International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 01 | Jan 2020 www.irjet.net p-ISSN: 2395-0072

Cheque Bounce Detection System Using Image Processing

Phalguni Nikam[1], Prof. Pramod Patil[2], Meetali Patidar[3], Aishwarya Nanoskar[4], Pranav Parmar[5], Jayesh More[6]

[1,3,4,5,6]Student, Dept. of Computer Engineering, Sandip Institute of Technology & Research Centre, Nashik, India
[2]Assistant Professor, Dept. of Computer Engineering, Sandip Institute of Technology & Research Centre, Nashik, India

---

Abstract - *Bank cheques are widely used all over the world. Every day in huge numbers, bank cheques are processed. In manual verification, information on the cheque including signature, date, courtesy and legal amounts has to be verified visually which requires more time and effort. And if we want to know if the cheque has bounced on not, manual processing takes time. So, this paper presents the automatic processing of handwritten cheques which includes preprocessing, extraction, recognition and verification of information on the cheques. And in the shortest time we will know if the cheque has bounced or not. If the cheque does not bounce, then further processing will be done.*

Key Words: Cheque image preprocessing, Important fields extraction, Signature verification, Date verification, Amount verification, Cheque bounce detection

1. INTRODUCTION

There has been a significant growth of automation in banking sector. The reason behind banking sector rapidly embraced IT is that when operations performed manually takes plenty of time and efforts of the staff in doing the same work again and again which leads to loss of productivity. On the other hand, automation reduces the redundancies in their operations and frees up employees that can be deployed to do more productive work. However, in several developing countries many banks are still dependent on manual processing of cheques, reading values from cheque, extraction and matching of the signatures, etc. Even today to process a cheque in banks requires a bank employee to read and manually enter the information present on a cheque (or its image) and also need to validate the entries like signature and date. In this paper we are introducing a system which uses image processing to automatically process a cheque using the logo and IFSC code of the bank and by verifying handwritten fields on cheques like courtesy amount, signature, and date system will detect whether cheque is passed or has bounced and accordingly system will notify to the customer and bank.

Fig -1: Cheque Image

2. ALGORITHMS USED

Different algorithms used in the system for preprocessing, extraction, recognition and verification on bank logo, IFSC code, signature, date, amount and for classification are binarization, optical character recognition (OCR), support vector machine (SVM) and pattern matching. Brief description about each of the following algorithms is as follows:

2.1 Binarization

Binarization is the method for converting color to grayscale and thus converts the image to the binary image. Binarization of the cheque image is the primary step in most of the cheque process systems. In Binarization process the foreground and background pixels are represented by '1's and '0's or contrariwise. Binarization of a grey-scale cheque image is difficult as a result of several causes together with complicated backgrounds, imprinted seal and different intensities of handwritten characters. In general, the binarization technique is divided into global and local thresholding. Global thresholding algorithms use one threshold for the complete image, and local thresholding algorithms calculate a separate threshold for each pixel based on its neighborhood.

2.2 Optical Character Recognition

OCR (Optical Character Recognition) is a technology which is used to distinguish characters inside a digital document, such as scanned paper documents. In this process of OCR, it inspects the text of a document and translates the characters into a code which can be used for data processing. Text recognition is another name for OCR.OCR is a combination of hardware and software which is used to convert physical documents into machine readable text. Hardware, such as optical scanner is used for reading the text while the advanced processing is handled by the software. In this the software makes use of artificial intelligence (AI) to implement more advanced methods like identifying languages or handwriting styles.

Working of Optical Character Recognition:

The first step is to use camera as a scanner to scan the physical form of a document (cheque image). After copying all the pages, OCR converts the document into a black and white format. After this the scanned image which is also known as bitmap is analyzed for dark and white areas, where the white areas are identified as background and the dark areas are identified as characters which need to be spotted.

The dark areas are further processed for the identification of alphabets and numbers. The characters are further identified by using one or two algorithms.

- Pattern Recognition – OCR programs are best examples of text which are available in different formats as well as different fonts which are used to compare and recognise the characters which are used in a scanned document.
- Feature Detection – OCR applies specific rules to extract features of a specific letter or numbers which are to be recognised in the scanned image. These features include number of angled lines, curves or crossed lines in a character which is used for comparing purpose. For e.g., the capital letter 'A' can be stored as two diagonal lines joined by a horizontal line in the middle.
  After identifying the characters, these characters are converted into ASCII code that can be used by computer systems for further manipulation.

2.3 Support Vector Machine

Support Vector Machine (SVM) is a type of deep learning algorithm that performs supervised learning for the purpose of classification of data groups. In AI and machine learning, supervised learning provides input as well as output which are then used for classification. This classification helps in data processing in the future. Two data groups are classified with the help of support vector machine. This algorithm draws lines which help to separate the groups on the basis of patterns.

A learning model is built by SVM which assigns new examples to one group or another. Therefore, SVM's are called as non-probabilistic because of these functions. In probabilistic classification, Platt Scaling methods are used by SVM's. Like any other supervised learning model for training purpose it requires labelled data.

2.4 Pattern Matching

Pattern Matching is the technique of locating and checking specific sequence of data pattern from a raw data. It helps in finding all the occurrences of the given pattern in the string. In case of pattern matching the match has to be exact. Pattern matching is an important aspect in programming. Pattern matching is used by major applications for doing their respective tasks.

The Pattern Matching Problem is defined as follows:

Let Σ be an alphabet.

INPUT: Text string T = (t1) (t2) . . . tn and pattern string P= (p1) (p2) . . . pm, ti, pi∈ Σ.

OUTPUT: All locations i in T where there is an occurrence of the pattern, i.e., T [I + k] = P [k + 1], 0 <= k<1.

3. LITERATURE SURVEY

A bank cheque contains following important contents: (i) date, (ii) payee name, (iii) legal amount, (iv) courtesy amount, (v) signature space for payee, (vi) account number. A novel approach used for automatic extraction of important regions from a cheque image has proposed [1] The binary bank logo is detected based on geometrical configurations. Extract the geometrically invariant key-features of all the logos from a bank cheque, such as centroid, eccentricity, convex area, Euler number, solidity and elongation [2].The variability of the size, structure and background of bank cheques, at the side of the complexness of the character recognition, makes the event of universal algorithms and strategies extraordinarily difficult for automatic bank cheque processing [3].In order to decrease frauds in banks, signature verification is extremely important. It will increase accuracy and efficiency. Numerous strategies are used for classification like hidden Markov model, support vector

machine, neural network and contour methodology [4]. It was found that the back-propagation technique was able to recognize the character up to 100% and almost 95% in noisy images [5]. Optical Character Recognition (OCR) system for camera captured image text regions are extracted first then skew corrected. These regions are binarized and segmented into lines and characters. Characters are passed into the recognition module [6]. In digital image processing method for automated cheques processing systems in which images are captured and processed for signature verification but precise automatic verification remains a difficult task for researchers. When pictures are capture the unwanted signals get added into original signal and decrease the image quality resulting in decreased performance. For that purpose, image pre-processing plays vital role [7].

4. PROPOSED SYSTEM

This paper proposes an effective system for bank cheque bounce detection by automatic processing of bank cheque. The main focus is on the processing of important fields of the cheque which include bank logo, IFSC code, Signature, date and amount.

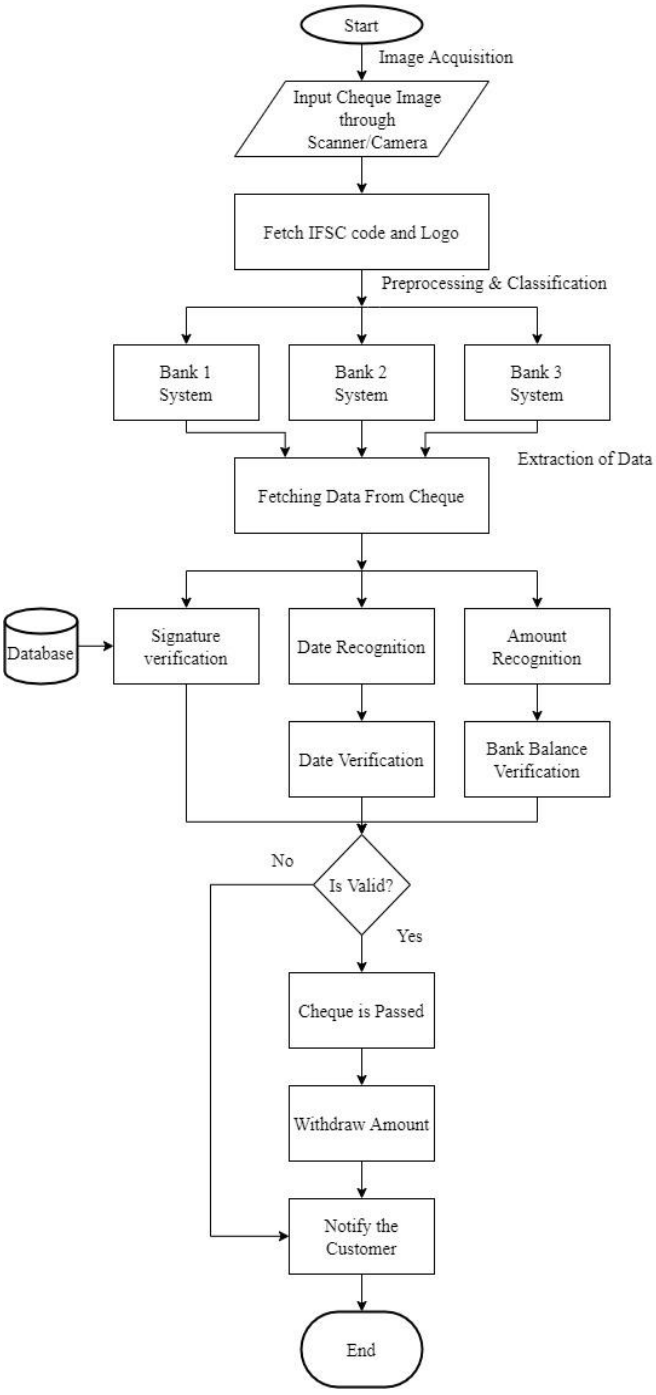

Fig -2: Flowchart

4.1 Methodology

Step1: Input the bank cheque image through scanner or camera, convert it into grayscale and perform the binarization.

Step2: Using pattern matching algorithm on bank logo detect the bank name and using OCR (Optical Character Recognition) on IFSC code detect the bank branch.

Step3: Classify the bank cheques using SVM (Support Vector Machine) and send the image to the particular bank system.

Step4: Further processing will be carried out on particular bank system.

Step5: Perform pattern matching on signature. Using OCR extract the date and amount.

Step6: Verify each of the three signature, date and amount.

Step7: After the signature is verified, fetch the details of the customer.

Step8: Perform verification on the details of customer like, the customer account has sufficient amount to withdraw.

Step9: When all three sign, date and amount are valid, pass the cheque and withdraw the amount. Notify the customer that the cheque is passed and amount is withdrawn successfully.

Step10: If any one of the three is not valid, then notify the customer that the cheque has bounced.

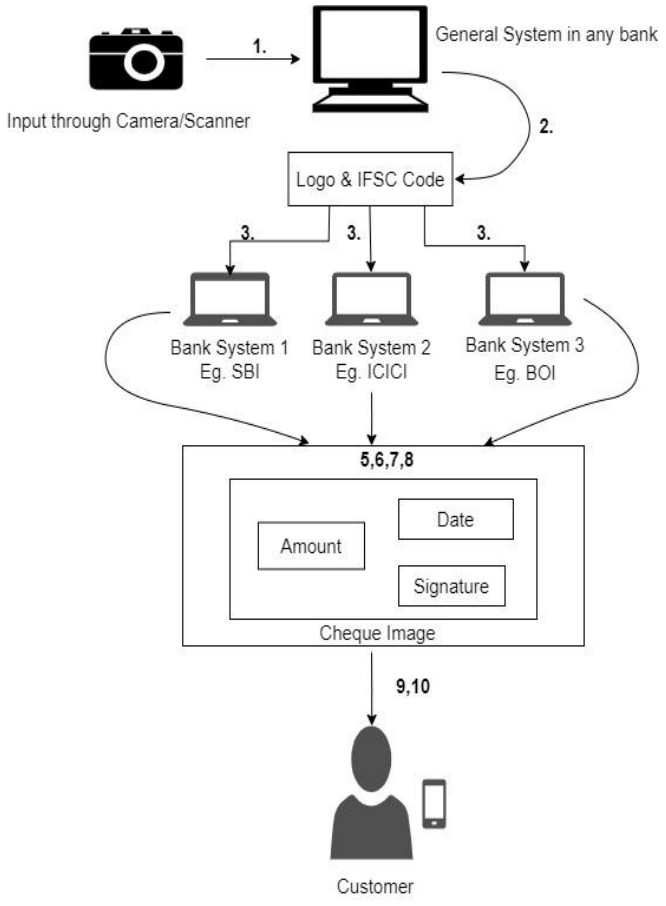

Fig -3: Abstract Architecture

5. CONCLUSION

A complete cheque bounce detection system which detects in shortest possible time has been presented in this paper. All the important fields of the handwritten cheque are processed by this system. The recognition of handwritten characters makes the development of algorithms challenging for automatic processing of bank cheque.

Bank logos and IFSC code can be obtained from web cloud for preprocessing in the future work of the system and the system can also be implemented at higher level in future.

REFERENCES

[1] Prabhat Dansena, K. Pramod Kumar, Rajarshi Pal, "Line Based Extraction of Important Regions from a Cheque Image", IEEE Eighth International Conference on Contemporary Computing, 2015, pp.183-189.

[2] Raghavendra S.P. Ajit Danti, "A Novel Recognition of Indian Bank Cheques based on Invariant Geometrical Features", IEEE International Conference on Trends in Automation, Communications and Computing Technology, 2015, pp.1-5.

[3] R. Jayadevan, S. R. Kolhe, P. M. Patil, U. Pal, "Automatic processing of handwritten bank cheque images: survey", IJDAR DOI 10.1007/s10032-011-0170-8, July 2011.

[4] Priyanka Dhayarkar, Rajashri Itkarkar, "Comparison Analysis for Signature Verification of Bank Cheque", IEEE International Conference on Automatic Control and Dynamic Optimization Techniques, 2016, pp.906-909.

[5] Shreshtha Garg, Kapil Kumar Gupta, Nikhil Prabhakar, Amulya Ratan Garg, Aayush Trivedi, "Optical Character Recognition using Artificial Intelligence", International Journal of Computer Applications,2018, pp.14-20.

[6] Ayatullah Faruk Mollah, Nabamita Majumder, Subhadip Basu, Mita Nasipuri, "Design of an Optical Character Recognition System for Camera-based Handheld Devices", IJCSI International Journal of Computer Science Issues, Vol. 8, Issue 4, No 1, July 2011, pp.283-289.

[7] Bhushan S. Thakare, Dr. Hemant R. Deshmukh, "An Adaptive Approach for Image Denoising Using Pixel Classification and Gaussian Conditional Random Field Technique", IEEE International Conference on Computing, Communication, Control and Automation,2017, pp.1-8.