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Implementation Towards Fake Currency Detection Using Image Processing

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ABSTRACT: Fake currency is the money produced without the approval of the government, creation of it is considered as a great Offence. The elevation of colour printing technology has increased the rate of fake currency note printing on a very large scale. Years before, the printing could be done in a print house, but now anyone can print a currency note with maximum accuracy using a simple laser printer. This results in the issue of fake notes instead of the genuine ones has been increased very largely. It is the biggest problem faced by many countries including India. Though Banks and other large organizations have installed Automatic machines to detect fake currency notes, it is really difficult for an average person to distinguish between the two. This has led to the increase of corruption in our country hindering the country's growth. Some of the methods to detect fake currency are watermarking, optically variable ink, security thread, latent image, techniques like counterfeit detection pens. We hereby propose an application system for detecting fake currency where image processing is used to detect fake notes. We are going to detect the variation in barcode among the real and fake one and also, we will find out dissimilarities between the image under consideration and the prototype. CNN classifiers will be used to detect fake currency. The proposed app for fake currency detection will be simple, accurate and easy to use.

KEYWORDS: Fake Currency, Image Processing, government, CNN.

I. INTRODUCTION

Computers and mobile phones have become an unavoidable part of our lives. There are a lot of things which we can do with these technologies. With the rapid development of mobile phones and technologies come several services like application creation - (refers to the process of making application software for handheld and desktop devices such as mobile phones, personal computers and Personal Digital Assistants. Through the usage of apps, the user is provided with various features that will enable him to fulfil all his needs and much more. Apps should be interactive to the users, Camera/webcam services- includes use of camera services for processing various aspects of image. Fake currency Detection is a system that can be used to overcome the limitations most of the people and our institutions of higher learning face with respect to making difference between counterfeit currencies- (is imitation currency produced without the legal sanction of the state or government, usually in a deliberate attempt to imitate that currency and so as to deceive its recipient) and real currencies. The project involves making use of Digital Image Processing Domain-Digital image processing is the use of computer algorithms to perform image processing on digital images. Counterfeit refers to the exact fraudulent imitation of something that is valuable. Counterfeit of currency without legal sanction of the government authorities is fraud or forgery. The Reserve Bank of India (RBI) is the sole authority to issue any form of currency throughout India. To counter the counterfeit of currency, like all other banks around the world, RBI also introduces newer bank notes with either addition of security features or with a completely different layout. Back in time, anti-counterfeiting measures used fine details with raised intaglio printing that helped anyone detect counterfeit currency with ease. The act of counterfeit of currency is as old as the currency and is still prevalent, causing a huge disruption in the country's economy, thus hindering the growth of the country. Every year, millions of counterfeit notes get circulated and most remain unidentified as counterfeit until they are scrutinized by the bank authorities. Most often than not, a common man, be it a vendor or a consumer, fails to identify legitimate currency or rely on anti-counterfeiting tools such as the counterfeit pen which only detects counterfeit currency if printed on a laser printer. The Ultra-violet (UV) imaging technique used by most banks is one of the most efficient techniques. However, they involve complex circuitry and prove costly for the use of a common man. Hence, it becomes vital to have a technique and a setup which is not only pocket and user friendly but also provides accurate results images.

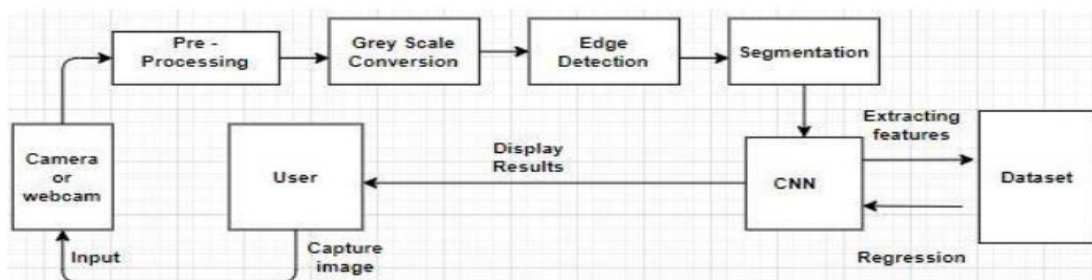
II. RELATED WORK

The paper titled as “Fake currency Detection using Basic Python Programming and Web Framework” (2020) presented by Prof Chetan More, MonuKumar, Rupesh Chandra, Raushan Singh. System proposed in this paper makes use of flask web framework (Flask is micro web framework of python and web programming) and is written in python programming language returned [1]. The paper titled as “Detection of Counterfeit Indian Currency Note Using Image Processing” presented by Vivek Sharan and Amandeep Kaur in 2019 describes Detection of Counterfeit Indian Currency Notes using Image Processing. In this paper, three major features were taken into consideration; Latent image, Logo of RBI and denomination numeral with Rupee symbol with color part of the currency note. Using these three features they had applied an algorithm which detects counterfeit Indian currency notes [2]. The paper titled as “Indian Paper currency detection” presented by Aakash S. Patil in 2019. It introduced a new technique to improve the Recognition ability and the transaction speed to classify Indian currency. It involved making use of OpenCv library of computer functions mainly aimed at real-time computer vision which covered functions such as note identification, segmentation and Recognition and NumPy module of Python used for numerical processing, argparse to parse command line arguments cv2 for the OpenCV bindings[3]. The paper titled as “Identification of fake notes and denomination recognition” presented by Archana MR, Kalpitha C P, Prajwal S K, Pratiksha N It proposed Identification of fake note and denomination recognition in 2018 to reduce human power. This system is mainly divided into two halves: currency recognition & conversion system. They made use of a software interface which could be utilized for different types of monetary standards[4]. Nidhi, A., Chongder, S., and Shreekanth, T. (2018). Vision Based Counterfeit Currency Detection System. Counterfeit currency has always been a threat to the economy of the country. Despite the addition of several security features to prevent this, people have always found ways to duplicate currency. It is also difficult in most cases for a common man to identify a fake note and thus, one falls prey to such tricks of counterfeit currency. Hence, it becomes important to adopt newer and better methods to counter the same for all the denominations of currency in circulation, the most vulnerable being the ones with higher denomination. While there exist a number of ways to check for the correctness of the older variants of Indian currency, the newer lot that has been released however has incorporated in themselves, a number of changes and newer features. This paper aims to bring out some of the vital parameters to be extracted to distinguish between real and fake notes in the new set of Indian currency of denominations 2000, 500, 200, 50 and 10 brought out by the Reserve Bank of India (RBI), using various image processing techniques [5]. The paper titled as “Fake currency detection using Image processing” presented by S. Atchaya, K. Harini, G. Kaviarasi, B. Swathi in 2017. The Paper gave the technique called Performance Matrix for the Fake currency detection using MATLAB image processing system. Neural networks and model-based reasoning are the two methods behind this technique. Various methods like water marking, optically variable ink, fluorescence, etc. are used to detect fake currency in this paper[6].

III. METHODOLOGY

Input: A webcam or phone camera will be used to take the input image by the user. The input image then taken by the user will be used for preprocessing steps such as erosion, dilation and noise cancellation. Image Processing: Further the input image will be moved into the system for processing wherein the image goes through an algorithm (C. N. N) and series of operations such as grayscale conversion, edge detection, image segmentation, feature extraction and then finally towards templates matching. Template matching: The template matching will then be used to find the small parts of an image that is needed to be compared with a template/dataset image. It is basically used to assure quality control of image.

A) System Architecture



B) Modules

- Image Processing
 - Image involves three steps such as grayscale conversion, edge detection, Image segmentation
- Feature Extraction:
 - Features are extracted through which comparison is done.
- Classification:
 - The CNN algorithm is applied to search for counterfeit currency

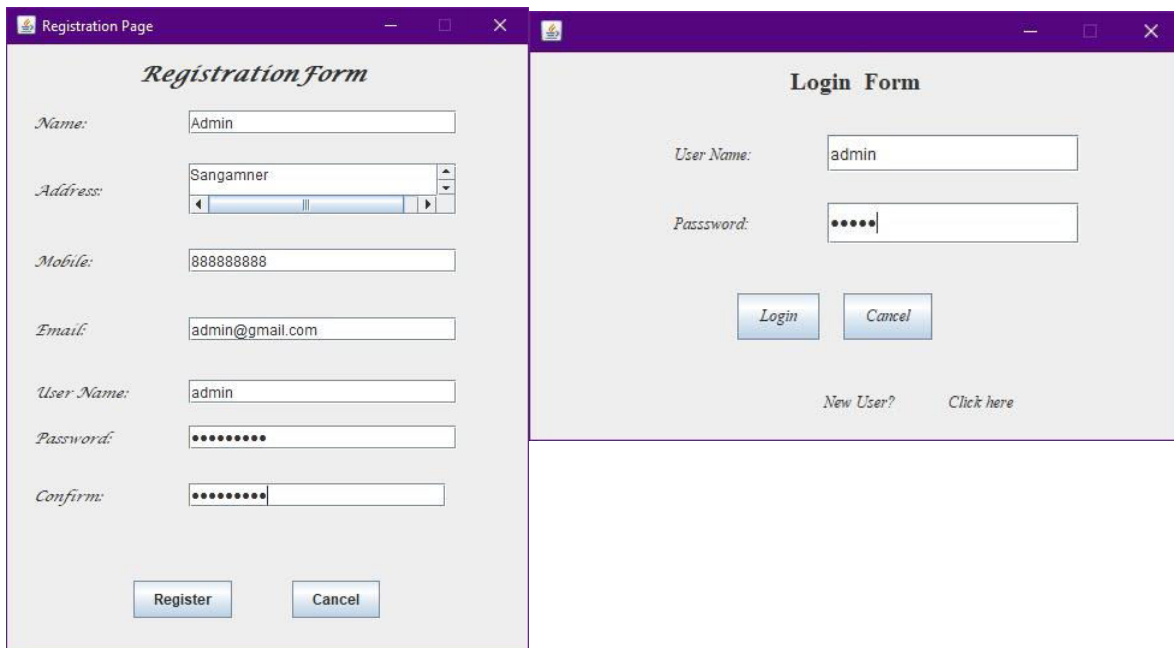
C) Algorithm

CNN

A Convolutions Neural Network (CNN) is comprised of one or more convolutions layers (often with a sub sampling step) and then followed by one or more fully connected layers as in a standard multi layer neural network. The architecture of a CNN is designed to take advantage of the 2D structure of an input image (or other 2D input such as a speech signal). This is achieved with local connections and tied weights followed by some form of pooling which results in translation in variant features. Another benefit of CNN's is that they are easier to train and have many fewer parameters than fully connected networks with the same number of hidden units.

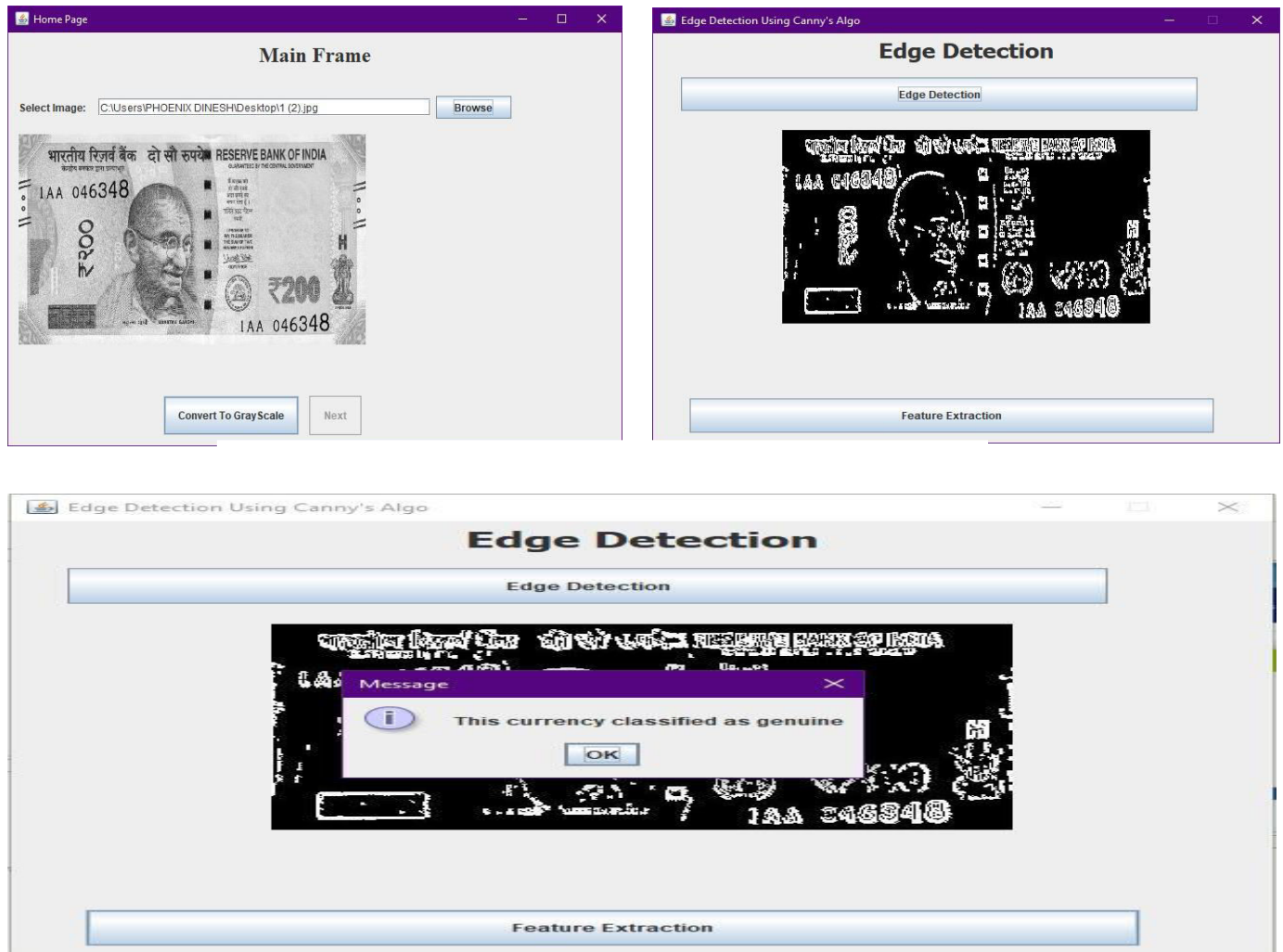
- Step 1: Dataset containing images along with reference caption is fed into the system
- Step 2: The convolutional neural network is used a encoder which extracts image features
- 'f' pixel by pixel.
- Step 3: Matrix factorization is performed on the extracted pixels. The matrix is of m x n.
- Step 4: Max pooling is performed on this matrix where maximum value is selected and again fixed into matrix.
- Step 5: Normalization is performed where the every negative value is converted to zero.
- Step 6: To convert values to zero rectified linear units are used where each value is filtered and negative value is set to zero.
- Step 7: The hidden layers take the input values from the visible layers and assign the weights after calculating maximum probability.

IV. EXPERIMENTAL RESULTS



The image shows two side-by-side web forms. The left form is titled 'Registration Form' and contains fields for Name (Admin), Address (Sangamner), Mobile (888888888), Email (admin@gmail.com), User Name (admin), Password (masked with dots), and Confirm (masked with dots). It has 'Register' and 'Cancel' buttons at the bottom. The right form is titled 'Login Form' and contains fields for User Name (admin) and Password (masked with dots). It has 'Login' and 'Cancel' buttons, and a link for 'New User? Click here' at the bottom.

Fig: Registration Form and Login Form



V. CONCLUSION

The main objective of the paper is the identification of counterfeit currency. This paper proposes a vision-based system which not only involves simple construction but is associated with better algorithms to detect counterfeit currency. The proposed application will improve the level of awareness and identification of the fake or counterfeit currency notes in circulation to the people who used cash transactions regularly in their various businesses.

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