BVM Engineering College, VV Nagar

Gujarat Technological University

PROJECT #1

SEM 7
PRESENTATION

OCR-based Information Assistant

Electronics & Communication Dept.

Presented By :

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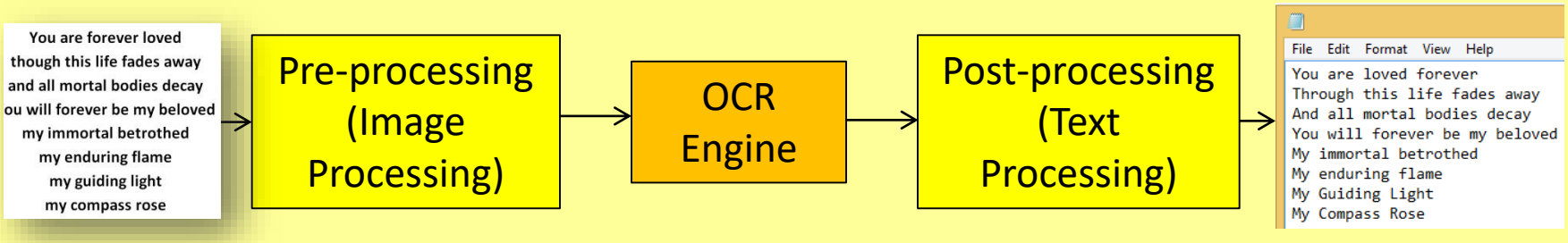
- Shahnawaz Yusufzai (120080112036)

OCR System: Process Diagram



OCR-PIA: Objective

Modern-day applications integrate diverse functionality and package them in a standalone Android (*.apk*) file. One such application is an Optical Character Recognition (OCR) module, which interprets text from an input image, and displays it in raw text format. The nature of android makes it difficult for non-Java programmers to work with existing *apks*. The work to be carried out will thus involve programming an OCR system in a scripting language (such as *Python*), and implementing it on an Android base. Native functionality will be added as supported by the *Kivy framework*, which enables building standalone *apks* using Python scripts.

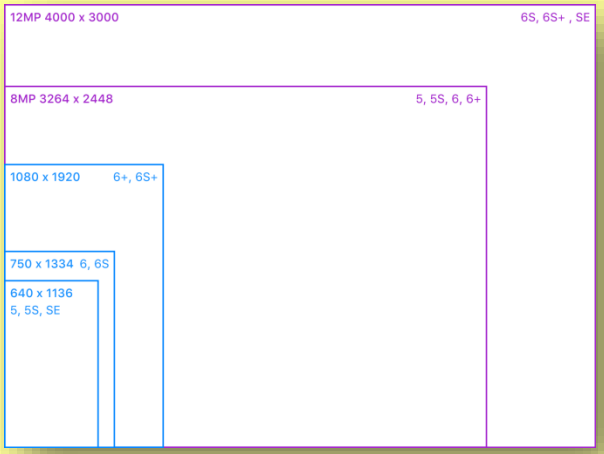
Steps Associated with Pre-Processing

Image processing

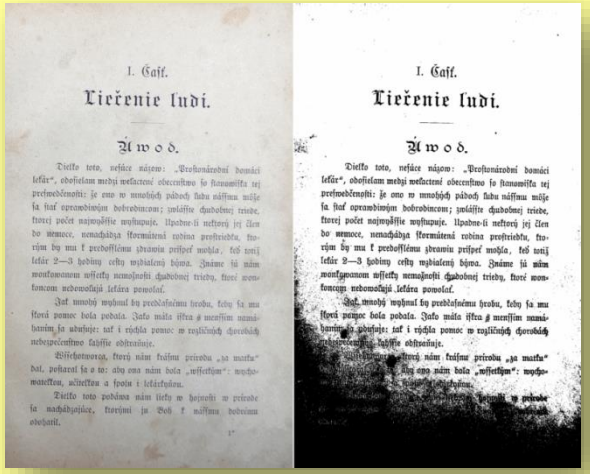
- Rescaling
- Binarisation (Thresholding)
- Rotation (De-Skewing)
- Border Removal
- Noise Removal

Page Segmentation

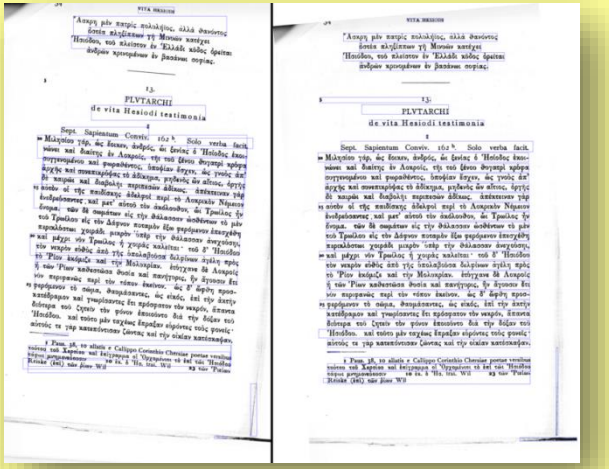
Dictionaries, Word lists & Patterns



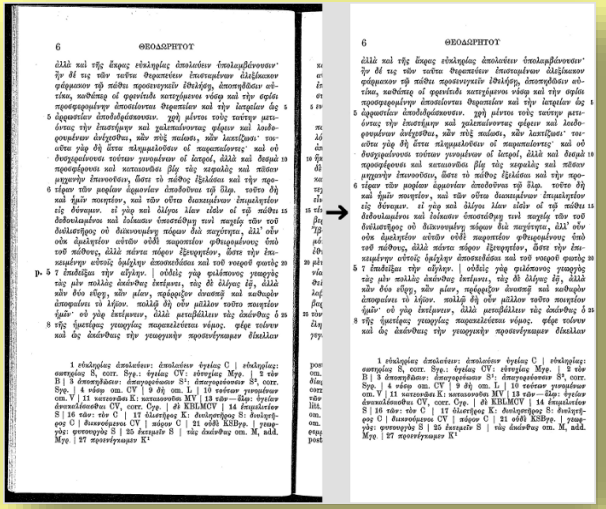
Rescaling



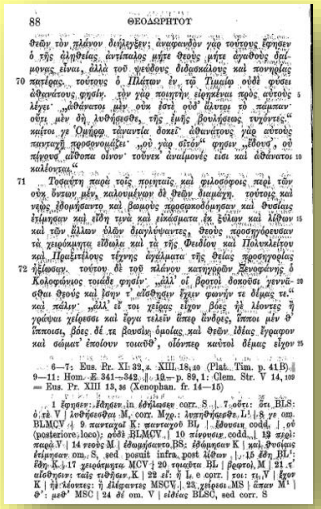
Binarisation



Rotation



Border Removal



Noise Removal

OCR: Problem Identification

Generic OCR Engines assumed the image to be scanned (by a ***flatbed scanner***). So, the work was focused on developing robust ***OCR Engines***.

Today, most images are captured using ***smartphones***. Implementing an OCR system for such images needs us to reconsider the defects generated in the process. So, the focus should be on effective ***Pre-Processing*** of images, while making use of existing OCR techniques.

We must also note that OCR Systems are prone to make mistakes, and generate text that might not make much sense. So, additional ***Post-Processing*** of text will improve efficiency of the process.

Pre-Processing

Post-Processing

File Edit Format View Help

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and a11 morta1 bodies decay
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  my enduring f1ame
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  my compas$ r0se
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File Edit Format View Help

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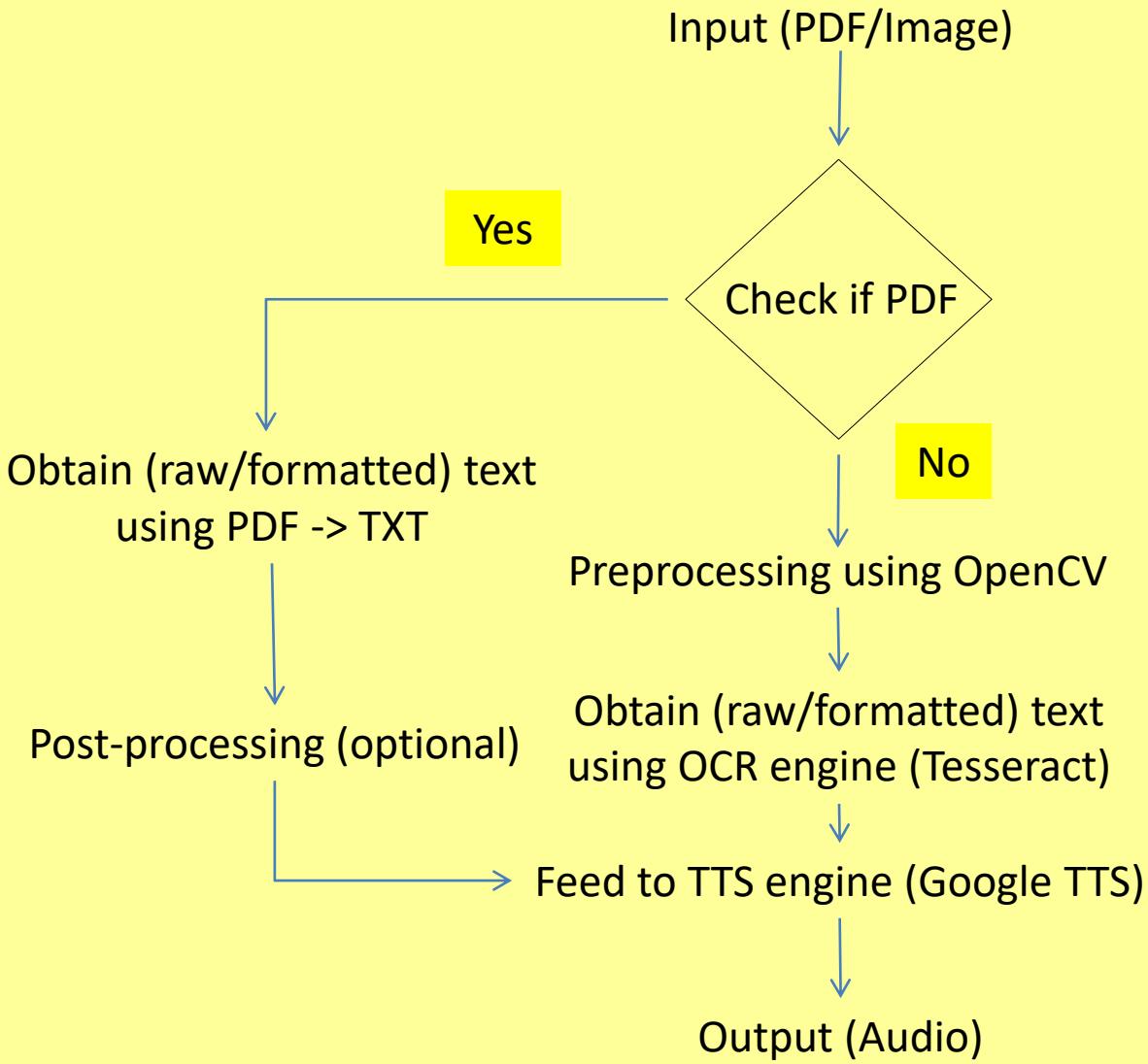
You are loved forever
Through this life fades away
And all mortal bodies decay
You will forever be my beloved
My immortal betrothed
My enduring flame
My Guiding Light
My Compass Rose
```

OCR-PIA: Flowchart

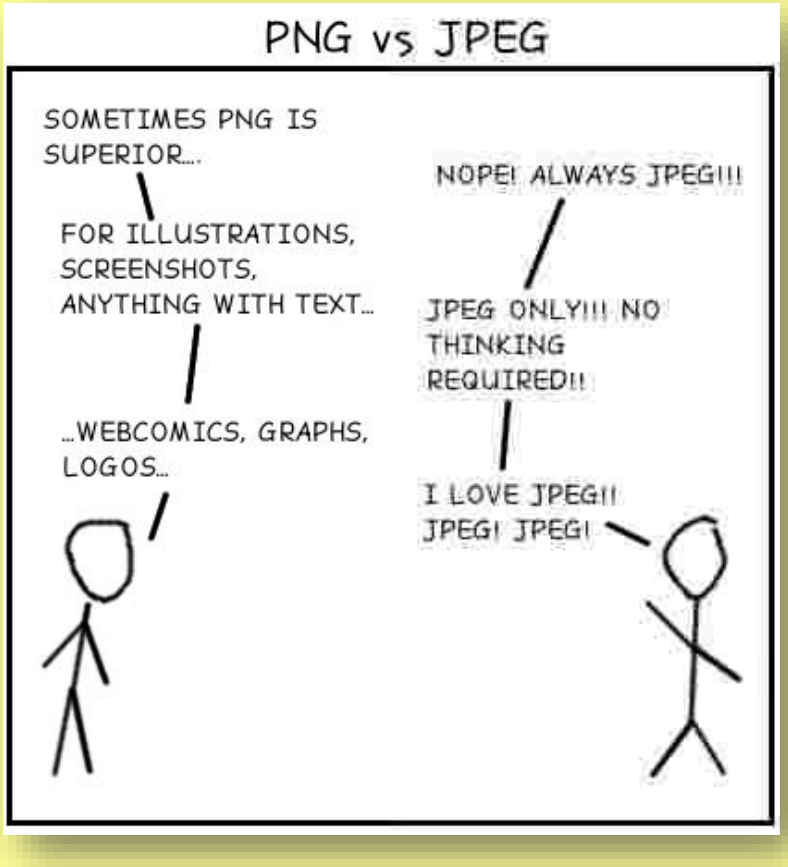


To JPEG or PNG, that is the question

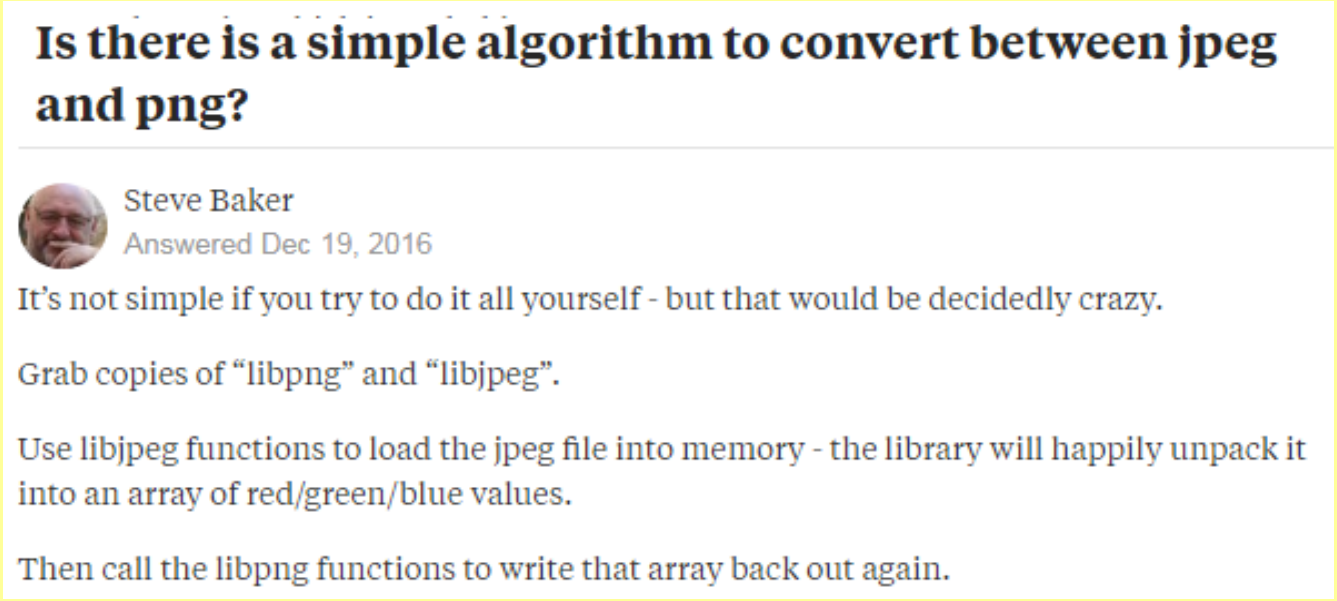
- JPEG uses lossy compression,PNG uses lossless compression.

WHAT DOES THIS MEAN?

- JPEG was designed for compressing full-colour/grayscale images of natural, real world scenes. It works well on photographs or naturalistic artwork, but not so good with lettering, cartoons, or line-drawings.
- Since human eyes perceive small colour-changes less accurately than small brightness-changes, JPEGs are great for us to look at. Plus, it saves space!
- But for OCR, we need high resolution image to start with, since we will lose pixels when processing it.
- PNG, which was meant for the Web, is better than GIF, and less complex than TIFF.
- But most smartphones save camera-generated images as JPEGs.



JPEG to PNG?



Is there is a simple algorithm to convert between jpeg and png?

Steve Baker
Answered Dec 19, 2016

It's not simple if you try to do it all yourself - but that would be decidedly crazy.

Grab copies of "libpng" and "libjpeg".

Use libjpeg functions to load the jpeg file into memory - the library will happily unpack it into an array of red/green/blue values.

Then call the libpng functions to write that array back out again.

- But since JPEG uses lossy compression, and PNG uses lossless, it's necessary to know what goes on in the conversion process.
- WHY? Just to be sure that we're actually benefitting from the conversion process, and not wasting any useful pixel-data.

Some Results

Technology has entangled our lives in wires

Have you ever thrown away a dead gadget, say an old tablet or an external hard drive, but kept its cables and charger? You are not alone.

"Just look in any household junk drawer and you'll find cords that have come and gone: relics of the camcorder era, laptops and digital cameras past, and outdated phone dongles," says an article in *The Verge*.

We can't bring ourselves to part with them because we are not sure we would not need them again. Phones have become efficient and their batteries larger, yet leaving home without a charger makes us anxious.

"A battery, no matter how sophisticated, is fleeting. When we have our cords with us, we are in constant pursuit of power, even when we are fully charged, as a form of security. We often discover our misfortune — the loss of power — when it's too late. The opposite of being fully charged is dead."

Will our lives ever be wire-free again? Maybe not. Apple introduced wireless earphones last year, and now Dell has a wireless charging laptop, but electric cars and their chargers are only beginning to arrive.

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For more: The Verge

ed a generation

20% gallantry medals to cops for J&K service

The Centre, in appreciation of forces engaged in sustained counter-terror operations in J&K, on Monday honoured two CRPF commandants with Kirti Chakra for acts of bravery in J&K and conferred 40 of the 190 police gallantry medals awarded this Independence Day on J&K police and CRPF/BSF personnel deployed in the Valley. At the same time, 52 personnel of Andhra police, including Grey Hound commandos, were honoured with police gallantry medals for killing a record 24 Maoists in a single operation in October 2016. P8

I-Day: Bareilly madrassas get govt 'warning'

Bareilly/Pilibhit: The administration will "take legal action" against madrassas that don't organise singing of national anthem and record proceedings on Independence Day, Bareilly divisional commissioner P V Jagmohan said.

"We are Indians first and our religion, caste or creed is secondary... educational institutes are considered public places. We will enforce government order in madrassas and if there is blatant violation, we will take legal action," Jagmohan said. He added action would be taken only after going through "evidence of violation". P8

20% gallantry medals to cops

We performed binarisation using ***Global-Thresholding*** methods in ***OpenCV***. But the time for conversion using ***Tesseract-OCR*** was found to be non-trivial. The results for ***Adaptive-Thresholding*** methods didn't yield any significant improvement. However, ***Otsu's Algorithm*** did provide quicker outputs in certain cases.

Original Image

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BINARY_INV

TRUNC

TOZERO

TOZERO_INV

Original Image

BINARY

BINARY_INV

TRUNC

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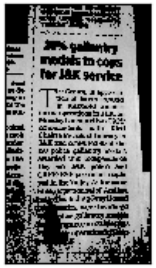

TOZERO_INV

Original Image

BINARY

BINARY_INV

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Original Image

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THRESH_TRUNC_1

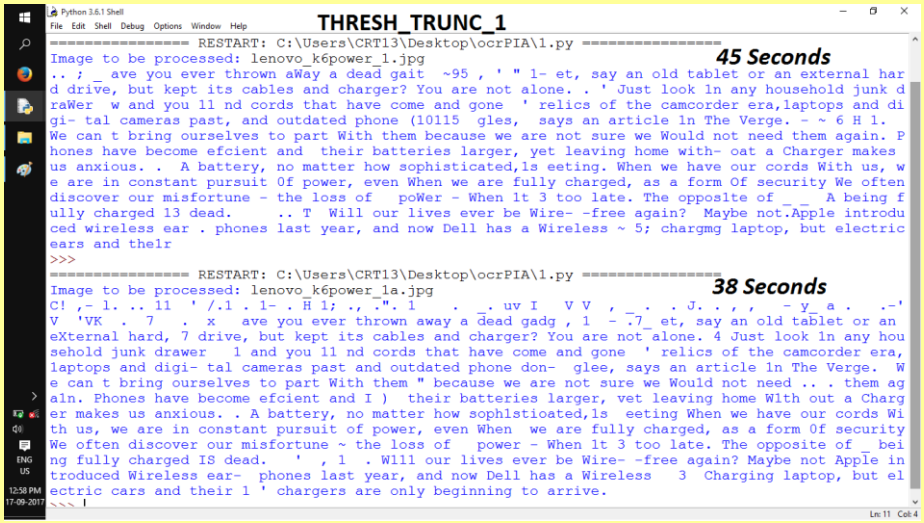

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Image to be processed: lenovo_k6power_1.jpg
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We often discover our misfortune ~ the loss of   power - When 1t 3 too late. The opposite of _ bei
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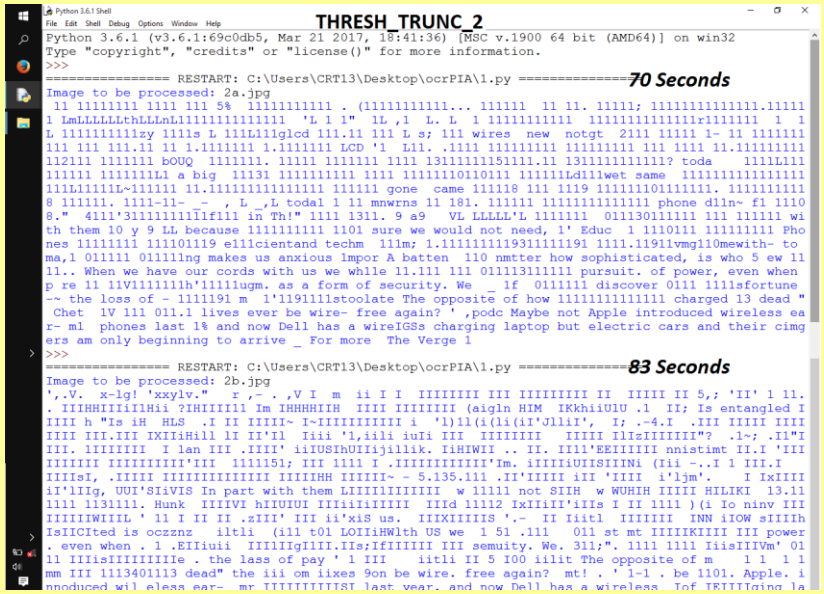
45 Seconds

38 Seconds

THRESH_TRUNC_2



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Python 3.6.1 (v3.6.1:69c0db5, Mar 21 2017, 18:41:36) [MSC v.1900 64 bit (AMD64)] on win32
Type "copyright", "credits" or "license()" for more information.
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========== RESTART: C:\Users\CRT13\Desktop\ocrPIA\1.py ==========
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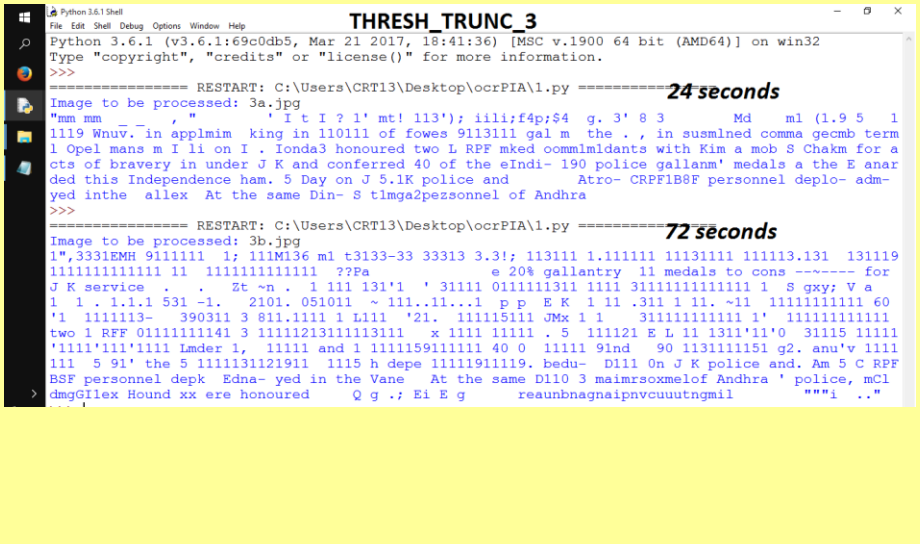

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Python 3.6.1 (v3.6.1:69c0db5, Mar 21 2017, 18:41:36) [MSC v.1900 64 bit (AMD64)] on win32
Type "copyright", "credits" or "license()" for more information.
>>>
========== RESTART: C:\Users\CRT13\Desktop\ocrPIA\1.py ==========
Image to be processed: 3a.jpg
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Image to be processed: 3b.jpg
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72 seconds

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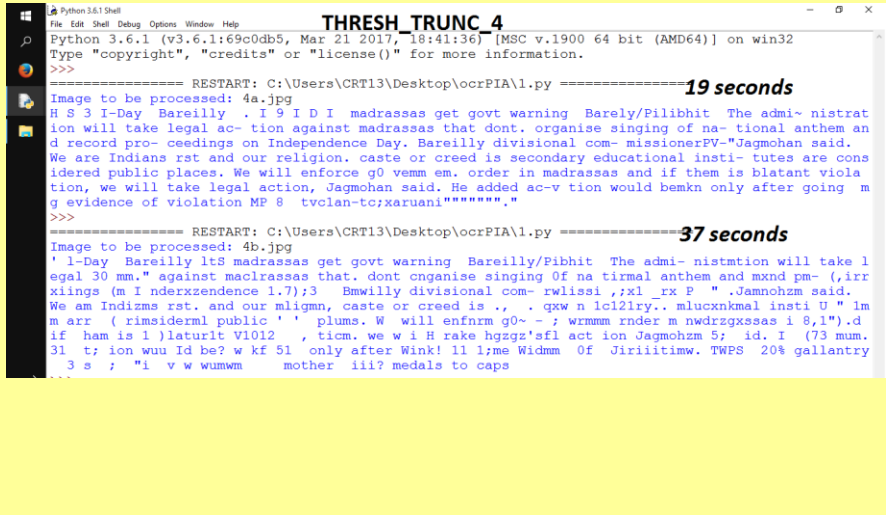

```
Python 3.6.1 (v3.6.1:69c0db5, Mar 21 2017, 18:41:36) [MSC v.1900 64 bit (AMD64)] on win32
Type "copyright", "credits" or "license()" for more information.
>>>
========== RESTART: C:\Users\CRT13\Desktop\ocrPIA\1.py ==========
Image to be processed: 4a.jpg
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ion will take legal ac- tion against madrassas that dont. organise singing of na- tional anthem an
d record pro- ceedings on Independence Day. Bareilly divisional com- missionerPV-"Jagmohan said.
We are Indians rst and our religion. caste or creed is secondary educational insti- tutes are cons
idered public places. We will enforce g0 vemm em. order in madrassas and if them is blatant viola
tion, we will take legal action, Jagmohan said. He added ac-v tion would bemkn only after going  m
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========== RESTART: C:\Users\CRT13\Desktop\ocrPIA\1.py ==========
Image to be processed: 4b.jpg
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19 seconds

37 seconds

Bibliography

Patents:
[1] US6577762B1, Background Surface thresholding
[2] US7400768B1, *Enhanced optical recognition of digitized images through selective bit-insertion.*
[3] US9298980B1, *Image preprocessing for character recognition.*
[4] US20120063690A1, *Object-Based Optical Character Recognition Pre-Processing Algorithm.*
[5] US7106905B2, *Systems and methods for processing text-based electronic documents.*
[6] US20130329023A1, *Text recognition driven functionality.*

Literature:
[7] Eugene Borovikov, A survey of modern optical character recognition techniques
[8] M Seeger, C Dance, Binarising camera images for OCR (ICDAR 2001, Proceedings of the 6th International Conference on Document Analysis and Recognition)
[9] Ranjith Unnikrishnan, Ray Smith, *Combined Script and Page Orientation Estimation using the Tesseract OCR engine* (ICDAR '07 Proceedings of the Ninth International Conference on Document Analysis and Recognition)
[10] Ray Smith, *An Overview of the Tesseract OCR Engine* (MOCR '09 Proceedings of the International Workshop on Multilingual OCR)
[11] Ray Smith, Daria Antoniva, Dar-Shyang Lee, *Adapting the Tesseract Open Source OCR Engine for Multilingual OCR* (MOCR '09 Proceedings of the International Workshop on Multilingual OCR)
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