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Fake Currency Detection Using Image Processing and Other Standard Methods

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ABSTRACT:

Counterfeit money is imitation currency produced without the legal sanction of the state or government. Producing or using this fake money is a form of fraud or forgery. Counterfeiting is as old as money itself, and is sufficiently prevalent throughout history that it has been called "the world's *second* oldest profession.. This has led to the increase of corruption in our country hindering country's growth. Common man became a scapegoat for the fake currency circulation, let us suppose that a common man went to a bank to deposit money in bank but only to see that some of the notes are fake, in this case he has to take the blame. Counterfeiting, of whatever kind, may be that has been occurring ever since humans grasped the concept of valuable items, and there has been an ongoing race between certifier like (banks, for example) and counterfeiter ever since. Some of the effects that counterfeit money has on society include a reduction in the value of real money; and inflation due to more money getting circulated in the society or economy which in turn dampen our economy and growth - an unauthorized artificial increase in the money supply; a decrease in the acceptability of paper money; and losses. And this Some of the methods to detect fake currency are water marking, optically variable ink, security thread, latent image, techniques like counterfeit detection pen and using MATLAB.

Key words- Fake currency, currency circulation, counterfeit detection.

INTRODUCTION:

The Reserve Bank is only one which has the sole authority to issue bank notes in India. Reserve Bank, like other central banks the world over, changes the design of bank notes from time to time. Traditionally, anti-counterfeiting measures involved including fine detail with raised intaglio printing on bills which allows non-experts to easily spot forgeries. On coins, *milled* or marked with parallel grooves edges

are used to show that none of the valuable metal has been scraped off. Reserve bank uses several techniques to detect fake currency.

HISTORY:

This counterfeiting is so famous such that it is considered as second world profession in earlier days. Coinage of money began in the Greek city of Lydia around 600 B.C. Before the introduction of paper money, the most prevalent method of counterfeiting involved mixing base metals with pure gold or silver. A common practice was to "shave" the edges of a coin. This is known as "CLIPPING". Every year, millions of "fake" notes are passed over retail counters and the majority are not identified as counterfeit until they're examined by the bank. Most often, retail associates don't know how to identify legitimate money or they rely on the simplest of all anti-counterfeiting tools; the counterfeit pen. Unfortunately, relying on the pen alone is not going to catch anyone other than an amateur who is printing money on a laser printer.

COMMONLY USED METHODS TO DETECT FAKE NOTES:

1. See through Register

The small floral design printed both on the front (hollow) and back (filled up) of the note in the middle of the vertical band next to the Watermark has an accurate back to back registration. The design will appear as floral design when seen against the light.

2. Water marking

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.

3. Optically Variable Ink

This is a new feature included in the Rs.1000 and Rs.500 notes with revised color scheme introduced in November 2000. The numeral 1000 and 500 on the obverse of Rs.1000 and Rs.500 notes respectively is printed in optically variable ink viz., a color-shifting ink. The colour of the numeral 1000/500 appears green when the note is held flat but would change to blue when the note is held at an angle.

4. Fluorescence

Number panels of the notes are printed in fluorescent ink. The notes also have optical fibres. Both can be seen when the notes are exposed to ultra-violet lamp.

5.SecurityThread

The Rs.500 and Rs.100 notes have a security thread with similar visible features and inscription 'Bharat' (in Hindi), and 'RBI'. When held against the light, the security thread on Rs.1000, Rs.500 and Rs.100 can be seen as one continuous line. The Rs.5, Rs.10, Rs.20 and Rs.50 notes contain a readable, fully embedded windowed security thread with the inscription 'Bharat' (in Hindi), and 'RBI'. The security thread appears to the left of the Mahatma's portrait.

6. Intaglio Printing

The portrait of Mahatma Gandhi, the Reserve Bank seal, guarantee and promise clause, Ashoka Pillar Emblem on the left, RBI Governor's signature are printed in intaglio i.e. in raised prints, which can be felt by touch, in Rs.20, Rs.50, Rs.100, Rs.500 and Rs.1000 notes.

7. Latent image

On the obverse side of Rs.1000, Rs.500, Rs.100, Rs.50 and Rs.20 notes, a vertical band on the right side of the Mahatma Gandhi's portrait contains a latent image showing the respective denominational value in numeral. The latent image is visible only when the note is held horizontally at eye level.

8. Micro lettering

This feature appears between the vertical band and Mahatma Gandhi portrait. It always contains the word 'RBI' in Rs.5 and Rs.10. The notes of Rs.20 and above also contain the denominational value of the notes in micro letters. This feature can be seen well under a magnifying glass.

9. Identification Mark

Each note has an unique mark of it. A special feature in intaglio has been introduced on the left of the watermark window on all notes except Rs.10/- note. This feature is in different shapes for various denominations (Rs. 20-Vertical Rectangle, Rs.50-Square, Rs.100-Triangle, Rs.500-Circle, and Rs.1000-Diamond) and helps the visually impaired to identify the denomination.

COUNTERFEIT DETECTION PEN:

A counterfeit pen is simply an inexpensive device that is designed to determine if a currency note is genuine or counterfeit. The pen contains a tincture of iodine as ink which, when drawn over a legitimate bill, will remain amber or brown. According to one manufacturer the ink will turn black if the bill is counterfeit.

Working of counterfeit pen:

The iodine in the pen reacts with starch, which, is the primary component that makes white paper look brighter. Most commercial paper, made from wood pulp, is brown unless bleached and starched. If there is no starch present in the paper then the pen will indicate - by remaining amber- that the bill is legitimate.

How counterfeiters defeat this pen:

The iodine in the pen reacts with starch that makes white paper look brighter. Most

commercial paper, made from wood pulp, is brown unless bleached and starched. If there is no starch present in the paper then the pen will indicate - by remaining amber - that the bill is legitimate.

Other techniques:

The best anti counterfeit device we can buy for the money is an Ultraviolet counterfeit detection scanner. Best used in highly lit point of sale locations, the UV detector identifies the ultraviolet security features present in most currencies. By simply placing the bill in the detector, counterfeit currency is immediately identified, without the need for an employee to closely examine the bill.

MATLAB technique:

We can split the red, blue, green components of a picture and name them as r1, g1, b1 which correspond to image i.e. original currency note. Consider second image that is note to be tested. Split this image to components r2, b2, g2. Construct a new image with components as r1, g2, b1 or r2, g1, b1 or b2,g1,b1.But r1,g2,b1 combination is most preferred because human eye is sensitive to green component and most of our images contains maximum green component so that our output image will be much easier to identify the fake note more efficiently. Now compare newly constructed image with image1.Calculate the threshold value of equivalence by calculating the standard deviation. If equivalence is above 40% then we can consider it as original note. We consider 40% value because note may be damaged. In addition to these we also apply above specified 10 methods. Parameters for measure of comparing images are Mean Square Error (MSE), Peak Signal to Noise Ratio (PSNR in dB), and structural Content (SC).

Code for comparing two images:

```
A=imread ('image1.jpg'); %Reading images as array
to variable a and b.

B=imread ('image2.jpg');

C=corr2 (a, b) %Finding the correlation between two
images

If (c==1)

        Disp ('images are same')

Else

        Disp ('images are not same')
End;
```

Code for creation or concatenation of two images:

```
Close all;

Clear all;

i=imread ('img1.jpg');

j=imread ('img2.jpg');

figure, imshow (i); figure,

imshow (j); r1= (I (:,:,1));

k= ones (194,259); g1=

(I (:,: , 2)); b1= (I

(:,:,3));

r2= (j (:,:,1)); g2=

(j          (:,:,2));

b2=(j(:,:,3));

i1=cat(3,r1,g2,

b1); figure,

imshow(i1);
```

RESULT and DISCUSSION

This is original 1000 note scanned.

This is the fake note scanned.

Resultant Image

When we combine two various components of two images then if note to be tested is original then only at the place of number we get variation. But in this example we took a fake note and applied the same code, we can observe that the image overlapping is not done correctly. We can also see that the resultant image is blurred indicating fake note. So we can confirm that it is a fake note.

Conclusion:

There are many methods for identifying a fake note which we have discussed and each one has its own significance. One should be cautious while detecting a fake note. Our paper enables a layman to identify a fake note and empower every citizen to detect fake notes which may reduce corruption in our country. Our MATLAB technique when deployed in mobile phone with a scanner or a camera so that it will detect fake notes which gives the power to a common man to control fake currency circulation in our country.

REFERENCES:

1.Counterfeit Currency Detection Technique Using Image Processing, Polarization Principle and Holographic Technique(IEEE) By Santhanam, K. ; Dept. of Electron.&Instrum. Eng., Sri Sairam Eng. Coll., Chennai, India ; Sekaran, S. ; Vaikundam,S; Kumarasamy,A.M.

2.Improved fake fake currency detector –NM Joshi,RP Bajpai,G.Mitra.

3.Fake currency detection & stenography- E.Muthukumaran,N.Mohanraju.

4.Counterfeirt money and anti-survelliance measures- C.Yanqing.

5.Limitations on the counterfeit detection pen- RA.clay.

6.Counterfeit document detection apparatus- GP.Mciney.

7.Develpoment of fast and nondestructive procedure for distinguishing fake notes

A.Vila, N.Ferror.