017, doi: 10.1109/ICECA.2017.8203667.

[5] Q. Zhang and W. Q. Yan, "Currency Detection and Recognition Based on Deep Learning," Proc. AVSS 2018 - 2018 15th IEEE Int. Conf. Adv. Video SignalBased Surveill., pp. 0–5, 2019, doi: 10.1109/AVSS.2018.8639124.

| ISSN: 2394-2975 | www.ijarety.in| | Impact Factor: 7.394| A Bi-Monthly, Double-Blind Peer Reviewed & Referred Journal |

|| Volume 11, Issue 3, May-June 2024 ||

DOI:10.15680/IJARETY.2024.1103025

[6] A. Kumar and A. Kumar, "Dog Breed Classifier for Facial Recognition using Convolutional Neural Networks," pp. 508–513, 2020. [9] M. Haider Ali, "Thesis Report on Fake Currency Detection using Image Processing Method," Akiful Mohaimin Rifat Islam Shahriar Chowdhury, no. 13301148, pp. 1–38, 1330.

[7] M. N. Shende and P. P. Patil, "A Review on Fake Currency Detection using Image Processing," Int. J. Futur. Revolut. Comput. Sci. Commun. Eng., vol. 4, no. 1, pp. 391–393, 2018.

[8] P. P. Binod Prasad Yadav, C. S. Patil, R. R. Karhe, "An automatic recognition of fake Indian paper currency note using MATLAB," Certif. Int. J. Eng. Sci. Innov. Technol., vol. 9001, no.4,pp.2319–5967,2008,[Online].Available:http://www.ijesit.com/Volume 3/Issue 4/IJESIT201404_77.

[9] T. Agasti, G. Burand, P. Wade, and P. Chitra, "Fake currency detection using image processing," IOP Conf. Ser. Mater. Sci. Eng., vol. 263, no. 5, pp. 88– 93, 2017, doi: 10.1088/1757-899X/263/5/052047.

International Journal of Advanced Research in Education and Technology

ISSN: 2394-2975 **Impact Factor: 7.394**

www.ijarety.in editor.ijarety@gmail.com