Machine Learning-Based Technique for Image Classification and Identification of Similarity for Commonness of Source

Sruthi.V, Lakshmi Narayanan.S

Abstract: In India Every year RBI (Reserve bank of India) faces the issue of fake currency. Fake Currency has consistently been an issue that has made a lot of chaos in the market. The expanding mechanical progressions have made the opportunities for making progressively fake currency which is circled in the market which decreases the general economy of the nation. There are machines present at banks and other business regions to check the validness of the monetary forms. Be that as it may, a typical man doesn't approach such frameworks and henceforth a requirement for a product to distinguish counterfeit cash emerges, which can be utilized by average folks. This proposed framework utilizes Image Processing to identify whether the currency is real or fake. The framework is structured utilizing Python programming language and OpenCV. It comprises of the means, for example, grayscale detection, edge detection, Highlight Extraction, and so forth which are performed utilizing reasonable strategies. And which will be further implemented in the Framework for Classification and Identification of Similarity for Commonness of Source

Keywords: OpenCV, Edge detection, Highlight Extraction, Image processing, and Fake Currency.

I. INTRODUCTION

In India Every year RBI (Reserve bank of India) faces the issue of fake cash notes. The bank staffs are uncommonly prepared to distinguish fake notes however issue starts once such notes are blended into the market and circled through average folks. Indeed getting phony notes from ATM counters has additionally been revealed at certain spots. In recent years, as a consequence of the extraordinary innovation come propels in shading printing, copying and examining falsifying issues become increments. With the improvement of present-day banking administrations, programmed techniques for paper cash acknowledgment Become significant in numerous applications, for example, in mechanized teller machines and programmed merchandise dealer machines. The requirements for programmed banknote acknowledgment frameworks urged numerous scientists to create comparing hearty and solid procedures. Handling pace and acknowledgment exactness are for the most part two significant focuses in such Frameworks.

A Digital Image handling is a region described by the requirement for broad exploratory work to build up the legitimacy of proposed answers for a given issue. It includes forms whose information sources and yields are pictures that incorporate forms that concentrate qualities from pictures up to and including the acknowledgment of person objects. OpenCV is the computational device of decision for research, improvement, and investigation. The picture designs bolstered by OpenCV are BMP, HDF, JPEG, PCX, TIFF, XWB, PNG and so forth. Trademark extraction of pictures is testing work in computerized picture handling. It includes extraction of unmistakable and some imperceptible highlights of Indian cash notes. A decent trademark extraction plan ought to keep up and upgrade those attributes of the information which make particular design classes separate from one another. The methodology comprises various advances including picture obtaining, dark scale change, and Edge identification, include extraction, picture division and correlation of pictures. Picture procurement is the making of advanced pictures, normally from a physical scene. In the proposed work, the picture will be gained by utilizing a straightforward advanced camera by giving some backdrop illumination so all the highlights of the money can show up on the picture appropriately. The picture is then put away in the PC for further preparation. Edge location and picture division are the most significant errands performed on the pictures.

II. CONSTRAINTS ON INDIAN CURRENCY

There are different security includes in Indian certified receipt yet the most significant highlights utilized right now paper as given beneath,

Fig.1 One Hundred Rupee Indian Currency

A. See-through Register

The little bloom setup printed both on the front (vacant) and back (finished off) of the note amid the vertical band close by the Watermark has an accurate continuous selection.

Retrieval Number: F3805049620/2020©BEIESP
DOI: 10.35940/ijitee.F3805.049620
Journal Website: www.ijitee.org

544

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication

The diagram will appear as an organic arrangement when seen against the light. (Fig.1)

B. Watermarking

The Mahatma Gandhi Series of banknotes contain the watermark with a light and shade sway and multidirectional lines in the watermark window. (Fig.1)

C. Security Thread

The Rs.500 and Rs.100 notes have a security string with relative evident highlights and scratching Bharat (in Hindi), and RBI. Right when held against the light, the security string on Rs.2000, Rs.500 and Rs.100 can be seen as one consistent line. The Rs.5, Rs.10, Rs.20, and Rs.50 notes contain a discernable, completely installed windowed security string with the drawing Bharat (in Hindi), and RBI. The security string appears to the opposite side of the Mahatma's picture. (Fig.1)

D. Intaglio Printing

The portrayal of Mahatma Gandhi, the Reserve Bank seal, confirmation and assurance stipulation, Ashoka Pillar Emblem on the left, RBI Governor's imprint are engraved in intaglio for example in raised prints, which can be felt by contact, in Rs.20, Rs.50, Rs.100, Rs.500 and Rs.2000 notes.

E. Micro lettering

This part shows up between the vertical band and Mahatma Gandhi's image. It, generally, contains the word RBI in Rs.5 and Rs.10. The notes of Rs.20 or even more in like way contain the denominational estimation of the notes in more diminutive degree letters. This segment can be seen well under an escalating glass. (Fig.1)

F. Optically Variable Ink

This is another segment joined into the Rs.1000 and Rs.500 notes with a refreshed concealing arrangement introduced in November 2000. The numeral 1000 and 500 on the front-side of Rs.1000 and Rs.500 notes independently is engraved in optically factor ink viz., a concealing moving ink. The shade of the numeral 1000/500 appears to be green when the note is held level anyway would change to blue at the point when the note is held at a point. (Fig.1)

G. Serial Numbers

Each banknote has its sequential number, so it is more essential to check whether the number isn't right or rehashed. There were the chosen units that will push us to perceive the banknote.

The fake money note first sectioned into various parts containing these units what's more, with the NNTOOL and proper calculation preparing and highlight extraction will be applied with the specific fragment.

III. DETECTION CRITERIA AND TECHNIQUES

Digital Image Processing Method to Detect Fake Currency. The blueprint stream of the fake currency identification framework In-corporates six stages:
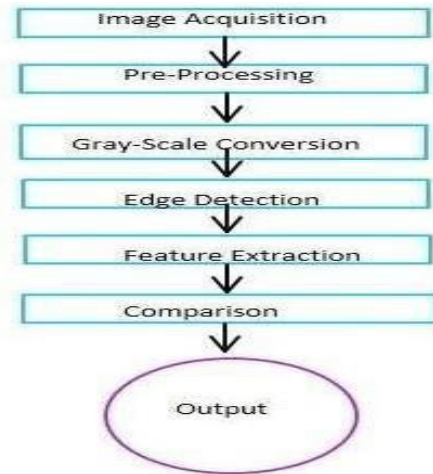

Fig.2 Six Phases of the Fake Currency Detection

A. Image Acquisition

There are various ways to deal with getting a picture, for instance, with the help of the camera or scanner. The acquired picture should hold all of the highlights. Highlight extraction alludes to the recovery of data about the picture by applying picture handling calculations. The pictures of a money note were obtained utilizing an advanced camera or examining the cash utilizing a scanner. In the wake of getting the picture, first pre-handling and afterward highlight extraction is done to separate highlights. Both the means are depicted right now: (Fig.2)

B. Pre-Processing

In pre-handling the activities typically introductory to primary information examination and extraction of data. Right now are stifled and upgrade some pictures include that is essential to additionally preparing. It incorporates pictures changing and pictures smoothening. After these two preparing steps, the pictures of the money were applied for include extraction. (Fig.2)

C. Gray-scale conversion

The picture picked up is in RGB concealing. It is changed over into a dark scale since it passes on simply the power information which is not hard to process rather than preparing three sections R (Red), G (Green), B (Blue). (Fig.2)

D. Edge Detection

Edge detection is a crucial apparatus in picture preparing what's more, PC vision, especially in the zones of highlight discovery and highlight extraction, which focus on distinguishing focuses on an advanced picture at which the 3 Picture splendor changes pointedly or, all the more officially, has discontinuities.

Edge discovery is one of the central steps in picture preparation, picture investigation, picture design acknowledgment, and PC vision procedures.

E. Feature Extraction

In plan affirmation and picture handling, highlight extraction is the one of a kind sort of dimensionality diminishment. It is the technique for getting the visual substance of pictures for requesting and recuperation.

Retrieval Number: F3805049620/2020©BEIESP
DOI: 10.35940/ijitee.F3805.049620
Journal Website: www.ijitee.org

545

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication

Exactly when the data to a count is too considerable to even think about being in any capacity arranged and it is suspected to be broadly tedious (much data anyway next to no information) by then the information data will be changed into a reduced portrayal set of highlights (furthermore named include vector). If the properties evacuated are intentionally picked, it atypical that the characteristics set will remove the huge information from the data with a particular ultimate objective to play out the pined for the task using this decreased portrayal instead of the full-size information. Highlight extraction incorporates streamlining the proportion of benefits required to depict the far-reaching plan of data. (Fig.3)
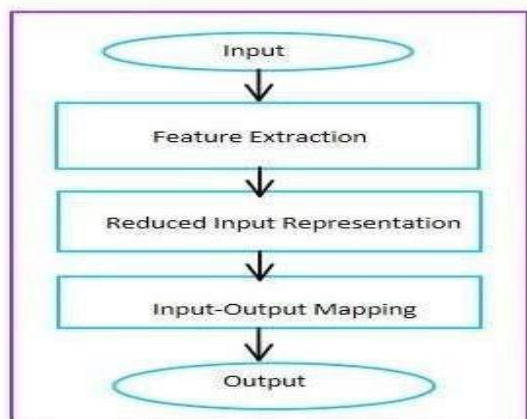

Fig.3 Systematic Representation of Feature Extraction

Visual characteristics of pictures are of two kinds-`Domain explicit traits which incorporate fingerprints, human appearances. General qualities which incorporate shading, surface, and shape. There are two sorts of qualities arranged under the shape characteristic extraction-Global traits incorporate minute invariant, viewpoint proportion and circularity. Nearby qualities incorporate limit portions. Correlation Lastly the removed highlights of test cash picture are contrasted and the extricated highlights of unique money picture, in the event, that it matches, at that point the cash is unique in any case counterfeit.

F. Comparison

Picture division sub-partitions the picture into its constituent areas or items. The level to which subdivision is conveyed relies upon the issue being understood. Division calculation for monochrome pictures by and large depend on one of the two fundamental properties of picture force esteems
1.) Discontinuity
2.) Similarity.
In the primary class, the methodology is to parcel a picture in light of unexpected changes in power. For example, edges in a picture. The methodology in the subsequent classification depends on apportioning a picture into areas that are comparable as indicated by a lot of predefined criteria.

IV. RELATED WORKS

At present, there are various techniques for paper cash acknowledgment [1] [2] [3] [4]. Paper Currency Check System Based on Character Extraction Utilizing Image Processing right now Proposed Paper Currency Verification System Based on Character Extraction Using Image

Processing [1] and in Using the properties of the HSV (Hue, Saturation and Value) shading space with an accentuation on the visual view of the variety in Hue, Saturation and Intensity estimations of a picture pixel [2]. Right now, the instrument of the Neural System is utilized with the end goal of paper cash check and acknowledgment. Pivotal highlights from Indian banknotes were separated by picture preparing furthermore, probed Neural Network classifier. In another examination work, a basic factual test is utilized as the check step, where univariate Gaussian dissemination is utilized [3]. They propose utilizing the likelihood thickness shaped by a multivariable Gaussian work, where the info information space is moved to a lower-dimensional subspace. Because of the structure of this model, the complete preparing framework goes about like a half breed neural system. The strategy and the numerical exploratory outcomes are appeared by utilizing genuine information and the acknowledgment machine. Another investigation portrays a way to deal with digit acknowledgment for the sequential numbers on the Chinese cash banknotes [4]. It comprises various parts counting picture preprocessing, picture banalization, morphological sifting, division, highlight extraction, and digit acknowledgment. The recently created programming Lab see which depends on the virtual instrument system is utilized for picture handling and acknowledgment of the cash. In another system for paper money acknowledgment [5], three qualities of paper monetary forms including size, shading, and surface are utilized in the acknowledgment. By utilizing picture histograms, an abundance of various hues in paper cash is processed and contrasted and the one in the reference paper cash. In light of the customary nearby twofold example (LBP) strategy, an improved LBP calculation, called square LBP calculation, is utilized for trademark extraction [6]. LBP is an integral asset for surface depiction. This technique has favorable circumstances of effortlessness and fast. A Neural Network-based acknowledgment conspire is utilized for Bangladeshi banknotes [7]. The plan can proficiently be executed in modest equipment which might be extremely valuable in numerous spots. The acknowledgment framework takes checked pictures of banknotes which are filtered by ease optoelectronic sensors and afterward took care of into a multilayer perceptron, prepared by back spread calculation, for acknowledgment. In another investigation, three attributes of paper money are considered including size, shading, and surface [8]. The Marco bind idea is utilized to demonstrate the surface of paper monetary forms. As a four arbitrary procedure. Group neural system (ENN) is utilized for the acknowledgment framework. The individual neural organizes in an ENN are gifted through negative relationship learning. The motivation behind utilizing negative relationship learning is to aptitude the people in a group on various parts or a few info designs. Another method is proposed to improve the acknowledgment capacity also, the exchange speed to group the Japanese and U.S. paper cash [9]. This paper analyzes two sorts of informational collections, time arrangement information and Fourier force spectra, are utilized right now. In the two cases, they are straightforwardly utilized as contributions to the neural system.

Still more we moreover allude to another assessment technique for acknowledgment capacity. In the meantime; a system is proposed to diminish the info size of the neural system without forestalling the development of acknowledgment. This paper applied the neural system to paper money acknowledgment and demonstrated the adequacy contrasted and an ordinary manual strategy. Moreover, it has proposed a structure decrease strategy for the neural system utilizing irregular covers and demonstrated its viability for time arrangement information also, its Fourier force spectra.

V. PROPOSED WORK AND RESULT

In the proposed work, we built up a framework to identify extortion cash for Indian Notes (Fig.4). First, take the contribution of the given picture and pre-handled the given picture and convert the RGB picture into the dim scale picture. After pre-handling we obscured the picture to choose the significant highlights then we resized the picture and identified the edges. After pre-preparing the cash we edited the numbers present in the money and spared in the record .at that point we utilized tesseract in python to peruse the numbers in the cash. After perusing the numbers in the upper right and base left corner we look at both the numbers on the off chance that they coordinate, at that point we spare the cash in the different documents. Else if the numbers confound the number is spared as another record. The framework proposed here works here on the picture of cash note under bright light obtained by an advanced camera. The procedure which is applied here is as per the following steps:
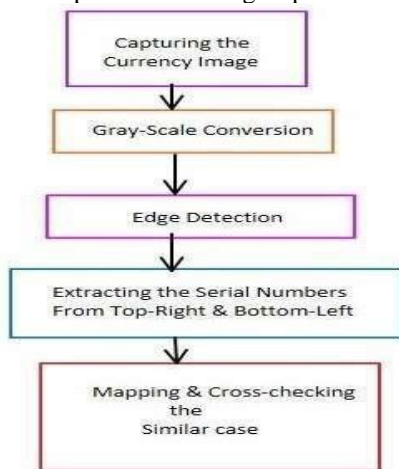

Fig.4 Framework to find extortion of Indian notes

Step 1: Procurement of picture of Currency note by basic advanced camera (or) Scanner. (Fig.5)

Fig.5 Originally Captured Currency Image

Step 2: The picture gained is an RGB picture and is changed over to the grayscale picture. (Fig.6)

Step 3: The image is resized to fit into the layout. (Fig.6)

Step 4: The image is then obscured to decrease the appearance of the picture. (Fig.6)

Fig.6 Gray-Scale Currency Image

Step 5: To avoid Disturbance during the feature Extraction, we use Automatic Canny Edge Detection with,

Sigma value = -0.0000001

And apply thresholding using a lower and upper boundary on the gradient values,

Step 6: Edge identification of the entire dark scale picture. (Fig.7)

Fig.7 Edge Detection on Gray-Scale Image

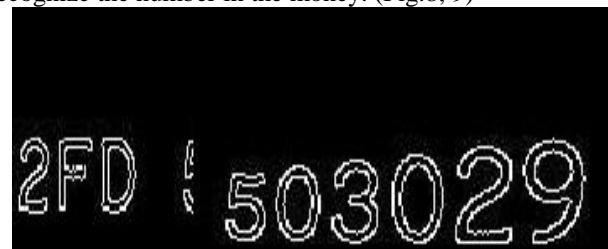**Step 7:** Crop the top right and bottom left of the picture to recognize the number in the money. (Fig.8, 9)

Fig.8 Top Right Serial number of the currency

Fig.9 Bottom Left Serial number of the currency

Step 8: Used Pytesseract bundle to change over the picture into a string and spared in a Database.

Top Right:

  2FD 503029

Bottom Left:

  2FD 503029

Step 9: If both upper right and base left string matches then the money is confirmed as unique.

Step 10: Now, we will create the database by providing the path of the multiple images to obtain the serial number of multiple currencies and to store them in Database1. (Fig.10)

Fig.10 Mapping and cross-checking similar case in Database 1

Step.11: Using GUI the input image is obtained and the obtained input image follows all 8 steps and it's spared in the Database2.

Step.12: If the serial number in the Database 1and the serial in Database2 are equal. Then, the related cases according to Database1 is shown as a result. If not then it shows there are no related cases to the provided input. (Fig.11)
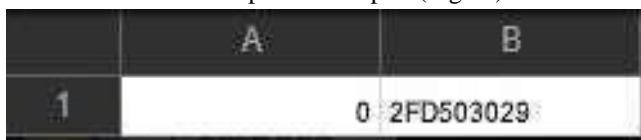

Fig.11 Storing Extracted Serial Number in Database 2

In the proposed strategy qualities of paper monetary forms are utilized that are utilized by individuals for separating diverse banknote sections. Essentially, from the outset case, individuals may not focus on the subtleties and definite qualities of banknotes for their acknowledgment, rather they Consider the regular attributes of banknotes, for example, the size, the foundation shading (the fundamental shading), and surface present on the banknotes. Right now, qualities will be utilized to separate various banknote categories. (Fig.10, 11) All the above outcome is determined uniquely in hypothetical not in a viable when we will do pragmatic then result will be in various ways.

VI. CONCLUSION

Our primary goal behind this task to present the framework base acknowledgment of Indian Currency notes to keep away from cheats. Right now applied fitting instrument of picture Processing, After separating pivotal highlights from Indian Notes (100,500,2000) by utilizing picture preparing This system will unquestionably valuable for limiting the fake cash note and proficiency of our framework. The system utilizes three-parameter of currency notes counting distinguishing proof imprint, security string, and Serial number. The framework may extricate the concealed highlights, for example, idle picture and watermark of the currency. The proposed work is a push to recommend a methodology for the Serial Number extraction from the Indian currency using OpenCV and image processing technique the approach recommended from the earliest starting point of picture obtaining to changing over it to dark scale picture and up to

the word division has been expressed. The work will valuable for limiting fake currency and identifying the Commonness of reliable sources.

REFERENCES

1. Rubeena Mirza, Vinti Nanda, —Paper Currency Verification System Based On Character Extraction Using Image Processing, International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume-1, Issue-3, February 2012
2. G.Trupti Pathrabe, Mrs.Swapnili Karmore, —A Novel Approach of Embedded System for Indian Paper Currency Recognition‖, International Journal of Computer Trends and Technology- May to June Issue 2011, ISSN: 2231-2803.
3. M. Tanaka, F. Takeda, K. Ohkouchi, Y. Michiyuk —Recognition of Paper Currencies by Hybrid Neural Network‖, IEEE Transactions on Neural Networks‖, 0 -7803-4859-1/98, 1998.
4. . Ji Qian, Dongping Qian, Mengjie Zhang —A Digit Recognition System for Paper Currency Identification Based on Virtual Instruments‖ IEEE Transactions, 1-4244-0555- 6/06, 2006.
5. H. Hassanpour, A. Yasir, G. Ardeshiri —Feature Extraction for Paper Currency Recognition‖, IEEE Transactions, 1 -4244- 0779-6/07,2007.
6. Junfang Guo, Yanyun Zhao, Anni Cai, —A Reliable Method for Paper Currency Recognition Based on LBP‖, IEEE Transactions, Proceedings of IC-NIDC2010, 978-1- 4244-6853-9/10.
7. Nadim Jahangir, Ahsan Raja Chowdhury, —Bangladeshi Banknote Recognition by Neural Network with Axis Symmetrical Masks‖, IEEE Transactions, 1 -4244-1551-9/07. 6
8. Ms. Trupti Pathrabe, Dr. N.G Bawane —Feature Extraction Parameters for Genuine Paper Currency Recognition & Verification‖ International Journal of Advanced Engineering Sciences and Technologies‖, Vol No. 2, Issue No. 1, 085 – 089, 2011.
9. Fumiaki Takeda, Shigeru Omatu —High-Speed Paper Currency Recognition by Neural Network‖ IEEE Transactions on Neural Networks, Vol. 6, No. 1, January 1995.
10. Chin-Chen Chang, Tai-Xing Yu, Hsuan-Yen Yen —Paper Currency Verification with Support Vector Machines‖, IEEE Computer Society, 978-0-7695-3122-9/08, 2008.
11. Shigeru Omatu, Michifumi Yoshioka, Yoshihisa Kosaka —Bank Note Classification Using Neural Networks‖, IEEE Transactions, 1 -4244-0826-1/07,2007.
12. Rajesh Kannan Megalingam, Prasanth Krishna, Pratheesh somarajan, Vishnu A Pillai, Reswan Hakkim —Extraction of License Plate Region in Automatic License Plate Recognition‖, International Conference on Mechanical and Electrical Technology, IEEE Transactions,978-1-4244-8102-6/10
13. Woods and Gonzalez (2008), Digital Image Processing (Third Edition), Pearson Education, New Delhi, 110092

AUTHORS PROFILE

V.Sruthi pursuing her B.E (Computer Science and Engineering) from SCSVMV Deemed to be University, Kanchipuram, Tamil Nadu, India. Experienced as an intern under the domain of web development, application development, processor development, cloud computing, database management, Image processing, AI& Machine Learning and pursuing her career in the field of Machine Learning and Deep Learning. Her area of interest includes Artificial Intelligence, Machine Learning, Operating Systems, Data Warehouse Mining, Data Science and Computer Vision.

S.Lakshmi Narayanan pursuing his B.E(Computer Science and Engineering) from SCSVMV Deemed to be University, Kanchipuram, Tamilnadu, India. Experienced as an intern under the domain of web development, application development, processor development, cloud computing, database management, Image processing, AI& Machine Learning and pursuing his career in the field of Machine Learning and Deep Learning. His area of interest includes Artificial Intelligence, Machine Learning, Operating Systems, Data Warehouse Mining, Data Science and Computer Vision.

Retrieval Number: F3805049620/2020©BEIESP
DOI: 10.35940/ijitee.F3805.049620
Journal Website: www.ijitee.org

548

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication