बैंक ऑफ़ बड़ौदा
Bank of Baroda

Technology Partner
Microsoft Azure

Bank of Baroda Hackathon - 2022

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Why did we choose this Problem Statement?

- The modern banks are not up to the mark in using the technologies developed, this will be a great chance for us to connect the chain between the regular banking methods and modern technology.
- We have a nice idea to implement and are confident that our idea will serve a purpose in changing the banking system

User Segment & Pain Points

Which user /advertiser segment would be early adopter of your product & why?

- The Banks take a long time to verify the cheques and also a lot of human effort during the process, so the Banks will be the first ones to use our project
- Corporate companies like insurance companies will make their clients pay the money for their policies by some deadline, many times the cheques given by the clients may get declined and may bounce back, so if the companies use our software, they can detect whether the cheque can be passed or not, if not they can ask the clients for another one.

Pain points:

- Getting the Cheque Dataset (as explained in the next slides) where we need the reference checks of all Indian Banks and also the coordinates of signature portion and other data portions inside the cheque.
- We need a person to scan the cheque he receives correctly and upload to the server
- We have to see that the scanned image of cheque and reference image will be having same dimensions and planar view

What are the alternatives/competitive products for the problem you are solving?

- There is a company called as “ Krish IT solution” which had worked on cheque automation and their work is impressive

Problems to solve

1. Cheque Verification
2. Automatic Data Entry
3. MultiLingual
4. Detect Potential Frauds
5. Reduce Human Efforts
6. Reduce processing time

Assumptions:

There will be a person employed to scan the cheques for the customers in a scanner that is present in the printer or in a scanner application in mobiles, so that the cheques will be free from any foldings.

The scanned image will be cropped exactly to its edges and sent as input to our software.

We are using the Azure OCR and the open source softwares like tensorflow

Method, Architecture, Solution :-

We are using two models named “Model1” and “Model2” whose functions will be explained in the next slides

We are following the method if we are able to gather reference image of all Indian Bank cheques (assuming we will work first on Indian Banks), then we will also have the coordinates to the signature position and other parts in the cheque in our database.

Cheque Dataset

- This dataset contain the information of all Indian Bank cheques that are being used till now and will be used further.
- The information it contains will be the **scanned image** of the cheque of a **specific dimension** and the **coordinates information of where the signature, date and other data** will be located inside the cheque

MODEL 1

- **The input to this model image will be the scanned image taken by the employee, suppose the scanned image is called as “scan_img”**
  (Precaution- we should have the “scan_img” and the reference image of the same dimension and same planar view)
- Our model identifies the input image is which banks cheque using the “**Cheque Dataset**” and gives output the reference image to the corresponding input
- We can use CNN(convolutional neural network) or K-nearest meighbour to map the input to the output image

MODEL 2

- It is trained on a dataset which contains the customer signature and the respective customer Id. **Embedding of every training image has to be saved**. The dataset should contain at least three signatures of each customer(**because a person signature might vary a little bit every time**)
- It takes an unknown signature as the input and gives the predicted customer Id of the input signature
- He we use **embedding** to find the unknown signature, an embedding captures some of the semantics of the input by placing semantically similar inputs close together in the embedding space. So we get the predicted Customer Id as output

Step1.We receive the cheque from the customer and obtain the scanned image of the cheque cropped exactly to its edges, let us call this “scan_img”

Step2.We subtract the scanned cheque with the reference cheque image we have, so that the subtracted image will only have the written details customer wrote on the cheque, let us call this “sub_img”. The way that we identify the cheque to subtract is done by using Model 2 as explained before

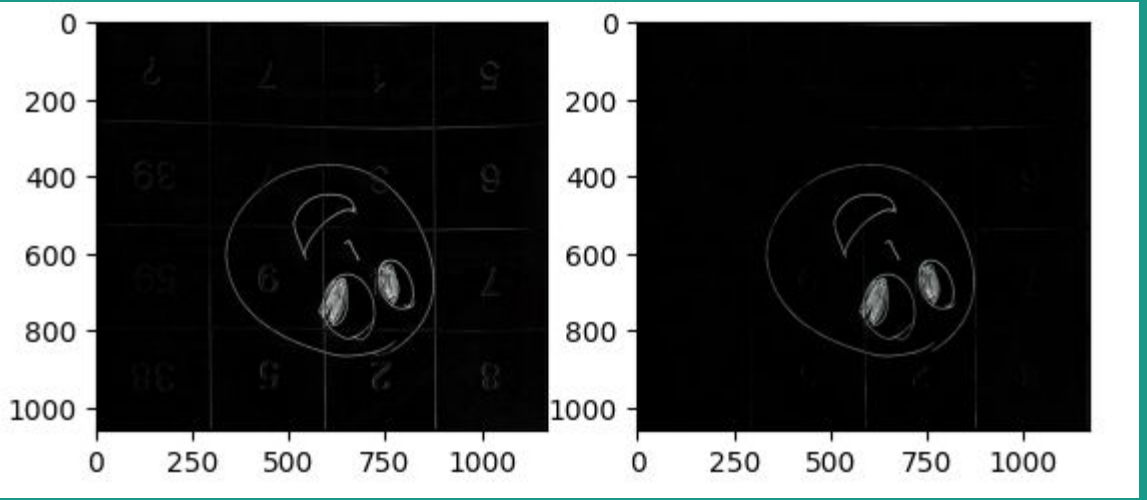
The process said in pointno2 is shown in the images below, where the image (c) shows the characters which are written by the user, in our case the signature, amount, date etc..

(a) (b) (c)

Precaution- we should have the “scan_img” and the reference image of the same dimension and same planar view

Sometimes the image we get after the subtraction may contain noise and unnecessary data(This can happen when our “scan_img” and reference image are of different scales or different planar views), to remove that we have use **Denoising algorithm** to remove the noise from the cv library, an example is shown below, right side image is the image obtained after applying Denoising filter to the left side image

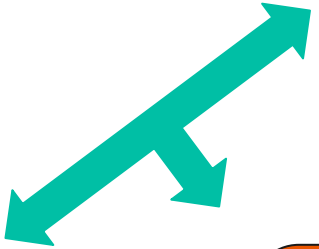
Here the inverted smiley face is our object of interest



Step3.

- From our database we will get the coordinates where the signature, amount(in numbers) and date will be there, so we crop each of those images separately in “scan_img”. Suppose the cropped image of signature is named as “sign_img”
- We will also get the cheque number portion of the “scan_img” and apply OCR, to obtain the cheque number, after getting the cheque number, we will find the customer I.D to which this cheque belongs from the bank database, suppose the actual I.D we get is “y”

Step4. “sign_image” will be sent as input to Model2 and Model2 will give an output prediction “x”, that is the predicted customer I.D.



Step5. Now if “x” will be equal to “y”, then signature will be verified, otherwise cheque is not verified.

Step6. Let the images we get by cropping the written part be “text_img”, let the image containing date be “date_img”, amount be “numbers_img”, we get them by cropping the “sub_img” as we know the coordinates of the different parts of cheque in our database. Then we apply Azure OCR tool to each of the image to extract the information.

TECHNICAL VERIFICATION

Step7. After extracting all necessary info, we check date to verify it, we check whether the amount written is valid, and other details validity.

What problems did we solve? and what are left?

- We are able to solve the cheque verification, detecting potential fraud, reduce human effort and reduce processing time
- We have to solve the multi lingual and Automatic data entry problems

Future prospects

- We can make this software available to all the bank customers in the banking app or website, so that the people will get confirmation whether the cheque will be passed or not before submitting to bank, but there might be challenges while doing that, the most import one is the picture taken by the customers as they can be of low quality with noice etc. We think if we are planning to make it available to customers, then we have to have a used a different algorithm like we have to use PCA (principle component analysis) to detect edges and the written part to the cheque image instead of subtraction method we mentioned in the previous slides.
- When developing this project further we are expecting to add other functionalities such as multilingual support, automatic data entry, preventing scams, etc.
- If the future cheque designs are made such that the detection of the borders of the cheque and signature is much easier, the accuracy of the verification can be increased by a large margin.