Detection of Indian Currency based on Internal Features with Parameter Result

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Abstract- The image analysis is the technique of image processing which helps to analyze various properties of the input image. In the recent times various application of the image analysis comes into existence. The current detection is the application of image analysis which is used to define that whether currency is fake or genuine. In the recent times various algorithms has been proposed which is based on SIFT algorithm to analyze external features of input currency. In the existing algorithm only external features are analyzed which reduced accuracy of detection. In this work, new technique is been proposed which is based on to analyze internal features of the image for the detection. The internal features of the image are strip values of the currency. The simulation is been performed in MATLAB and RMSE results are decreased up to 10%, accuracy results are increased up to 6%.

Keywords- SIFT algorithm, image processing, currency detection, fault detection, strip values.

I. INTRODUCTION

Computer Imaging can be defined an acquisition and processing of visual information by computer. Computer imaging can be separate into two primary categories; Computer Vision and Image Processing. In computer vision application the processed images output for use by a computer, whereas in image processing applications the output images are for human consumption. JPEG compression is a standard stage in the camera pipeline in most consumer level digital cameras [1]. To balance the reconstructed image quality and compressed file size using digital camera. JPEG compression has two objectives in digital camera. The image should not exceed the fixed size and the second is that for given compression factor, image quality can be improved [2].
The extraction of image content description and their associated matching is called feature detection. The main step of which is required is memory consuming and redundant raw images. The main techniques of feature extractions are Sobel Edge Detection, Canny Edge Detection, and Hough Transformation [3]. Currency is a token which is exchanged for buying services and goods. Currencies can be in many forms like metal, paper and polymer etc. Paper currencies are easy to handle and are used in different countries for transactions. There should be a need of efficient recognizer to make efficient recognizer [4]. The Currency reorganization system is based upon scanner, PC and algorithm. The unique feature is depended upon algorithm like its Gray image, RGB, Binarization, noise elimination, segmentation and pattern matching

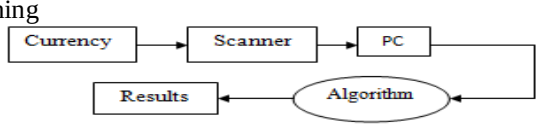

Fig.1: Currency reorganization system

Some methods use physical properties as the extrinsic features of the currency. Internal features can also be used. But there are many countries which are not use internal properties due to false detection of same currency. The basic distribution is same, head portrait at the right side, a white area in the left side. In left side water mark is available with some texts on the top. The values position of the currency is distributed at the corner [5]. A Bayesian Method is a graphical model to find out relationship among variable features.
The Bayesian Network structure is directedacyclic graph and nodes one-to-one correspondence relationship among their features [6]. SIFT is scale invariant feature transform provides motion tracking, multiview geometry and recognition. Applications include object recognition, robotic mapping and navigation, image stitching, 3D modeling, gesture recognition, video tracking, individual identification of wildlife and match moving. Features of SIFT are highly distinctive, relatively easy to extract and allow for correct object identification with low probability of mismatch [7].

II. LITERATURE REVIEW

Yadav B.P., et.al. examined in this paper [8] that notes are the one of the biggest problem in cash transactions. It has become one of the biggest hurdles for INDIA. Due to easy printing, it is very easy to print fake news within seconds using latest tools. Detecting fakes notes with manually process is time consuming and vary untidy. So there is a need of a machine that automatically detects fake currency in efficient manners. Many techniques have been proposed with the use of MATLAB, feature extraction with HSV colour space and other applications of image processing. We have implemented a fake note detection unit with MATLAB algorithm. This

paper is a based on the same project to give solution for fake currency problem.

Deborah , M. et.al. explained in this paper [9] that main aim of this paper is to detect fake currency using image processing.Fake currency detection is a process of finding the forgery currency. After choose the image apply pre-processing. In pre-processing the image to be crop, smooth and adjust. Convert the image into gray colour. After conversion apply the image segmentation. The features are extracting and reduce. Finally compare the image into original or forgery.

Wang, H. et.al. proposed in this paper [10] that to achieve automatic diagnosis of plant diseases and improve the image recognition accuracy of plant diseases, two kinds of grape diseases (grape downy mildew and grape powdery mildew) and two kinds of wheat diseases (wheat stripe rust and wheat leaf rust) were selected as research objects, and the image recognition of the diseases was conducted based on image processing and pattern recognition. After image preprocessing including image compression, image cropping and image denoising, K-means clustering algorithm was used to segment the disease images, and then 21 color features, 4 shape features and 25 texture features were extracted from the images. Back Propagation (BP) networks were used as the classifiers to identify grape diseases and wheat diseases, respectively. The results showed that identification of the diseases could be effectively achieved using BP networks.

LIU,L.et.al. explained in this paper [11] that linear prediction analysis is known to suffer from the problems that are sensitive to the addictive noise. In this paper a new approach for LP analysis of cross correlation sequence between speech signal and its zero-crossing wave has been presented. Simulation results show that the proposed method is capable of performing the speech analysis under a white noisy environment. In this paper, a new approach for LP analysis has been proposed for use in noisy environment. This approach for LP analysis is based on cross-correlation sequence between speech signal and its zero-crossings wave. Based on the experimental results, the proposed method is shown to be suitable for performing speech signals analysis in a noisy environment and be capable of reducing the noise level.

Zhou,X. et.al. proposed in this paper [12] a survey which analyses the main factors which are responsible for the water quality based on the principle analyse method. There are various fields which discussed in this paper like agricultural area, non-agricultural area, effective irrigated area and industrial added value. In this project they are taking main samples as input samples for main index demands. The stimulation results are consistent with the actual value and use the model to predict water demand in 2014 and 2015. The prediction results of BP neutral networks and index quota method are compared, and it shows that the water demand prediction by BP neutral networks is better. It is suggested to put index quota method of water demand prediction as the foundation, and combine with BP neural networks prediction results to better guide regional water resources allocation.

He,Y. et.al analyzed in this paper [13] regarding the road accidents which are affected by the road conditions and weather conditions. They proposed a parametric piecewise-affine incident model. The model is calibrated offline using a combination of constrained and unconstrained non-linear regression methods, and is shown to provide a good fit. The prediction of local incident impact is achieved via the design of a neural network model learning the parametric fit of the incident model based on available incident features. The neural network-based prediction model is shown to outperform state-of-the-art prediction methods such as multivariate decision trees.Practical deployment and applicability of the proposed method in operational conditions are also discussed.

III. PROPOSED WORK

In the proposed technique, the currency is taken and each currency has their unique identification whether it is 500, 1000 and 50 rupee note. The proposed system will match various features of the currency note to declare that whether note is legitimate or not. These features of font type of the numeric, shape, RBI seal and latent seal. All these features are extracted using SWIFT and features are matched using nearest neighbour classifier. In this improvement will be proposed in framework in which neighbour classifier will be replaced with Bayesian classifier. This will leads to improve accuracy of currency detection and improvement in SIFT algorithm will proposed to match internal features of the currency.

IV. FLOW CHART

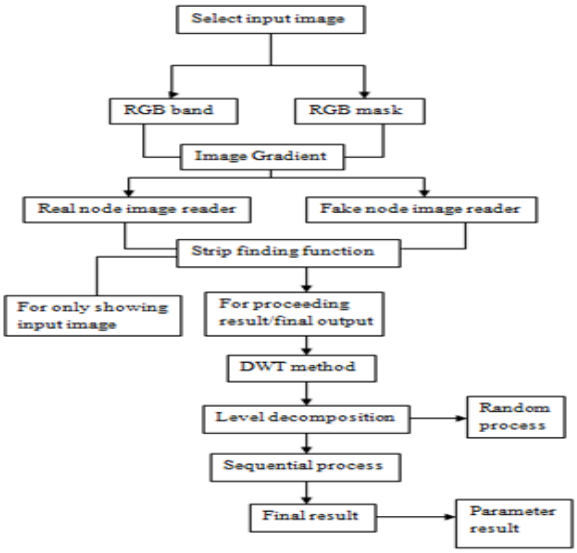

Fig. 2: Flow Chart of Proposed Work

The image is taken as input and converted into gray scale. To detect the font of the character, SIFT algorithm has been applied to analyze the image and to detect image edges. Image segmentation has been applied in next step to detect numeric from the input image. In the last step, the numeric text is extracted and compared with the genuine numeric to check whether currency is genuine or fake. Peak signal to noise ratio (PSNR), root mean square error (RMSE), fault detection rate (FDR) and accuracy values of the proposed and existing algorithm are compared to validate the proposed system.

V. RESEARCH METHODOLOGY

In the proposed technique, the currency is taken and each currency has their unique identification, it means that whether it is 500, 2000 and 50 rupee note. The proposed system will match various features of the currency note to declare that whether note is legitimate or not. These features of font type of the numeric, shape, RBI seal and latent seal. All these features are extracted using SIFT and features are matched using nearest neighbor classifier. In this improvement will be proposed in framework in which neighbor classifier will be replaced with Bayesian classifier. This will leads to improve accuracy of currency detection and improvement in SIFT algorithm will proposed to match internal features of the currency.

In this work, existing base paper technique is implemented for currency reorganization. In this work, the image is taken as input and that input image will be converted into gray scale. To detect font of the character, technique of SIFT algorithm which will analyze the whole image on the basis of properties of the image edges are detected. The technique of image segmentation is applied in next step to detect numeric from the input image. In the last step the numeric text is extracted and compared with the genuine numeric and define that whether currency is genuine or fake.

In the proposed technique, the currency is taken and each currency has their unique identification irrespective matched. The proposed match various features of the currency note to its denomination check the note is legitimately of note. These features of font type are numeric, shape, RBI seal and latent seal. All these features are extracted using SIFT and features are matched using nearest neighbour classifier (NNC). Previously SIFT technique with nearest neighbour classifier has been used to detect fake currency. In the proposed technique SIFT technique has been used with Bayesian classifier (BC) and DWT tool.

VI. EXPERIMENTAL GRAPHS

Fig.3: Input of currency Image

As shown in figure 3, this image is input to the proposed technique. In the proposed technique take two inputs the take image and real image. The RGB bands of the both images are extracted to identify that legitimacy of the input image

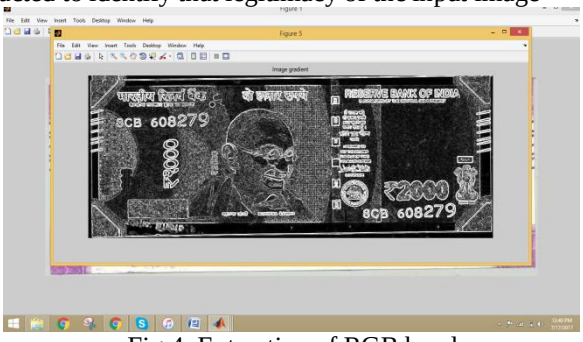

Fig.4: Extraction of RGB band

As shown in figure 4, in the proposed technique two images are taken as input the first image is real image and second image is take image. The RED, GREEN and BLUE colour of the image are masked and from these image intensity of the colour are calculated using gradient function.

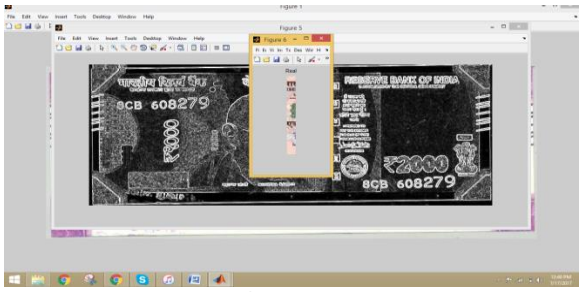

Fig.5: Strip Extraction

As shown in figure 5, the image which is taken as input, on that image features are analyzed using morphological scanning. The DWT technique is applied to extract features of this image. The strip part of the image is extracted for batter analysis of the image.

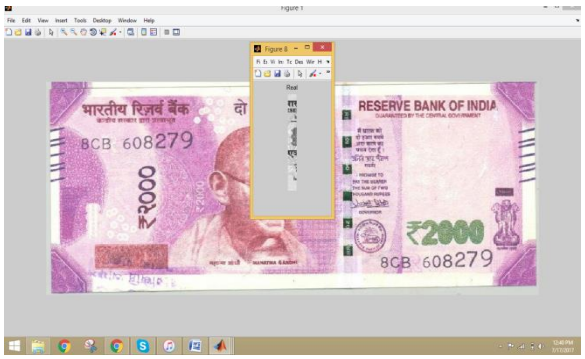

Fig.6: Strip Extraction

As shown in figure 6, the image which is taken as input, on that image features are analyzed using morphological scanning.

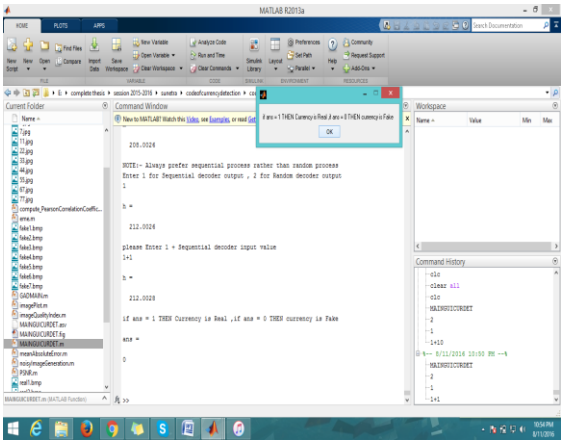

Fig.7: Detection of fake or legitimate currency

As shown in figure 7, the image which is taken as input, technique of morphological scanning and DWT is applied and on that technique classifier is applied to classify extracted image features. The variable answer is defined, if the value of answer is 0 then currency is fake and if answer variable value 1 then it is real. The Comparison of Result for both the Techniques are shown by the graph for the result given by the software. The Parameters are PSNR, RMSE, FDR, Accuracy.

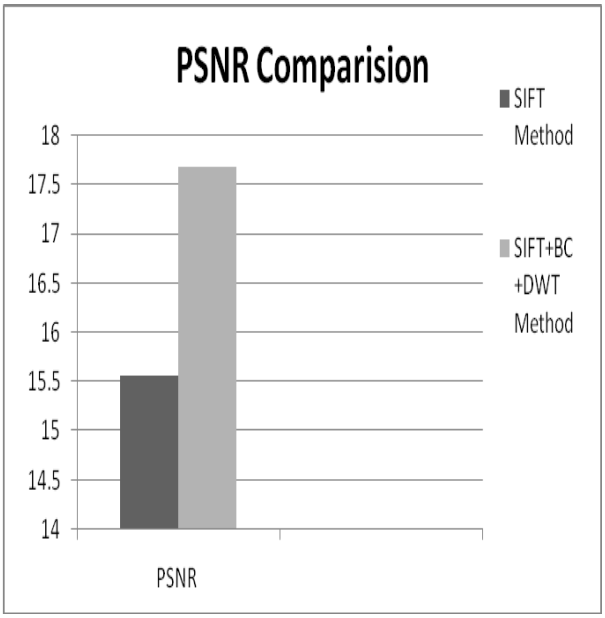

Fig.8: PSNR Comparison

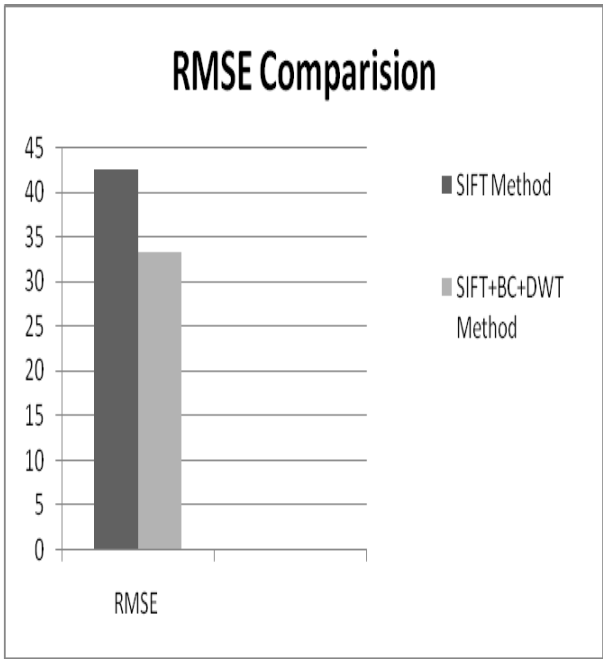

Fig.9 : RMSE Comparison

Fig.9:RMSE Comparision

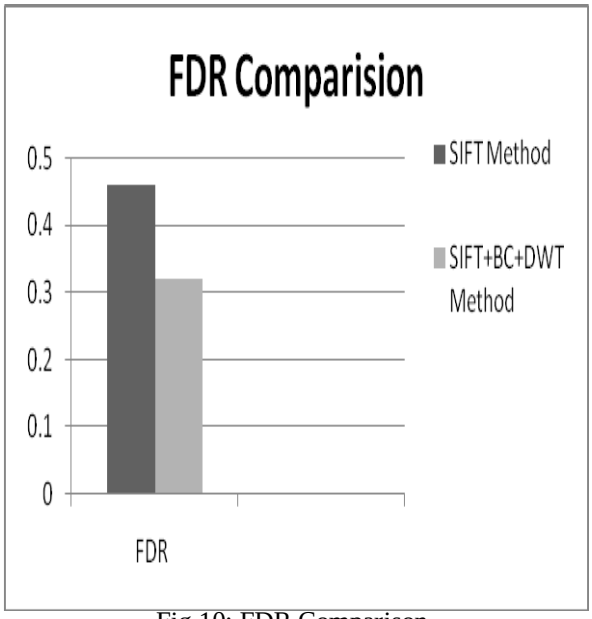

Fig.10: FDR Comparison

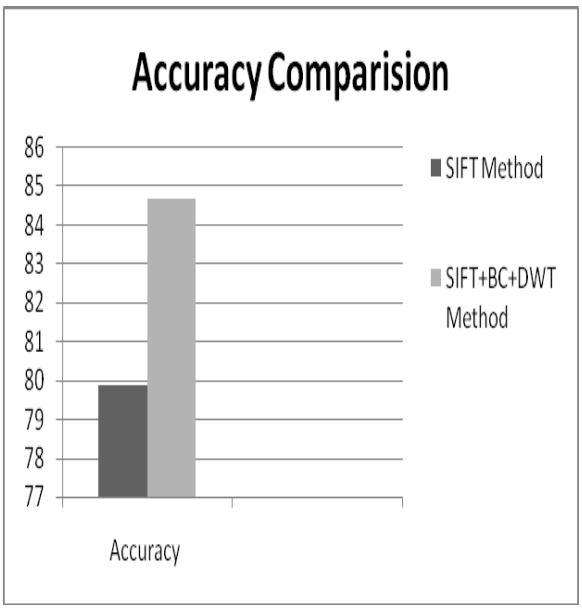

Fig.11: Accuracy Comparison

VII. CONCLUSION

At present we are having Rs 2000 as the highest value currency in India so in upcoming years there is a chance of scamp and duplication of new currency. So we have to develop such a module, which can detect the original currency and easily we can differentiate between counterfeit notes and genuine notes. By using digital image processing, analysis of Currency image is more accurate as well as this method is efficient in terms of cost and time consuming compared to existing techniques. MATLAB Software is used for this analysis. Day by day research work is increasing in this field and various image processing techniques are implemented in order to get more accurate result. The currency detection is that the application of image analysis, during which SIFT algorithmic rule is applied to research external options of the image. The detected options gave output that whether or not input currency image is real or faux. In this work, we concluded that due to analysis of external features accuracy of currency detection is reduced. In this work, new technique is been proposed which is based on DWT and Bayesian classifier for the currency detection. The new technique will analyse internal features of the image for detection. The value of Peak signal to noise ratio (PSNR), root mean square error (RMSE), fault detection rate (FDR) and accuracy values of the proposed and existing algorithm (SIFT algorithm with nearest neighbour classifier) are compared to validate the proposed system. The results confirmed that the proposed technique is better as compared to the existing technique for checking the originality of the currency notes. The simulation is been performed in MATLAB and RMSE results are decreased up to 10%, accuracy results are increased up to 6%.

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