My Handwriting Generator

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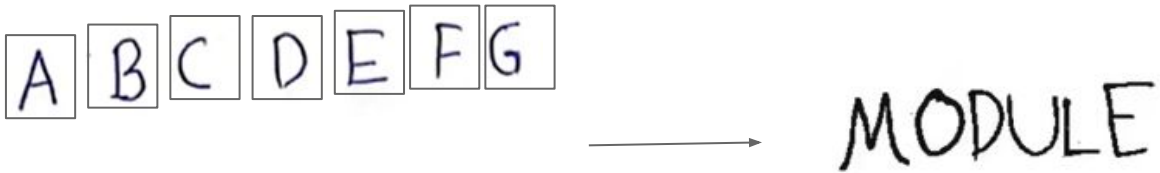
Motivation

There are occasions in life where we need to handwrite something, which for example could be a heartfelt letter, but typing is obviously more convenient and effortless. In order to reach both goals, we design a tool to convert any text to the handwritten version using our own pieces of handwriting.

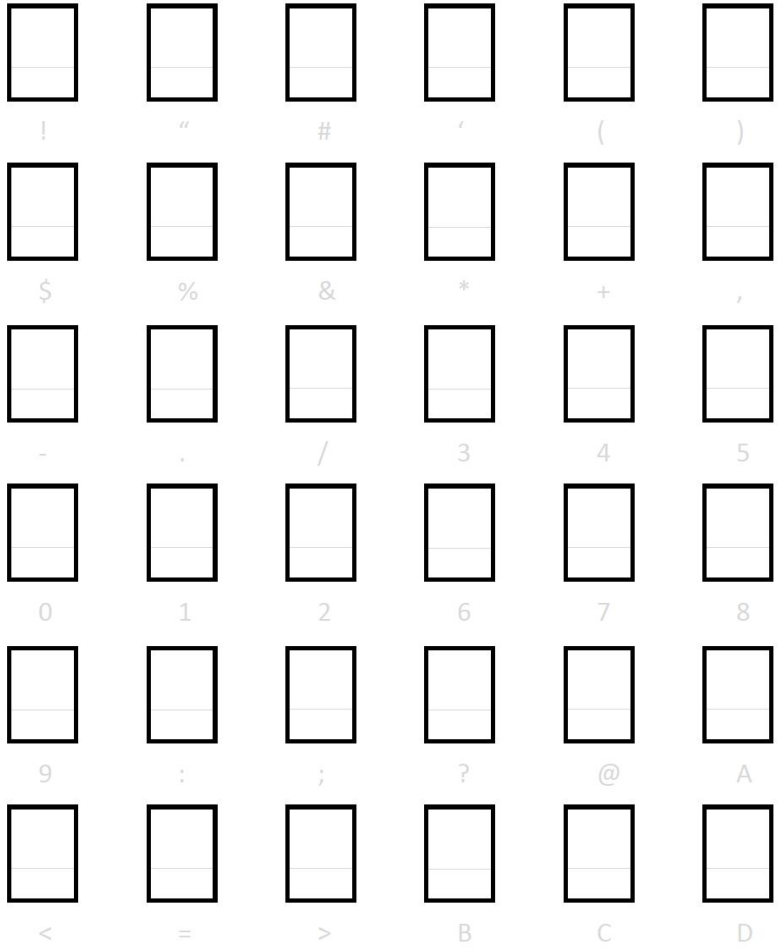
Problem definition

Given a set of images (white background) containing handwritten characters written in blocks and an English text file, we want to generate the handwritten version of the text file.

ex.



Form



Algorithm - Pre-process (1/3)

- Threshold by intensity
- Extract frames
  - Find contour
- Closing operation
  - Bigger kernel
- Opening operation
  - Smaller kernel

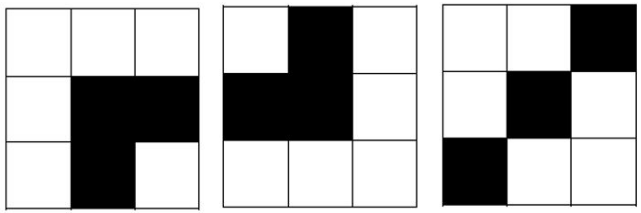
without closing operation

with closing operation

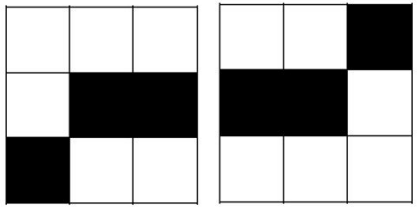
Algorithm - Pre-process (2/3)

- Bounding box
  - Image-oriented bounding box and compute bottom line
- Thinning
- Compute orientation

ex 45°



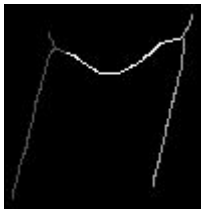
22.5°



Algorithm - Pre-process (3/3)

- Divide
  - Divide pixels in thinning image into different parts by their orientations
- Classify the pixels in frame




Algorithm - Transform and Combine

- Perform random transformation on each parts
  - Backward transformation
  - Rotation: -10° ~ 10°
  - Scaling: 0.9 ~ 1.1
- Combine parts into a character
  - Connect cut points in each parts after transformation by shifting
- Closing operation

original parts

transformed parts

original

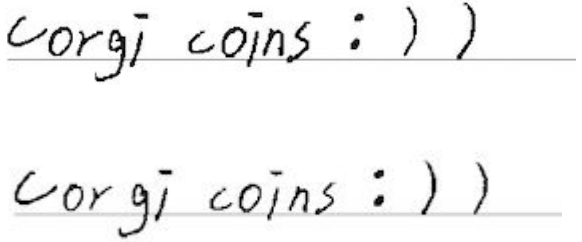
transformed and combined

closing operation

scaled

Algorithm - Generate

- For each character in input:
  - Transform and combine parts
  - Compute orientation
  - Scale the character to desired font size
  - Combine and align the transformed character with previous ones
  - Kerning
- Parameters
  - Word/line/letter-spacing
  - Font size and color
  - Ruled paper



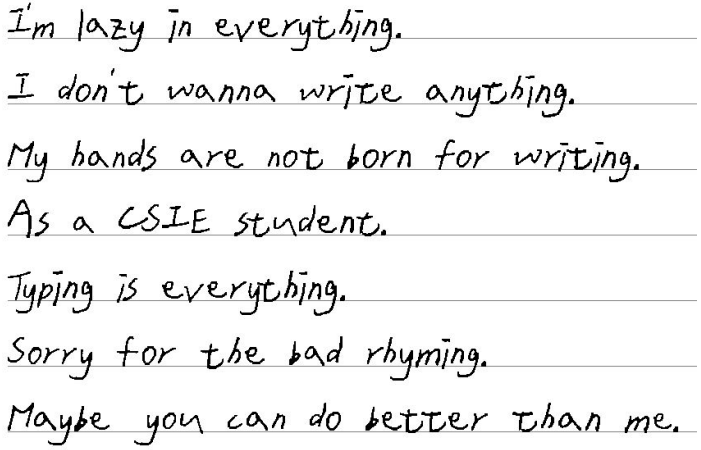
Experimental results

- Same characters are similar but slightly different

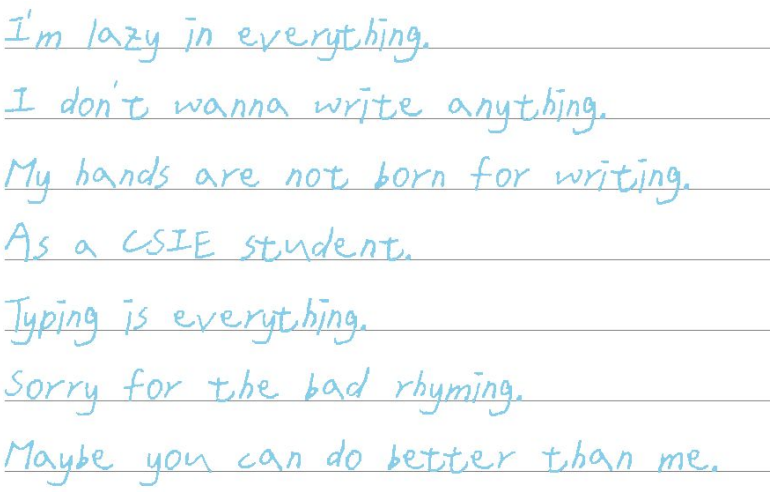
basic

I'm lazy in everything.
I don't wanna write anything.
My hands are not born for writing.
As a CSIE student.
Typing is everything.
Sorry for the bad rhyming.
Maybe you can do better than me.

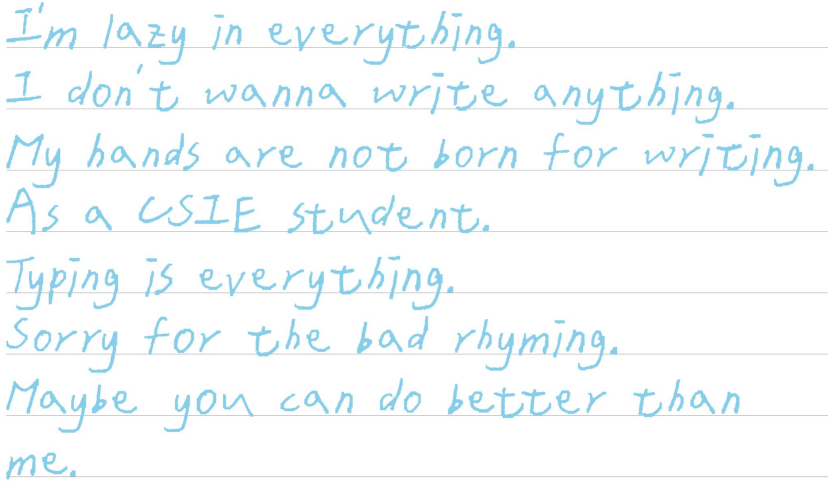
ruled paper



different color

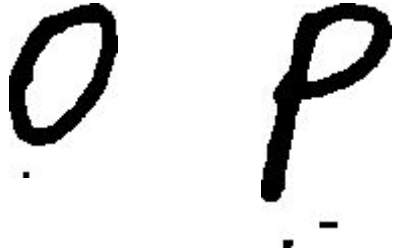


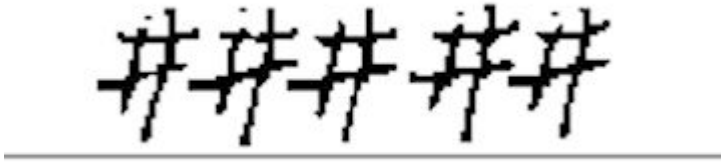
font size, line/word/letter-spacing

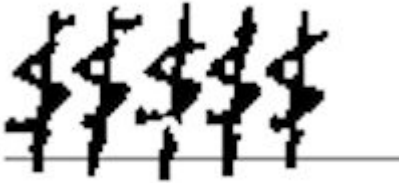


Unresolved issues

- Extract frame
  - Noise
  - High quality input required
- Divide parts
- Combine parts
- Combine character
- Binary image







Reference

Saurabh Daware - I made a Text-to-handwriting tool to write my college assignments for me

https://github.com/saurabhdaware/text-to-handwriting

Digital Image Processing: PIKS Inside, Third Edition. William K. Pratt Copyright © 2001 John Wiley & Sons, Inc.

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