iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 **Issue:** VI **Month of publication:** June 2021

DOI: https://doi.org/10.22214/ijraset.2021.35341

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VI Jun 2021- Available at www.ijraset.com

Detection of Counterfeit Indian Currency

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Abstract— Lot of the fake currency note is being printed in recent years which has caused great loss and damage to society. So, it has become necessary to develop a tool to detect fake currency. This project proposes an approach that will detect fake currency notes being circulated by using their image. Our project will provide required portability and compatibility to most peoples as well as feasible accuracy for fake currency detection. The paper is about Fake Indian Paper Currency using image processing implemented in Android Studio to make the app portable and efficient. Features of currency notes like color, height, width, ratio, watermarks were extracted. The process starts from capturing or browsing the image of a currency note and then compare its features with the real note and check whether it is fake or original.

Keywords— Fake currency, Image Processing, Zhang-Suen thinning algorithm, Java programming, Android Studio, grayscale conversion, segmentation, scan-line algorithm, cropping.

I. INTRODUCTION

Illegal replication of original currency is known as counterfeiting money, hence counterfeit currency is a fake currency that has not been authorized by the government. RBI is the only body in India that has the sole responsibility to print currency notes. This problem of counterfeit currency notes is faced by RBI every Year, once they are filtered and circulated in the market. As a result, it has been important that the features of the image of the currency note are extracted and a proper algorithm is applied to improve accuracy to recognize the genuineness of the note. Normal citizens are the people who are most affected by these fake currency notes, as it becomes very hard to identify these and it gets passed on from one hand to another's hand very quickly. From petrol pumps to the local vegetable vendors, everybody is careful while accepting banknotes in denominations of Rs. 100, 200, 500 (which was released after the demonetization) but a lot of these notes are almost impossible to differentiate from genuine ones. Inflation is the common effect of counterfeit currency. Fake notes are one of the huge problems came out in cash transaction. For a country like India, it is becoming a big obstacle. With the aid of the latest hardware tools, it is effortless for a person to print fake notes because of advances in printing, scanning technologies. Hence there is a requirement for the identification of fake currency. In this paper intrinsic properties of the note are considered and after the grayscale conversion features are extracted the intrinsic properties that are the watermarks we are considering are the security thread, identification marks that are the lines present on both sides of the note the number of lines is different for each note, the denominational numeral in Devanagari which is present vertically on left half side of the note. After comparing all the watermarks if there is a difference in the watermarks or if anyone of it is missing then the system will show it as a fake note detected. Acquiring an image is a way of creating digital images, from a physical thing. Here, the image is captured by a camera, that may be so easily available, such that all the features are highlighted. In this way, we can get instant output to detect currency.

II. METHODOLOGY

- Input is given to the system for pre-processing in the form of an image that is scanned or browsed using a mobile camera.
- The motive of pre-processing is an improvement of the image data that reduce unwilling distortions or enhances some image features important for further processing.
- The image is converted into a grayscale image. Many methods can be used to convert an RGB image to a grayscale image such as averaging method with a particular threshold which we have used in this paper.
- Edge Detection The grayscale image is the input to this step. The system uses Scan-Line Algorithm as it gives efficient results compared to the other techniques.
- Segmentation: There are various methods like thresholding, clustering methods, region-based segmentation, etc. to perform segmentation in image processing. Here thresholding method is used to perform segmentation.
- Feature Extraction and Comparison If the features extracted are carefully chosen it is expected that the features set will extract the relevant information from the input data.
- The output shows the different features marked that are used for feature extraction and comparison. In the output, the system first asks the user to browse or scan an image of the currency. The system finally displays if the note is fake or original.

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We extracted four features of note in this project:

Sr.no	picture	Watermark name	Description
1		Security Thread	❖ The security thread appears to the left of the Mahatma's portrait. The security thread has a plain, non-readable fully embedded security thread. ❖ This feature extracted using the Line Count algorithm.
2		Bleed lines	❖ For the visually impaired, bleed lines are available on both the right and the left side of the note which is also drawn in the raised print to aid the blind. ❖ This feature extracted using the Line Count algorithm.
3		The Mahatma Gandhi	❖ The Mahatma Gandhi Series of banknotes contain the Mahatma Gandhi watermark with a light and shade effect and multi-directional lines in the watermark window. ❖ This feature extracted using the Chain code-Histogram algorithm.
4		Denominational numerical in Devanagari	❖ The Indian currency is called the Indian Rupee (INR). The symbol of the Indian Rupee is ₹. The design resembles both the Devanagari letter "₹" (ra) and the Latin capital letter "R", with a double horizontal line at the top. ❖ This feature extracted using the Zhang-Suen thinning algorithm.

III.LITERATURE SURVEY

A lot of researches have been done in this field of Currency note recognition over the years. The authors have done recognition based on Color, texture, security features, etc. Many systems are existing for the recognition of fake Indian currency using a different technique. many of the systems use various steps like image acquisition, feature extraction, and classification system using the various algorithm.

A. Detection of Fake Indian Currency by Gouri Sanjay Tele, Sneha Mahakalkar, Akshay Prakash Kathalkar, Bharat Sahoo, Vaishnavi Damage have used CNN for feature extraction in their work for distinguishing and have used Matlab for the same.[3]

B. Detection of fake currency using Image processing by Ankush Singh, Prof. Ketaki Bhoyar, Ankur Pandey, Prashant Mankani, Aman Tekriwal has used the SVM algorithm for their system to distinguish between a fake and real note.[5]

C. Akanksha Upadhyaya Research Scholar, Vinod Shokeen Associate Professor, Garima Srivastava. In their study, they have proved that using image processing along with logistic regression the system gives an accuracy of above 99%.[11]

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IV. SCREENSHOTS OF THE APP

Fig. 1 Security thread watermark identified.

Fig. 2 Bleed lines watermark identified.

Fig. 3 The Mahatma Gandhi watermark identified.

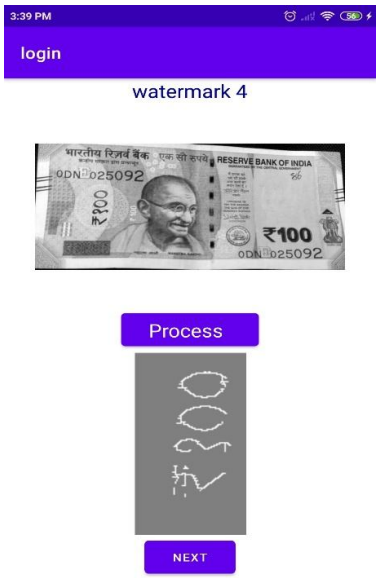

Fig. 4 Numerical in devnagari watermark identified

V. CONCLUSION

Our System will be helpful for normal peoples who are not technically involved in daily life with background processes. A smartphone app will provide its user a concise way to perform a very necessary task of detecting fake currency in a short time giving accurate results to prevent themselves from a scam. The work will surely be very useful for minimizing the spread of counterfeit currency. Through this application, we can see the missing parameters which the fake note have as compared to the original notes.

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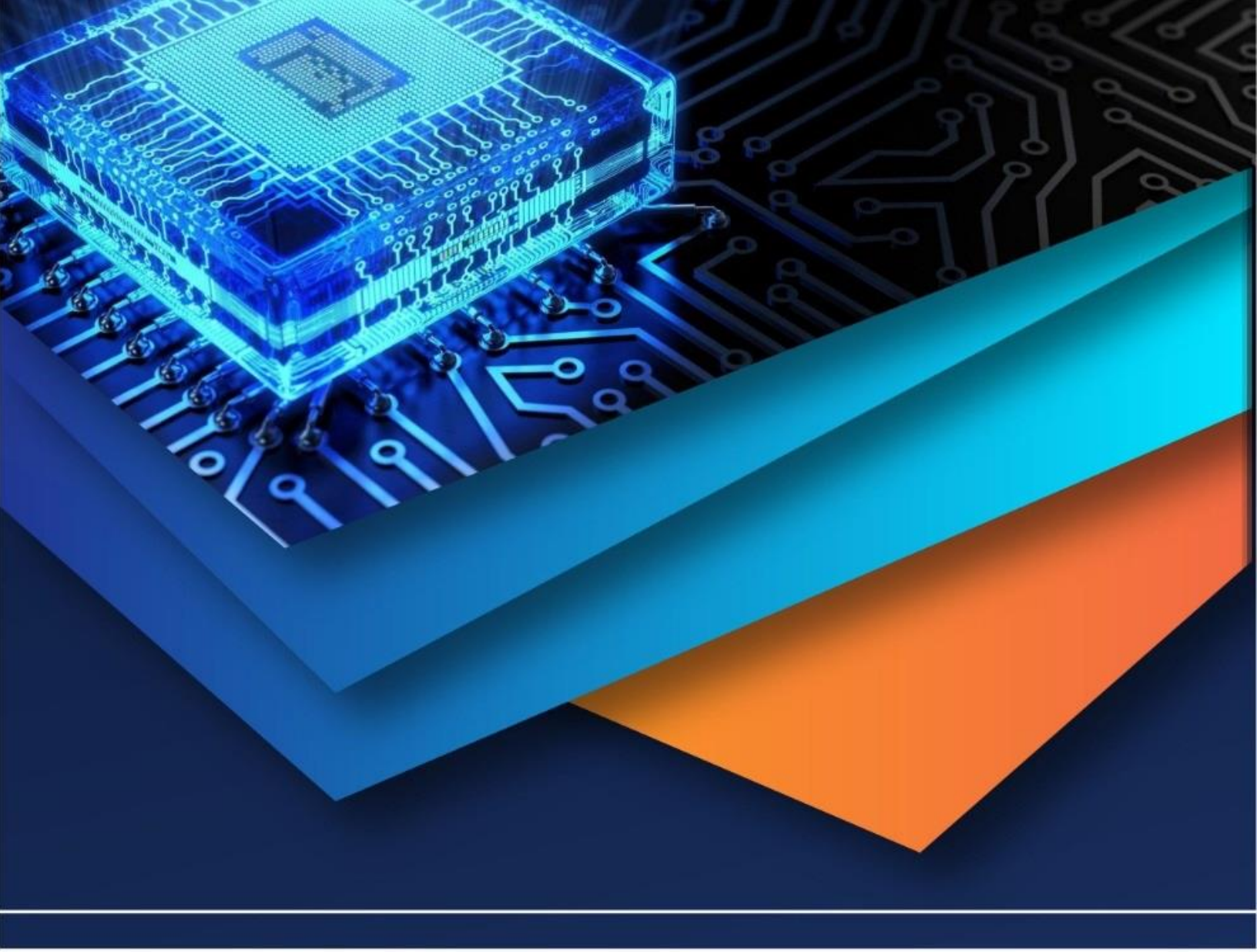

10.22214/IJRASET

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