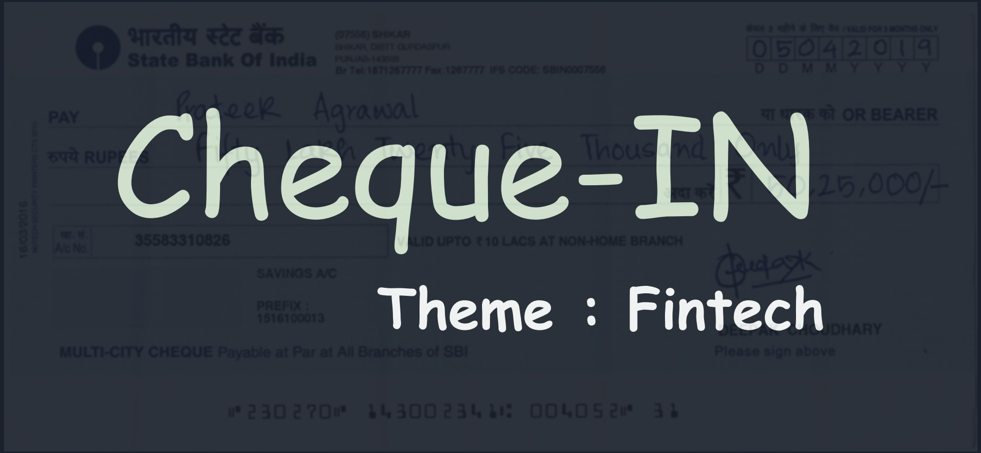
Cheque-IN

Theme : Fintech



भारतीय स्टेट बैंक
State Bank Of India

(07556) SHIKAR
SHIKAR, DISTT GURDASPUR
PUNJAB-143505
Br Tel:1871267777 Fax:1267777 IFS CODE: SBIN0007556

केवल 3 महीने के लिए वैध / VALID FOR 3 MONTHS ONLY

0 5 0 4 2 0 1 9
D D M M Y Y Y Y

PAY Prateek Agrawal या धारक को OR BEARER

रुपये RUPEES Fifty Lakh Twenty Five Thousand Only

अदा करें ₹ 50,25,000/-

खा. सं. A/c No. 35583310826

VALID UPTO ₹10 LACS AT NON-HOME BRANCH

SAVINGS A/C

PREFIX : 1516100013

DEEPAK CHOUDHARY
Please sign above

MULTI-CITY CHEQUE Payable at Par at All Branches of SBI

⑈230270⑈ 143002341⑆ 004052⑈ 31

Source code link

https://github.com/Hriday31/cheque-processing

TEAM MEMBERS:

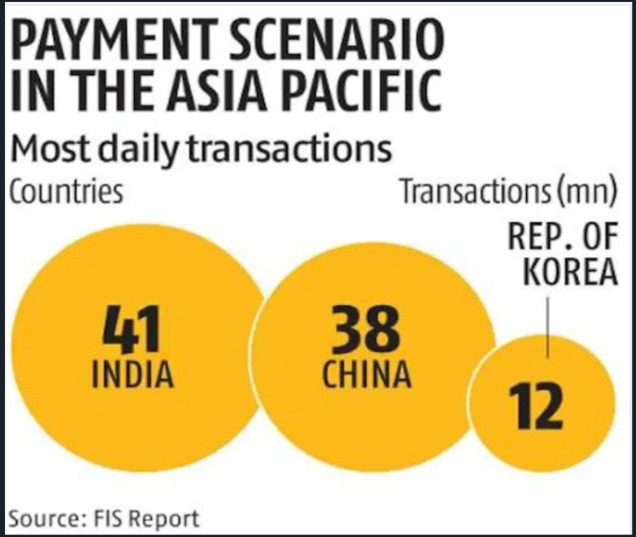
Aditya Gupta
Anandita
Hriday Aggarwal
Vansh Kalra

What is the problem we are trying to solve?

Bank handles large volumes of cheques in the clearing process. The process involves many technical verifications including **signature verification**. Some of these steps are manual and require human intervention to complete the process. The current process requires the high human capital deployment and longer **processing time**. Furthermore, the frauds will be minimized to a large extent.

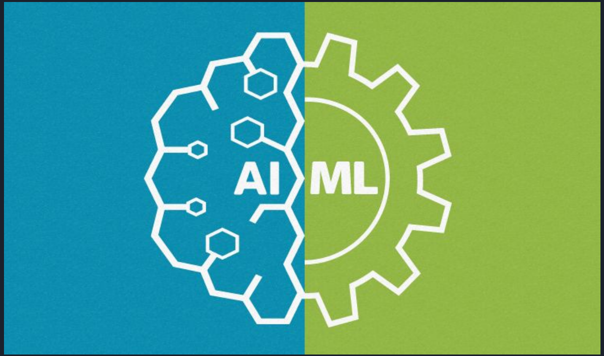
Vision

- ➢ Automation of cheque clearance using AI/ML.
- ➢ Automatic data entry and technical verification.
- ➢ Signature verification.
- ➢ Reduce human efforts.
- ➢ Reduce cheque processing time.
- ➢ Reduction of cheque frauds.



Abstract Of Solution

- ➢ Based on Artificial Intelligence using **Python** Libraries.
- ➢ **Tesseract-OCR** is used for text extraction.
- ➢ **Computer Vision** facilitates Image Processing.
- ➢ **File Handling** has been used to record data entries
- ➢ **Structural Similarity Index(SSIM)** and **Morphological Transformation** techniques to recognise signatures.



Solution

- Through our idea we are trying to reduce the **processing time** of the cheque! Right now for a cheque to be processed it normally takes around **2-3 working days.** Through our solution, we are resolving this process by automating the cheque processing. The cheques will directly be placed in the scanning machine and will get verified after comparing them with the initial payee's data which are already stored in Bank's database. The process will be saving a lot more time which would ultimately be leading to **greater Bank productivity** in terms of cheque processing.
- The idea which we are currently working on will also help in **Automatic Data Entry & Technical verification** which is currently done manually through our solution we will be reducing the human effort and less work to manpower.
- Accept & Store Genuine Signature Image: Actual signatures' scanned image of the onboarding customer is taken and it is stored in a database against their Bank Account Number.

- ➢ Accept & Compare Signature Images: Based on corresponding signature image, the signature stored in DB against the given Account Number is matched for Structural similarity Match Score between the two signature images.
- ➢ Accept document input: System has an input mechanism for accepting document images (TIFF, JPEG).
- ➢ As an output, system returns the records for every check processed in an excel format.

SIGNATURE RECOGNITION:

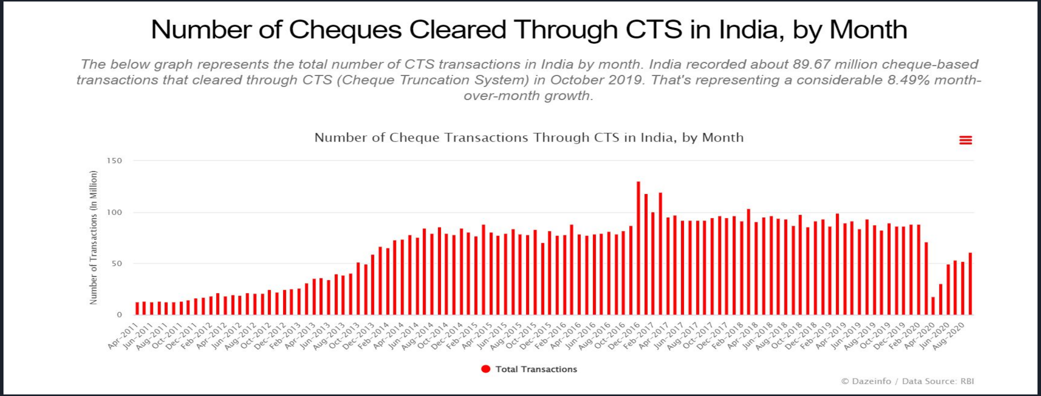
- A person’s signature is a representative of his identity. At the Bank, a signed document by a customer is an instruction from him for carrying out an approved transaction for him. On onboarding a customer they capture an image of his signature in their systems, and on receiving a signed document (Cheques, DDs and others) from him they match the signature on the document with the one recorded in the database before proceeding with the instruction.
- In case of skilled forgeries, it becomes very difficult to verify the identity of the customer. A system is needed to be built that can help them distinguish forgeries from actual signatures. This system should be able to study signature parameters as strokes, curves, dots, dashes, writing fluidity & style, in a Writer-Independent manner and create features for identification of the signature.

Solution flow

- ➢ Reading scanned checked through **Computer Vision** (OPEN**CV**)
- ➢ Colour mapping to Grayscale for easier image processing
- ➢ Extraction of required data from the cheque (Payee details: Account Number,Name ; Signature ; Transaction Amount)
- ➢ Displaying details using Tesseract-OCR engine through **Pytesseract**
- ➢ Processing signature image through **Morphological Transformation** to remove the extra background noise from the image for accurate matching.
- ➢ Matching signature with the Pre-stored records in the banking database for evaluation of credibility of the cheque with the help of **Structural Similarity Index** using Skimage

EASIER FOLLOW-UP PROCEDURE :

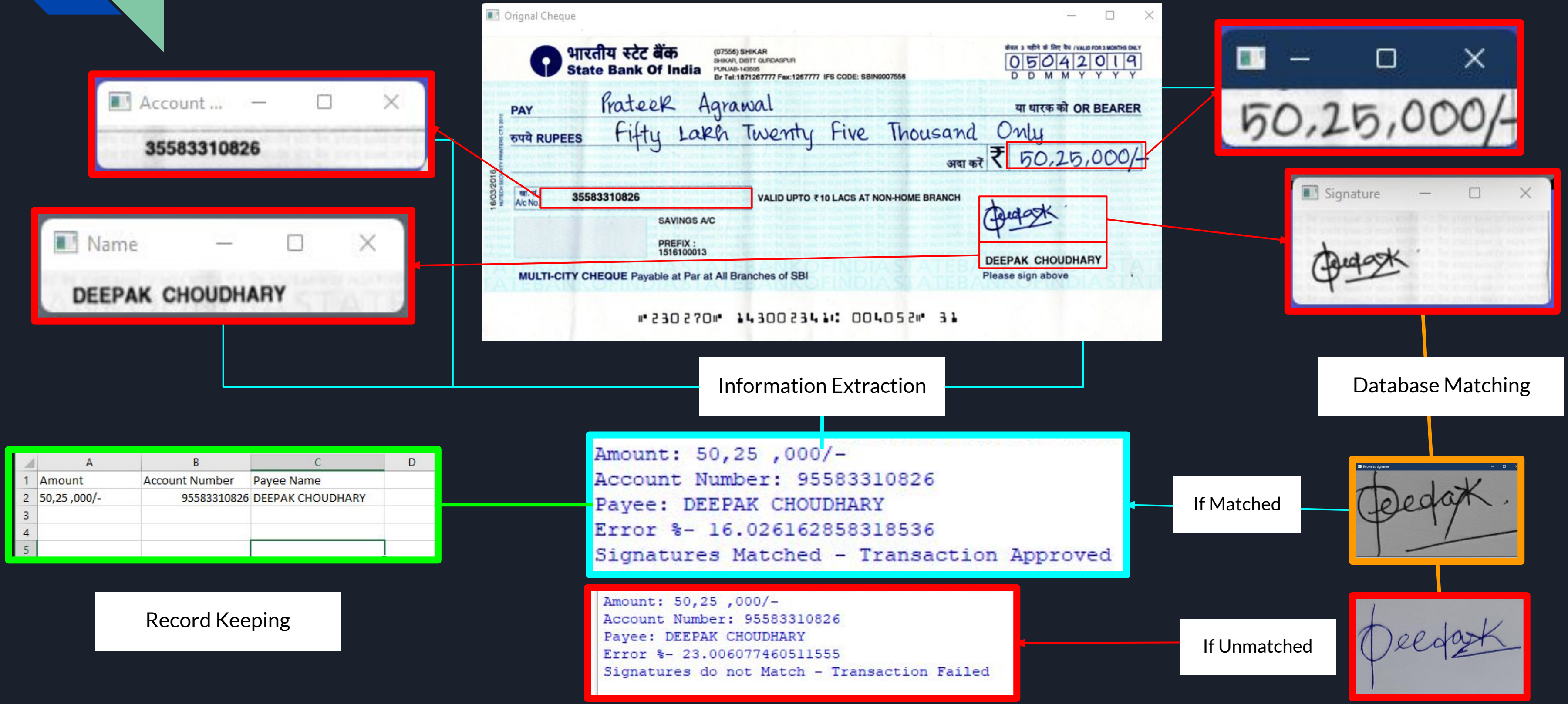
- ➢ Through the developed solution we propose the Banks to update the Record Sheets on their public domains.
- ➢ Through these record sets the customer can easily checkup upon the status of their checks on daily basis.
- ➢ These records will increase the transparency between public and banking institutions which will cut over the loopholes which have been prevailing for a long time now.



Number of Cheques Cleared Through CTS in India, by Month

The below graph represents the total number of CTS transactions in India by month. India recorded about 89.67 million cheque-based transactions that cleared through CTS (Cheque Truncation System) in October 2019. That's representing a considerable 8.49% month-over-month growth.

Processing



Orignal Cheque

भारतीय स्टेट बैंक
State Bank Of India

(07556) SHIKAR
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Br Tel:1871267777 Fax:1267777 IFS CODE: SBIN0007556

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MULTI-CITY CHEQUE Payable at Par at All Branches of SBI

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16/03/2016

Account ...

35583310826

Name

DEEPAK CHOUDHARY

50,25,000/-

	A	B	C	D
1	Amount	Account Number	Payee Name	
2	50,25 ,000/-	95583310826	DEEPAK CHOUDHARY	
3				
4				
5				

```
Amount: 50,25 ,000/-
Account Number: 95583310826
Payee: DEEPAK CHOUDHARY
Error %- 16.026162858318536
Signatures Matched - Transaction Approved
```

```
Amount: 50,25 ,000/-
Account Number: 95583310826
Payee: DEEPAK CHOUDHARY
Error %- 23.006077460511555
Signatures do not Match - Transaction Failed
```

Working code

```
from types import GeneratorType
import cv2  # computer vision
import numpy as np
from pytesseract import pytesseract  # Tesseract-OCR
from skimage.metrics import structural_similarity as ssim  #
SSI
import csv
import warnings
warnings.filterwarnings("ignore", category=UserWarning)

image = cv2.imread('test.png')  # read cheque image
image1 = cv2.imread('sign.jpeg')

# resizing to prevent any mismatch during scanning of cheque
img = cv2.resize(image, (804, 370))

img = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)  # convert image
to grayscal
signm1 = cv2.cvtColor(image1, cv2.COLOR_BGR2GRAY)

sign = img[170:255, 570:804]  # image cropping to extract
details
name = img[255:280, 570:800]
acc = img[180:210, 75:300]
amt = img[135:165, 620:775]
# display images
'''cv2.imshow('Orignal Cheque',image)
cv2.imshow('Signature',sign)
cv2.imshow('Name',name)
cv2.imshow('Account Number',acc)
cv2.imshow('Amount',amt)'''
```

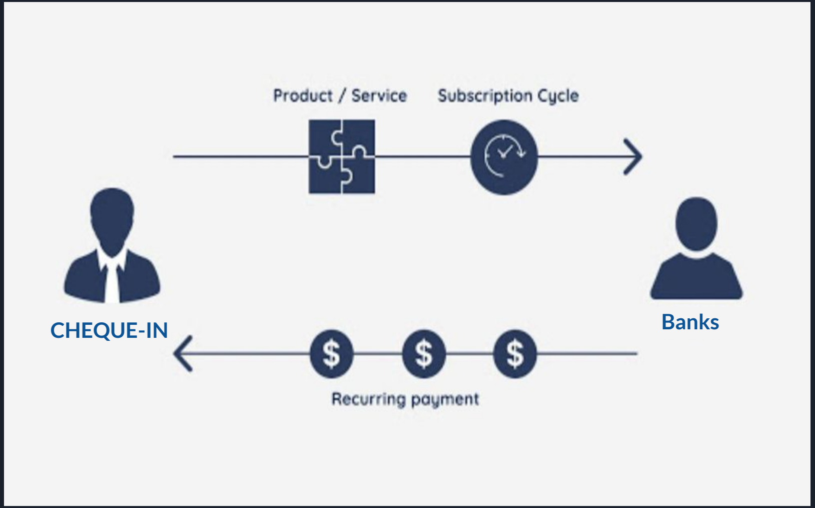
```
def imgtotext(p):  # extracting text from collected
information
    path_to_tesseract = r'C:\Program
Files\Tesseract-OCR\tesseract.exe'
    pytesseract.tesseract_cmd = path_to_tesseract
    text = pytesseract.image_to_string(
        p, lang='eng', config='--psm 6
tessedit_char_whitelist=0123456789')
    return (text[0:-1])

print("Amount:", imgtotext(amt))
print("Account Number:", imgtotext(acc))
print("Payee:", imgtotext(name))
def remove_white_space(image):  # Morpholigal Tranformation
    blur = cv2.GaussianBlur(image, (25, 25), 0)
    thresh = cv2.threshold(
        blur, 0, 255, cv2.THRESH_BINARY_INV +
cv2.THRESH_OTSU)[1]
    noise_kernel =
cv2.getStructuringElement(cv2.MORPH_RECT, (3, 3))
    opening = cv2.morphologyEx(
        thresh, cv2.MORPH_OPEN, noise_kernel, iterations=2)
    close_kernel =
cv2.getStructuringElement(cv2.MORPH_RECT, (7, 7))
    close = cv2.morphologyEx(opening, cv2.MORPH_CLOSE,
                             close_kernel, iterations=3)
    coords = cv2.findNonZero(close)
    x, y, w, h = cv2.boundingRect(coords)
    return image[y:y+h, x:x+w]
```

```
sign2 = remove_white_space(signm1)
sign3 = remove_white_space(sign)

cv2.imshow('Recorded signature', sign2)
cv2.imshow('Sign on cheque', sign3)

# Image Matching using structural similarity Index

# unifying dimesions for matching images
cheque_image = cv2.resize(sign3, (100, 100))
original_image = cv2.resize(sign2, (100, 100))

'''cv2.imshow('wrong_image',wrong_image)
cv2.imshow('original_image',original_image)'''

print("Error %-", ssim(cheque_image, original_image)*100)

if ssim(cheque_image, original_image) <= 0.2:
    print("Signatures Matched - Transaction Approved")
else:
    print("Signatures do not Match - Transaction Failed")
f = open('chequeprocessing.csv', 'a', newline='')
a = [imgtotext(amt), imgtotext(acc), imgtotext(name)]
csv.writer(f, delimiter=',').writerow(a)
f.close()

cv2.waitKey(0)  # waits until a key is pressed
cv2.destroyAllWindows()  # destroys the window showing
image''
```

Business Model

There are 21 private, 12 public and 43 regional banks in India which processes check worth of almost Rs 56,27,189 crores*.

We will charge banks with an yearly subscription for this software. We will be approaching various national banks with our prototype where after subscribing they will install it in different branches according to their requirements.



Future Aspects

1. **OTP:** We shall also be looking forward to introduce One Time Password (OTP). In case the payee isn't directly visiting the Bank to drop cheque. Just prior to when his cheque is going to be processed the payee would receive an OTP either on his email or phone number as per convenience. The OTP would be valid for a period of 1 hour as to ensure flexibility and further, the cheque wouldn't be processed unless the Bank receives the payee's approval by entering OTP.

2. **QR CODE:** A Secure QR Code with details such as cheque number, account number and bank code stored inside is added to the cheques at the time of issuance of the cheque book Such high security, tamperproof code can only be created by the issuing bank and is digitally signed by their private key. No other person can create this code. Hence even if a fake cheque leaf is generated, the QR code on it cannot be created with the same information inside.

THANK YOU