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Automating Data Entry Forms for Banks Using OCR and CNN: Survey

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Abstract: Digitalization of money transfer is a must in the present situation of banking operations. Clients have a variety of ways to carry out transactions, such as credit, wiring money, and so forth. However, depositing cash requires the physical presence of the depositor at the bank, and cashier needs to enroll the transaction into the system, which slows down the rate of money deposit and teller's activity. To accelerate the process, banks around the world have to adapt and construct guidelines for a digital deposit. To accurately digitize and transmit deposit slip information from smartphones to the bank, a scheme called "Automating Data Entry Forms for Banks Using OCR and CNN". The deposit slip scanner algorithm is based on input from the Smartphone camera.

Keywords: OCR engines, Preprocessing, Row and character segmentation, Otsu's thresolding Techniques.

I. INTRODUCTION

Optical Character Recognition (OCR) finds an important application in building the intelligent indexing systems in today's computer world. These identification procedures digitize the documents and transfer them into editable forms. Document image analysis is a region, which works with scanned images. OCR performance for industries is mainly dependent on the quality of the camera, whereas, for document analysis, it depends upon the scanner. Non-uniform clarification within the scanner due to shadow, scanning angle and ink diffusion are some of the main problems encountered while scanning.

OCR usually involves three processes, namely text localization, character segmentation, and recognition. The recognition is an important area of document image analysis, which is in the mature stage for machine-printed text. The segmentation is responsible for correctly recognize the character and also for the segmentation.

There is some OCR technique used but they have many issues like character recognition, segmentation etc. The main problem arises because of different writing styles and font sizes. The segmentation plays an important role in correctly recognize the character. It also helps in character segmenting from the word images. Numerous touched typescripts generate problems during segmentation and therefore recognition error takes place occasionally. Also, the intermixed texts in a multilingual environment, it still remains a challenging problem.

II. LITERATURE REVIEW

Rana S et al.[1] focus on to recognize the Arabic handwritten character using a neural network. The proposed system uses the Hopfield Algorithm which designed using MATLAB. The system has 3 main stages i.e. preprocessing, feature extraction and then recognition.

Ali Farhat et al.[2] gives OCR technique is used for detecting Qatari number plate. The proposed system implemented in MATLAB. Also, the used 4 types of algorithm for feature extraction and template matching like vector crossing, zoning, zoning, and vector crossing, template matching-correlation. These algorithms are developed to generate an encoded text from the segmented characters from Qatari NP images.

S. Rishi Kumar et al.[3] proposed an efficient and real-time cost beneficial method that enables international travelers to hear the text images of sign boards, routes in their own languages. It combines the concept of Optical Character Recognition (OCR), text to Speech Synthesizer (TTS) and translator in Raspberry Pi. Text Extraction from color images is a difficult job in computer vision. Text-to-Speech conversion is a method that scans and reads any language letters and numbers that are in the image using OCR technique and then translates it into any desired language and at last, it gives an audio output of the translated text. The translate shell which is used to translate the text to is available in many languages. BaoguangShi et al.[4] investigate the problem of scene text recognition, which is among the most important and challenging tasks in image-based sequence recognition. The system proposes a neural network architecture, which integrates feature extraction, sequence modeling, and transcription into a unified framework.

ParulSahare et al.[5] proposed system introduces the algorithm for character segmentation and recognition is presented for multilingual Indian document images of Latin and Devanagari scripts. The proposed system uses the SVM and k-NN classification algorithms. The SVM used for the character segmentation and k-NN used for character recognition.

Sebastian Stoliński et al [6] nowadays, a lot of paper documents are transformed into electronic form, which easies information processing, like searching, analysis, and conversion. The analysis of OCR usability for regular data entering is given. The analysis is based on practical experiments, tests, and productive use of the OCR systems. The experiment was performed on two existing data types: barcodes and filled text forms. Various document categories were tested: bank transfer forms, insurance forms, invoices, banking contract, and application forms.

III. PROPOSED SYSTEMS

Nowadays the whole world is a shift in the digital world. They want everything in digital form, they not ready for manual work or any manual handwritten transaction. Also, they want to avoid the handwritten data. Depositing cash requires the physical presence of the depositor at the bank, and cashier needs to enroll the transaction into the system, which slows down the rate of money deposit and teller's activity.

To overcome such issue we OCR based effective system which transmits deposit slip information from smartphones to the bank. With the help of CNN, we can recognize the data from the slip.

The flow of the proposed system is as shown in below figure1.

1) *Capture Image:* The camera captures the deposit slip from cashier's android phone.
2) *Apply Grayscaling on Image:* Without preprocessing we can't get 100% accuracy, so we have to do preprocess on images and then send for further process of recognition. Preprocessing involves converting the frame into another format (grayscale, binaries image and so on).

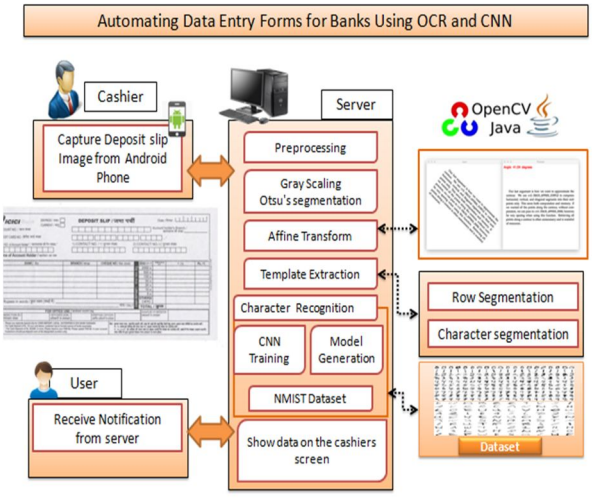
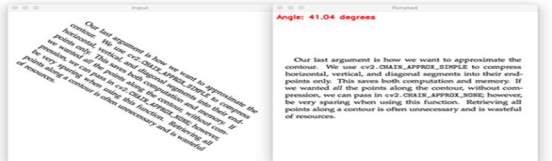


Figure:1 - System Architecture.

3) *Apply Otsu's Thresholding Techniques:* Noise represents unwanted information which deteriorates image quality. Noise can be added to the images at the time of capturing. Before applying image processing tools to an image, noise elimination from images is done at maximum priority. We are going to use Otsu's algorithm to perform thresholding on the grayscale image.
4) *Apply Affine Transform:* The Affine Transformation is a general rotation, shear, scale, and translation distortion, operator. That is it will change an image to carry out all four of the given distortions all at the same time. We use affine transform to straighten the tilted image at the time of image capturing.



5) *Row Segmentation:* Character height wise row segmentation will do in row segmentation stage. In which we can extract the meaning full information from the deposit slip. Such as

a) Account Number
b) Pan Number
c) Amount to deposit
d) Signature

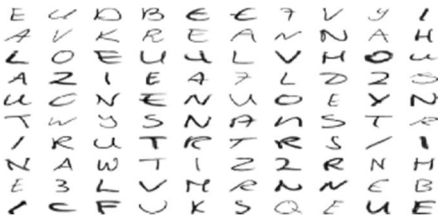
6) *Character Segmentation:* Segment characters from an image like "AAAA1234ABC" are the no of pan card we have to detect using image processing then we have to capture image and segment all character from the given image and then send input to CNN for Number recognition.

In this step, we are doing one by one character segmentation and create segmented character images.

a) *Number Recognition:* 0-9 number recognition in this stage.

This kind of dataset will used for recognize number from segmented images.

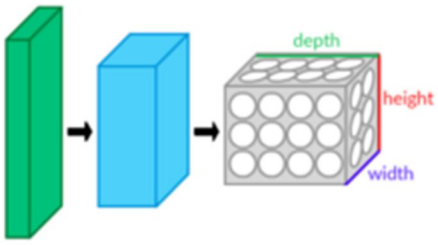
b) *Character Recognition*



This kind of dataset will used for recognize character segmented from images.

7) *CNN Training on Predefined Highlights Dataset:* Download dataset from http://yann.lecun.com/exdb/mnist/this website. This is the MNIST database of handwritten digits.

Four files are available on this site:
train-images-idx3-ubyte.gz: training set images (9912422 bytes)
train-labels-idx1-ubyte.gz: training set labels (28881 bytes)
t10k-images-idx3-ubyte.gz: test set images (1648877 bytes)
t10k-labels-idx1-ubyte.gz: test set labels (4542 bytes)
1. Training set of 60,000 examples
2. Test set of 10,000 examples



A CNN consists of an input and an output layer, in addition to many hidden layers. The hidden layers of a CNN usually consist of Convolutional layers, pooling layers, fully connected layers and normalization layers. CNN will be used to train the images analytics engine for recognizing important data from images.

8) Show Recognized Data On Cashiers Screen

Recognize Account number, Pan Number, Deposit amount, signature from deposit slip will be displayed on the cashiers screen for further action.

a) Advantages: The whole system can be implemented in very low cost and provides better accuracy.

IV. ALGORITHM USED

A. Convolution Neural Network (CNN)

Accepts a volume of size W1×H1×D1

Requires four hyper parameters:

1) Number of filters K

2) Their spatial extent F

3) The stride S

4) The amount of zero padding P

Produces a volume of size W2×H2×D2 where:

W2= (W1−F+2P)/S+1

H2= (H1−F+2P)/S+1

(i.e. width and height are computed equally by symmetry)

D2=K

With parameter sharing, it introduces F*F*D1 weights per filter, for a total of (F*F*D1)*K weights and K biases.

In the output volume, the d-th depth slice (of size W2×H2) is the result of performing a valid convolution of the d-th filter over the input volume with a stride of S, and then offset by d-th bias.

A common setting of the hyper parameters is F=3,S=1, P=1

However, there are common conventions and rules of thumb that motivate these hyper parameters.

V. CONCLUSION

Automate Data Entry Forms for Banks with the help of OCR technique can recognize and analyze text from deposit slip image. The cashier can use his/her Smartphone camera to perform this operation.

In this survey, different literature is studied and grants us to get equipped with work. This survey also describes proposed systems with their advantages.

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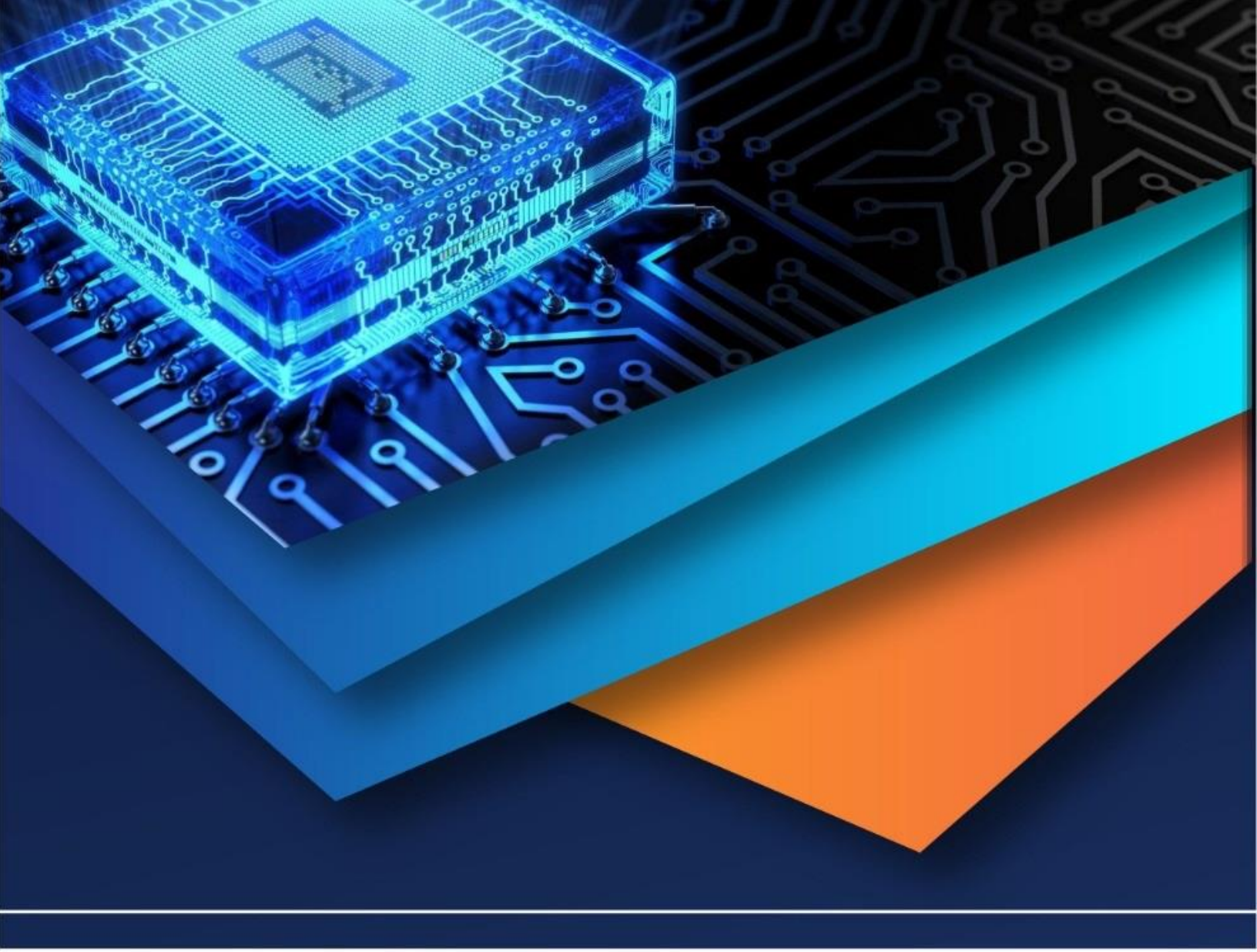

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