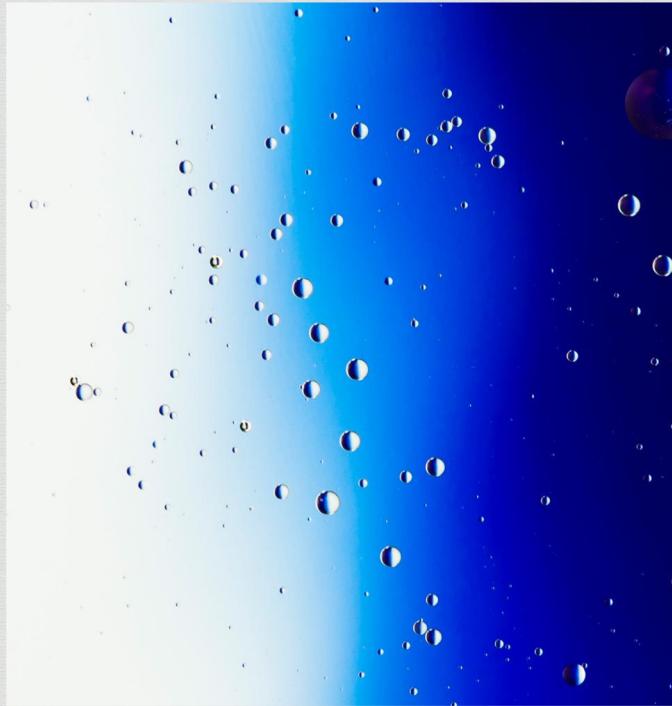
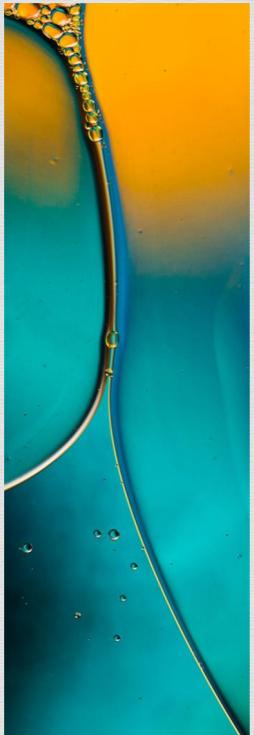



LETTER RECOGNITION WITH CNNs

MRITYUNJAY MISHRA, MIHIR SUVARNA, DANIEL SIALM





AGENDA

1

MOTIVATION

INTRO TO RESEARCH TOPIC AND
LETTER RECOGNITION

2

METHODS

DATA COLLECTION, PREPROCESSING,
BUILDING THE NETWORK

3

EXPERIMENTS AND RESULTS

COMPUTATIONAL EXPERIMENTS AND
RESULTS

4

CONCLUSIONS

WRAP-UP, QUESTIONS



1

MOTIVATION

BACKGROUND



OCR

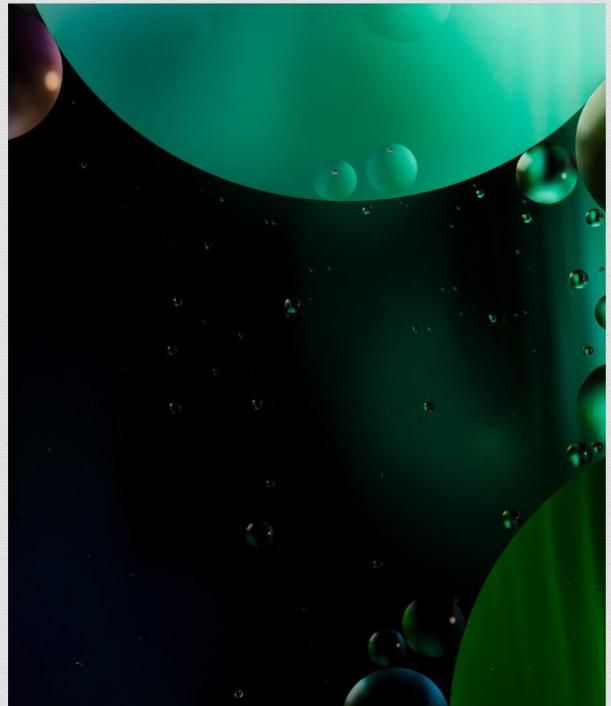
MOTIVE

- Text recognition is growing in importance.
- Robust letter recognition model.
- Domains: postal, health, robots, iOS apps, etc.

**Letter recognition is a
subtask of text
recognition with wide
applications.**

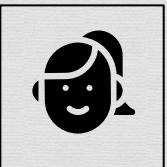
2

METHODS



METHODS

COLLECTION



- 23 STUDENTS FROM UT
- EACH STUDENT WROTE ALPHABET 10 TIMES



PRE-PROCESSING

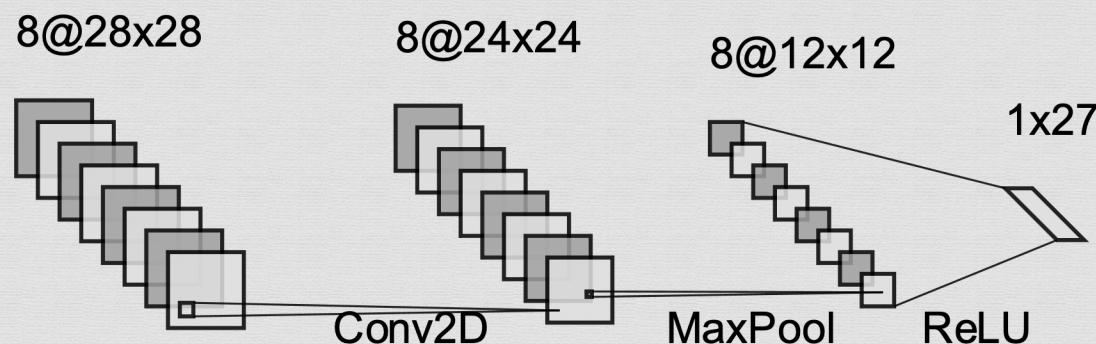
NECESSARY FOR BETTER FEATURES.

- DONE WITH **CALLIGRAPHR**
 - NORMALIZATION
 - REGULARIZATION
 - IMAGE RECTIFICATION



METHODS

BUILDING THE CNN



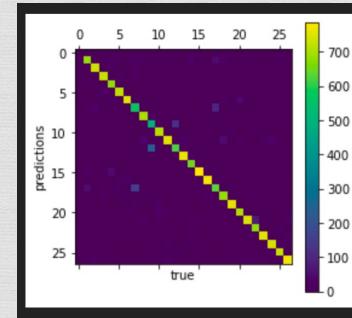
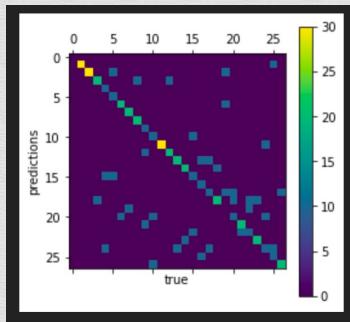


3 EXPERIMENTS AND RESULTS

PRELIMINARY RESULTS

53.85%

WITH ORIGINAL DATASET, AT 6K+ UNIQUE POINTS

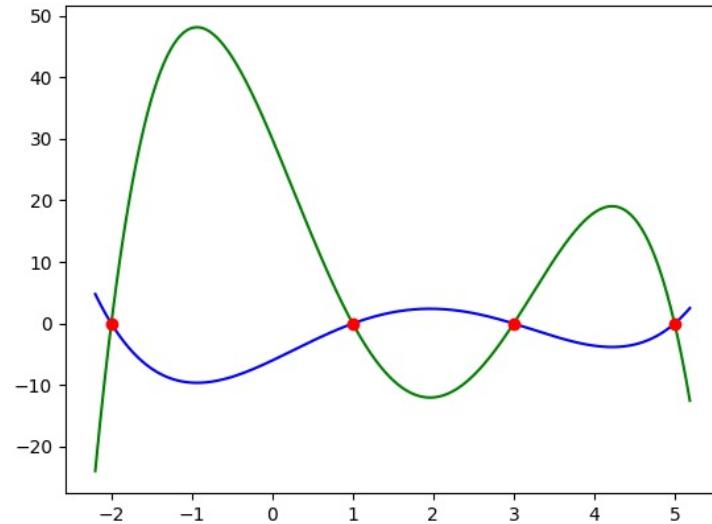


84.69%

AUGMENTED WITH EMNIST, NOW AT 30K+ DATA POINTS
(IMPROVED IN ACCURACY BY 57.2%)

1st COMPUTATIONAL EXPERIMENT: REGULARIZATION

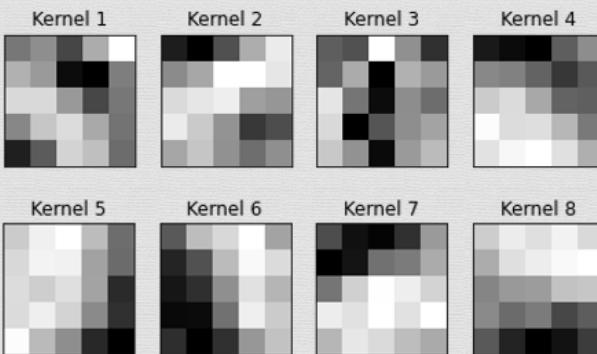
- Data augmentation: 84.81%
- Dropout: 82.84%
- Average Pooling: 83.61%
- Early Stopping: 84.92%



2nd COMPUTATIONAL EXPERIMENT: ARCHITECTURE

DOUBLE CONVOLUTIONAL LAYER

LEARNED KERNELS WITH A SINGLE
CONV LAYER



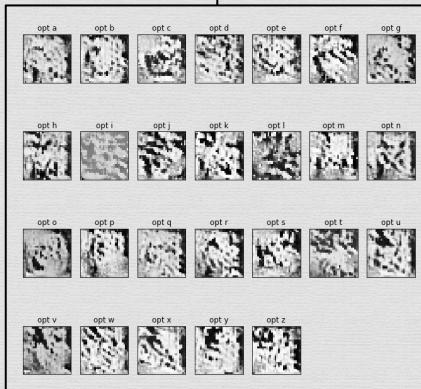
LEARNED KERNELS FOR 2nd
CONV LAYER



BIGGER KERNEL SIZES

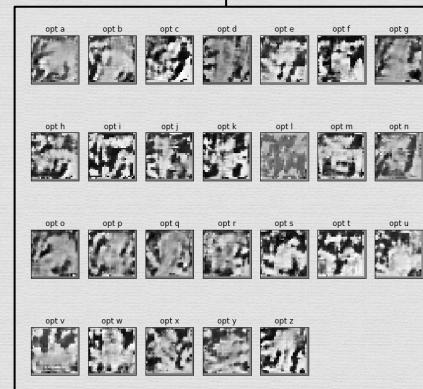
5x5

84.69%



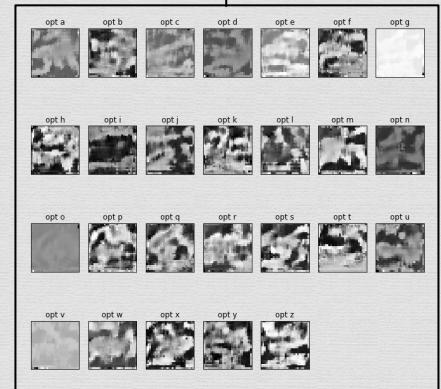
8x8

85.58%



11x11

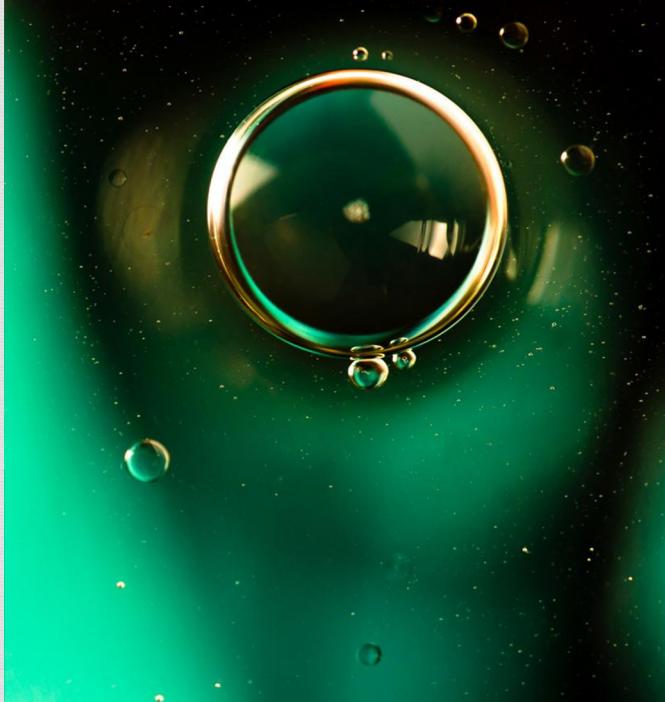
85.53%



FUTURE WORKS

- DIFFERENT ANGLES
- DIFFERENT INTENSITIES
- ADDING NOISE





THANK YOU!
