ScaN4U(Doc Scanner)
AI, Deep Learning and DWH Mining –Inhouse

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Content

Introduction to Project

- There are a wide range of people who use CamScanner - like apps on a daily basis like Adobe Scan, Tap Scanner etc.
- The principle involved in these apps is that the user has to click the image of the page he/she has to scan and then check if the quality of the image is upto his/her expectation.
- In June, there was a notion to ban chinese apps which included CamScanner. As CamScanner was the most popular app at that time, there was no other good alternative.
- Thus, we planned to develop a Video-based scanning app which would provide the users with a much more convenient alternative.

Competitions

Adobe Scan is our main competition and the figure on the right shows the Feature Comparison between the applications.

Feature Comparison

Primary Features	CamScanner	Adobe Scan	ScaN4U
Image/Video based Scanning	—	—	✓
Handwritten text recognition	—	✓	✓
Cropping Images	✓	✓	✓
Image Filters	✓	✓	✓
Authentication	—	✓	✓
Cloud Storage	✓	✓	✓
Document Sharing	✓	✓	✓
Take images and make Pdf	✓	✓	✓

Premium Features	CamScanner	Adobe Scan	ScaN4U
Digitalisation of negative photos	—	—	✓
Object Detection	—	—	✓
Constructing an aura map of an image	—	—	✓
QR Code Scanner	✓	—	✓
Changing Handwriting	—	—	✓

Business Model

Fast Scanning

Handwritten Text Recognition

Authentication

Video-Based Scanning

Cloud Storage

Object Detection

Ad Free

Problem

- Traditional scanning applications allow the user to capture images of the documents to be scanned. It sometimes could be annoying for the user to do so given the high probability of the scanned images to be blurry or not of required quality.

- Authentication in the existing applications is tedious and time consuming.

- Users are annoyed when they face Ads in between scanning of documents.

Solution

- Video based scanning application allowing users to scan documents in the form of video
- Convenience of use for the users with no-ads interruption
- Authentication Feature to secure users account

- Providing cloud services to user for backup and synchronization of their documents
- Faster scanning of documents and clearer images in the PDFs
- Handwritten text recognition to detect the words in the document to provide PDFs without duplicate pages.

Use cases

Scanning Docs for Submissions

QR Code Scanning

Digitalization of Negative Images

Literature Survey

Paper Name	Year of Publication	Models		Purpose
A No Reference Image Blur Detection Using Cumulative probability Blur Detection (CPBD) Metric	2013	**Model** Probability Summation	**Accuracy** -	• Image quality Measure. • Uses 'Just Noticeable Blur' metric as a threshold value for clarity of image.
Optical Character Recognition for Quranic Image Similarity Matching	2017	**Model** KNN	**Accuracy** 92.3077%	• This paper uses KNN algorithm to detect characters for an image. • It separates out the diacritics and characters for better character recognition.
Handwritten Text Recognition using Deep Learning	2017	**Model** CRNN,LSTM	**Accuracy** 93%	• This paper uses CRNN algorithm to detect words in a handwritten text line-image. • This paper suggests segmentation of words present in line images to keep the classifier small.

Literature Survey

Paper Name	Year of Publication	Models		Purpose
HTR in Historical documents	2018	**Model** ANN	**Accuracy** -	- Image quality Measure. - Uses 'Just Noticeable Blur' metric as a threshold value for clarity of image.
An optical character recognition	2012	**Model** HMM	**Accuracy** 96.5%	- This paper uses KNN algorithm to detect characters for an image. - It separates out the diacritics and characters for better character recognition.
Deploying ML models using Flask	2019	**Model** Keras ResNet50	**Accuracy** -	- This paper uses CRNN algorithm to detect words in a handwritten text line-image. - This paper suggests segmentation of words present in line images to keep the classifier small.

Hardware, Software, Tools & constraints

Hardware & Software Requirements

- **Android Phone**
- **Android Version(7 & above)**
- **Camera specs(16mp & above)**
- **Internet Bandwidth(1mbps & above)**
- **Storage(100 MB & above)**
- **Email Account**

Tools & Constraints

- **Flutter**
- **AWS**
- **Firebase Storage**
- **Firebase Cloud Firestore**
- **RESTful API**
- **Flask**
- **Limited Cloud Storage**
- **Limited computing power**
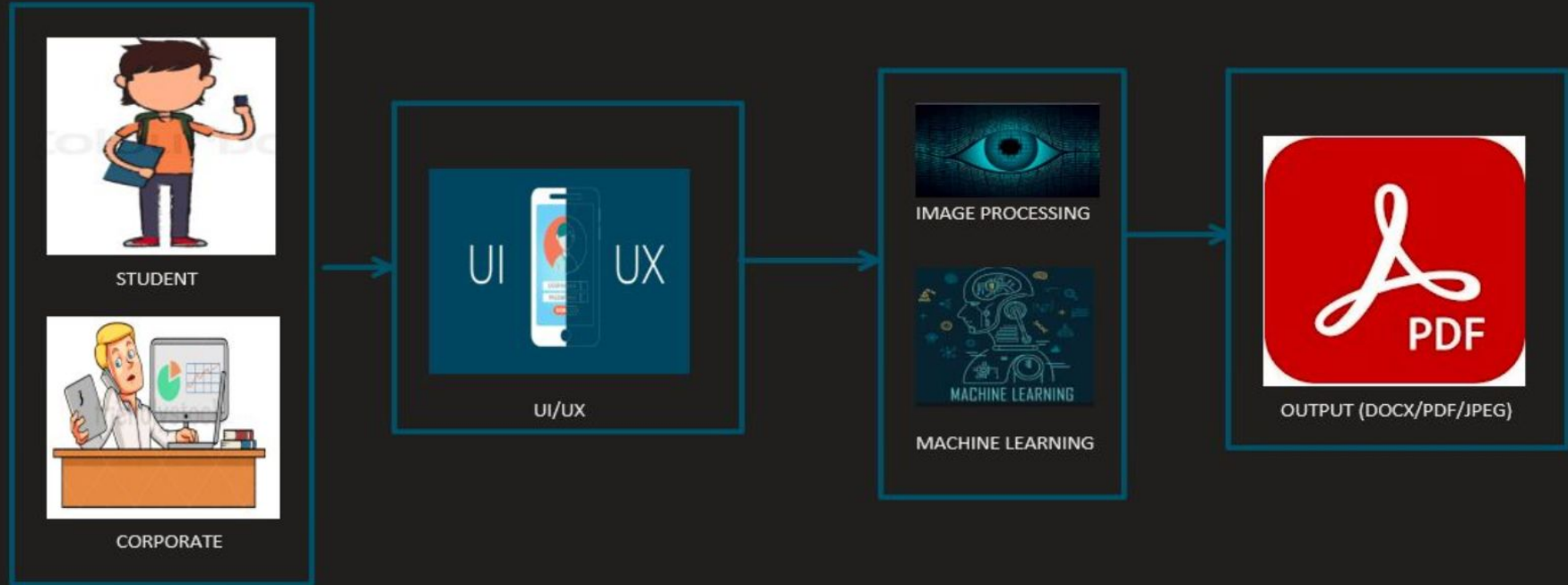- **Video files greater than 100mb cannot be processed**

Optimization Techniques

- We will be making use of video compression algorithms to reduce the size of the video sent to the cloud for processing.
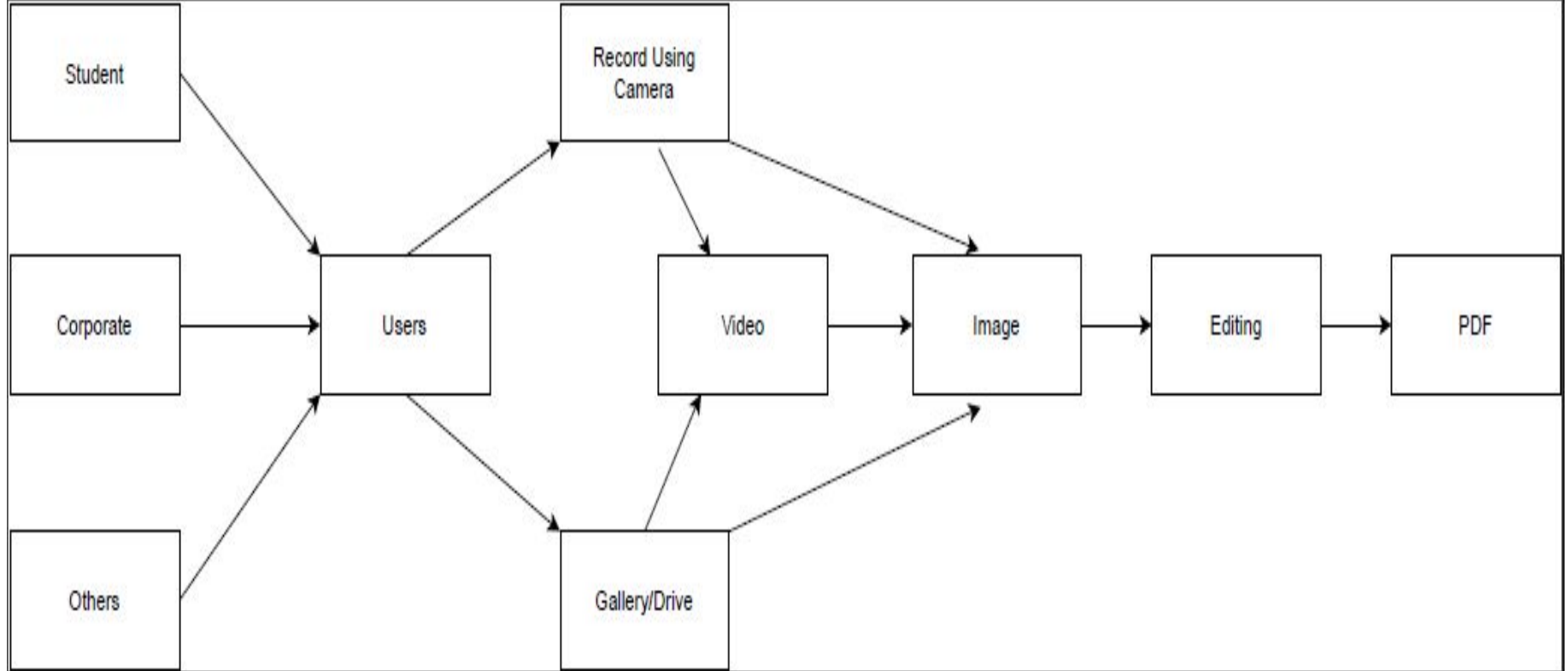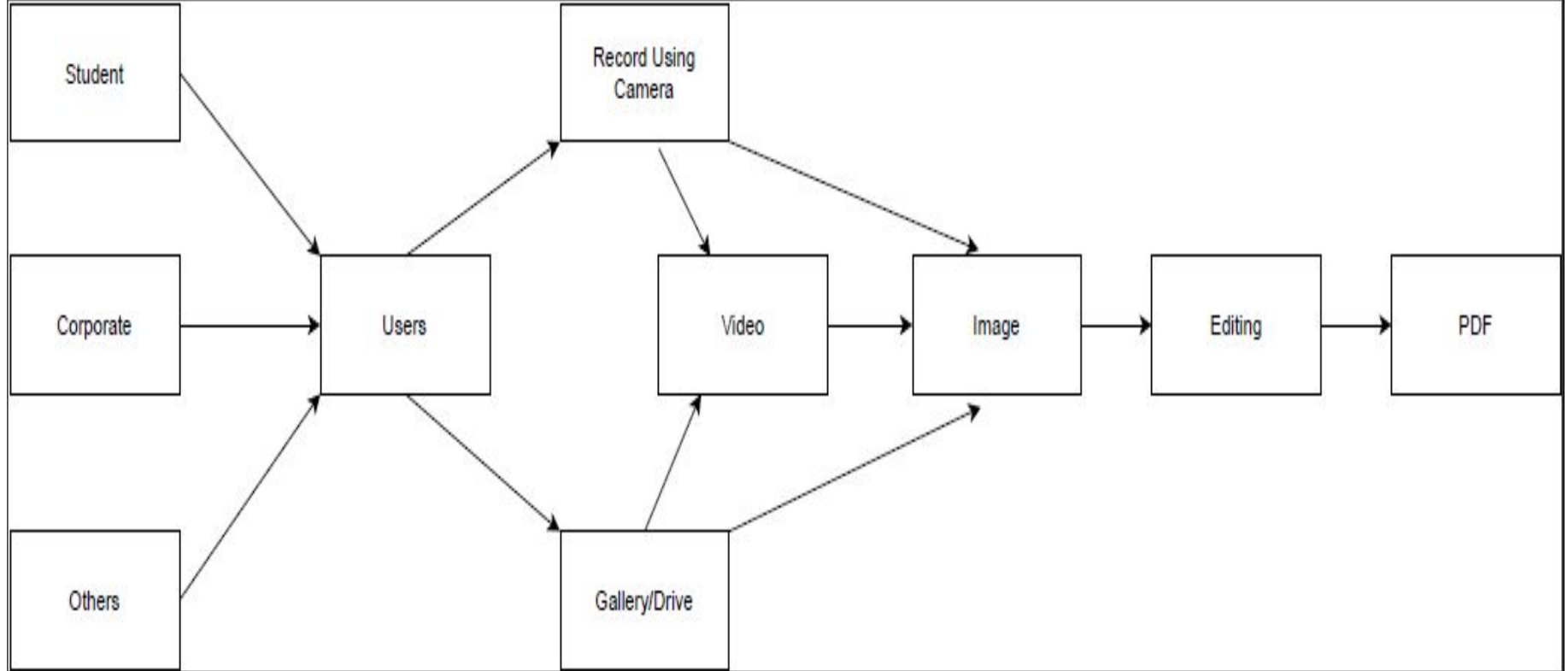
  Video_Compressor
- For

Block Diagram of the Project

STUDENT

CORPORATE

UI/UX

IMAGE PROCESSING

MACHINE LEARNING

OUTPUT (DOCX/PDF/JPEG)
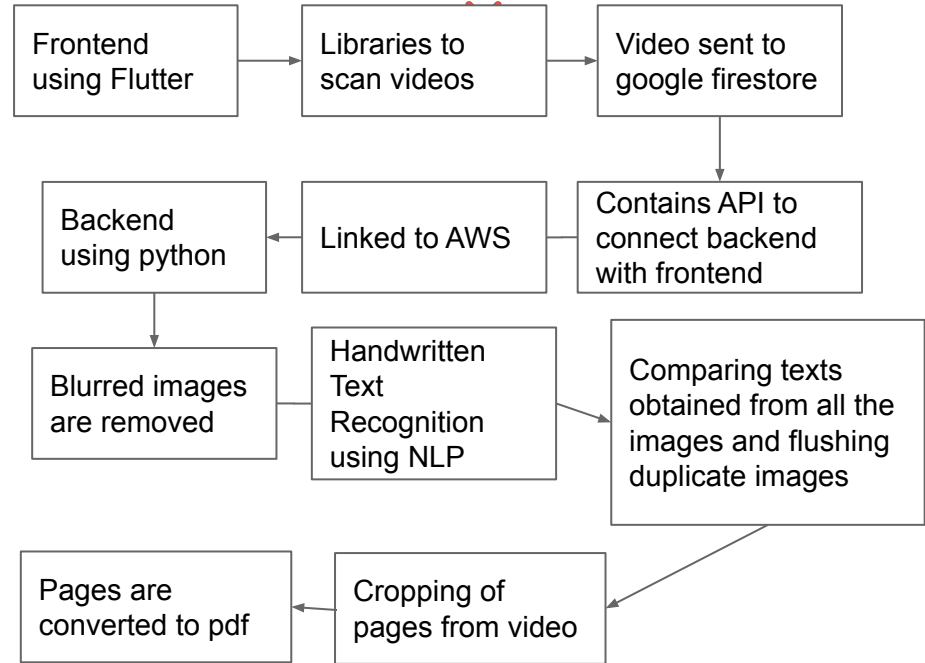
Modular Diagram of the Project

Modular Diagram for Scanning of Documents

Methodology Employed

1. Scanning

First we started with the development of the frontend which is build using Flutter. Here we have imported libraries which allows us to scan pages in video form and also to import videos from gallery. Then these videos are sent to google firestore which is linked to heroku. In heroku we have an API which helps us to connect to the backend which is coded in python. The backend crops out the pages from the video then removes the blurred images and then allows the user to select the pages they want for the document and then converts them into a pdf which is the final output of the system.

```
Frontend          →    Libraries to     →    Video sent to
using Flutter           scan videos           google firestore
                                                   ↓
Backend           ←    Linked to AWS    ←    Contains API to
using python                                  connect backend
   ↓                                          with frontend
Blurred images    —    Handwritten      →    Comparing texts
are removed            Text                   obtained from all the
                       Recognition            images and flushing
                       using NLP              duplicate images
                                                   ↓
Pages are         ←    Cropping of      ←
converted to pdf       pages from video
```

Methodology Employed

Algorithms Implemented

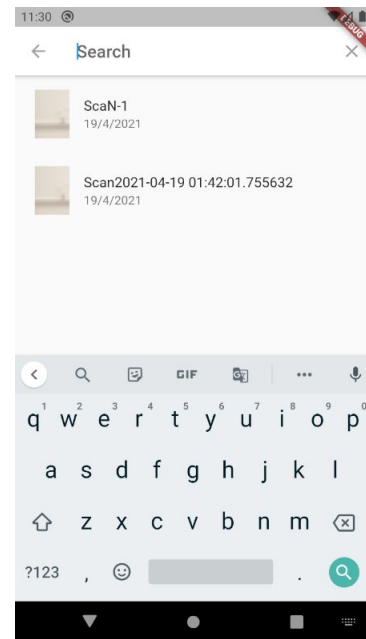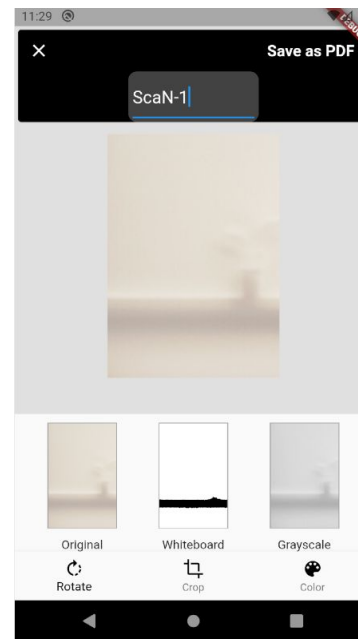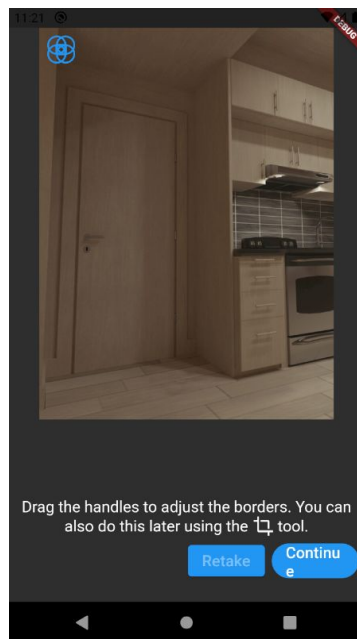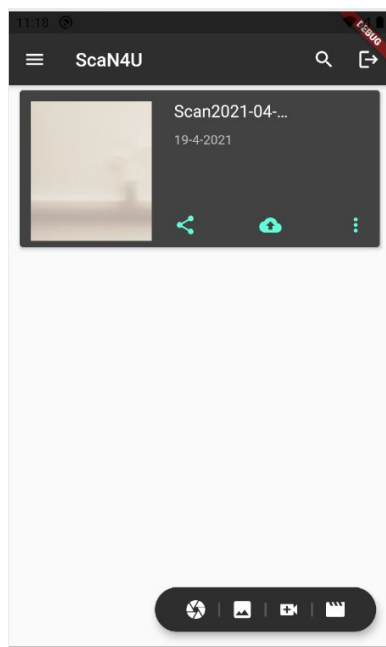| For Handwritten Text	For Printed Text	For Calculating Blurriness Level
Handwritten Text Recognition (HTR)	Optical Character Recognition (OCR)	Cumulative probability Blur Detection(CPBD)

Implementation Details

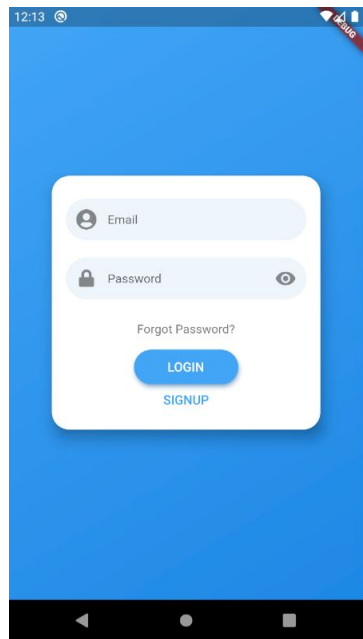**Dataset Used:**

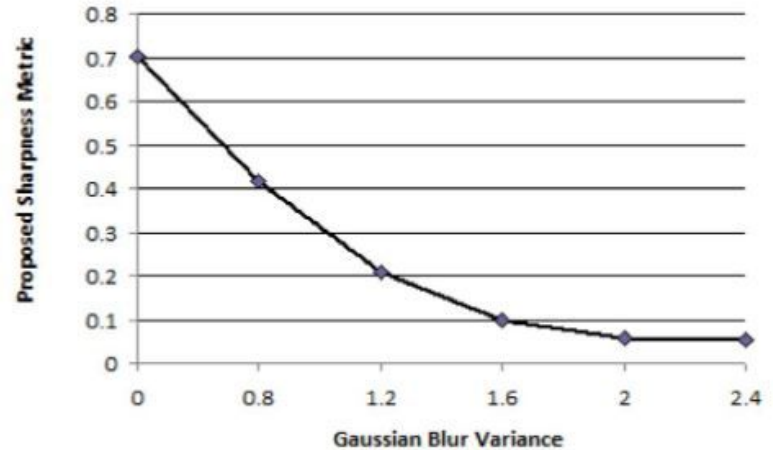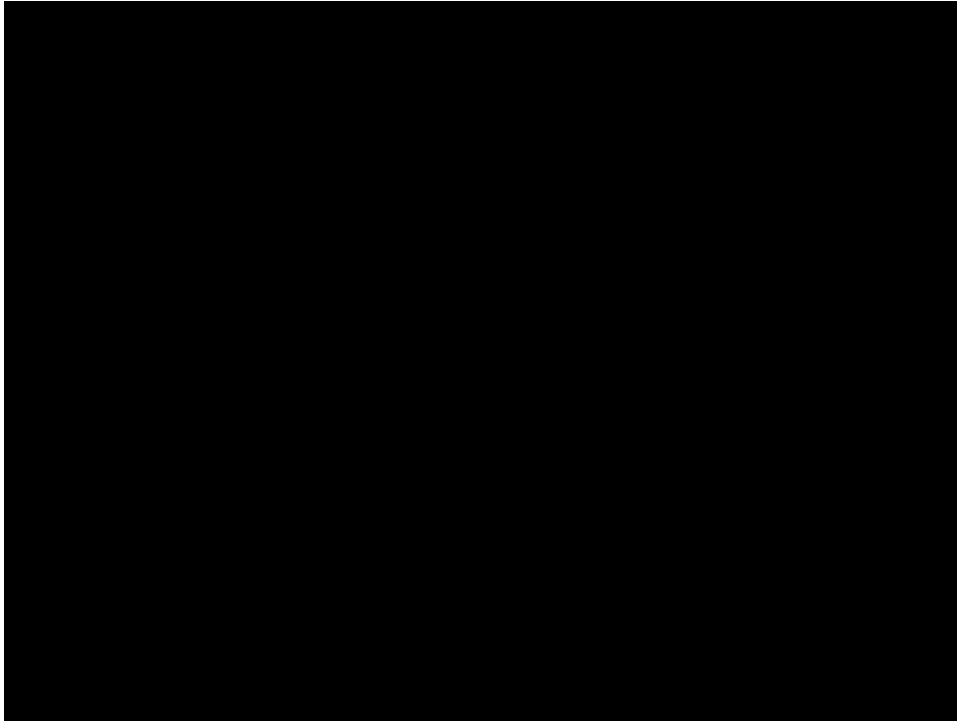https://scriptnet.iit.demokritos.gr/competitions/8/
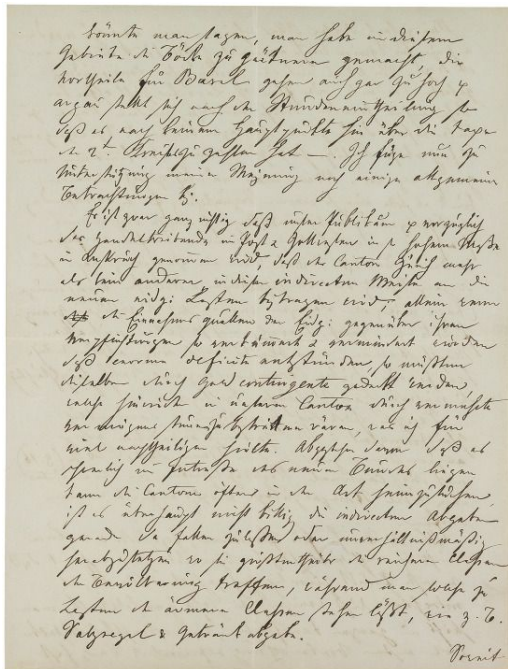
Example Image

GUI Screenshots

Results Obtained (Screenshots of Handwriting Recognition)

Results Obtained (Screenshots)

Market Opportunity

- Increasing number of students and workers in the corporate sector who might have to deal with frequent scanning of documents for their own respective purposes

- Growing number of pages/items to be scanned for a single pdf creation

- Ever increasing demand for high quality images to be captured during creation of pdfs

- Preference for free and non-advertising apps over apps that constantly display variety of ads

- Growing troubles due to potentially huge amount of time consumption

Evaluation Measures

- Checking whether the the extracted frame is blurred or not

- Whether the text is in printed form or handwritten form

- Check whether the handwritten text is block or cursive

- Checking the contrast level in B/W images

Conclusion

Scan4U is an application that allows the user to make documents by using Video.
The perks of this project are:

- Time Saving

- Free of Cost for all features

- Comes with Authentication

- Convenient

Future Optimizations

- Converting old negative photo reel to digital   (Premium Feature)

- Object Detection   (Premium Feature)

- Constructing an aura-map of an image   (Premium Feature)

- Changing Handwriting   (Premium Feature)

References

[1] Optical Character Recognition for Quranic Image Similarity Matching : https://ieeexplore.ieee.org/abstract/document/8101474

[2] Handwritten Text Recognition using Deep Learning : http://cs231n.stanford.edu/reports/2017/pdfs/810.pdf

[3] HTR in Historical documents: https://repositum.tuwien.at/retrieve/10807

[4] Handwritten Text Recognition System using TensorFlow: https://towardsdatascience.com/build-a-handwritten-text-recognition-system-using-tensorflow-2326a3487cd5

[5]A No-Reference Image Blur Metric Based on the Cumulative Probability of Blur Detection (CPBD): https://ieeexplore.ieee.org/document/5739529

[6]Deploying ML models using Flask: https://medium.com/analytics-vidhya/deploy-ml-models-using-flask-as-rest-api-and-access-via-flutter-app-7ce63d5c1f3b

[7]Auto Jotting a Notes Maker https://www.academia.edu/43390007/Auto_Jotting_A_Notes_Maker

[8] Handwritten Text Recognition Methods: https://nanonets.com/blog/handwritten-character-recognition/

[9] Deep Residual Learning for Image Recognition https://www.cv-foundation.org/openaccess/content_cvpr_2016/papers/He_Deep_Residual_Learning_CVPR_2016_paper.pdf

[10] An optical character recognition http://www.m-hikari.com/ces/ces2012/ces9-12-2012/meslehCES9-12-2012.pdf

Thank You