The Tableizer™

Rafael Ramos, Yashas Roy,
Anny Truong, Devin Wieker

Problem

While collecting data for a scientific experiment, students are often writing down numerical data and then inputting them into Excel by manually typing the numbers into each cell which could potentially take ***hours*** or ***days***!!!

Solution

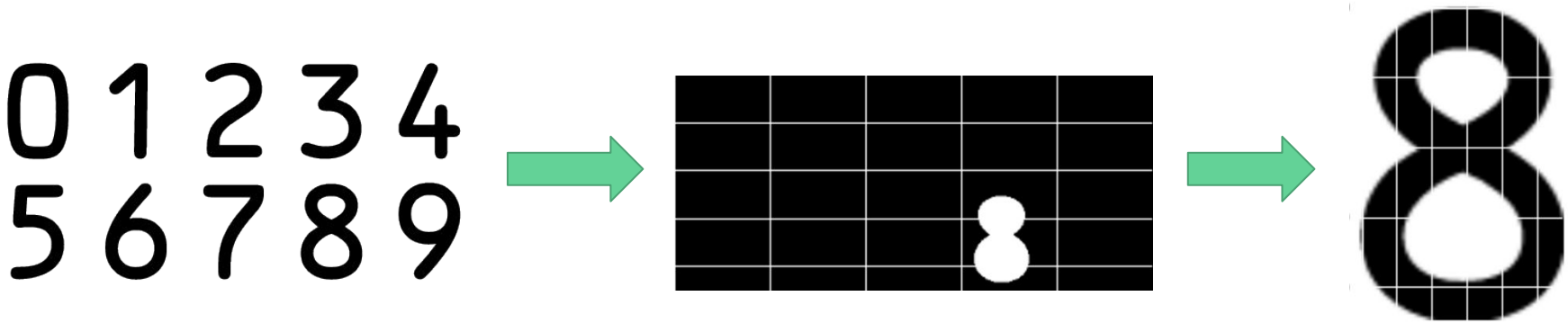
The Tableizer™

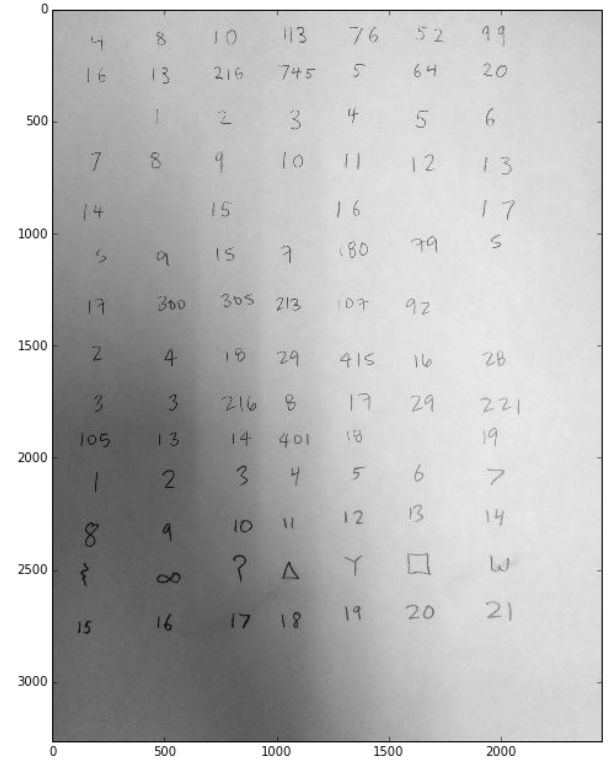
With the Tableizer App, students can take a picture of their handwritten data and the app will automatically convert them into digital tables for easy computing.

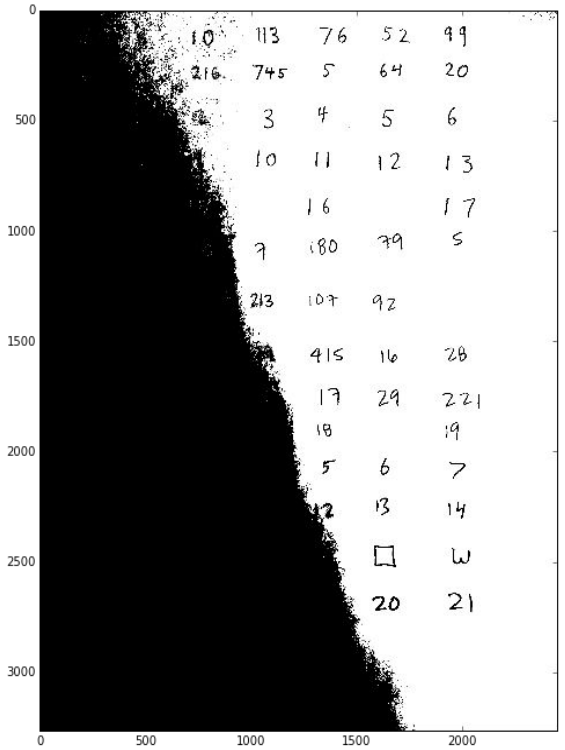
Digit Classification Training Data

- The MNIST Database of Handwritten Digits
  - 60,000 training instances
  - 10,000 testing instances
- Semeion Handwritten Digit Data Set
  - 1,593 original instances
  - Created 9,558 additional instances by manipulating the original instances

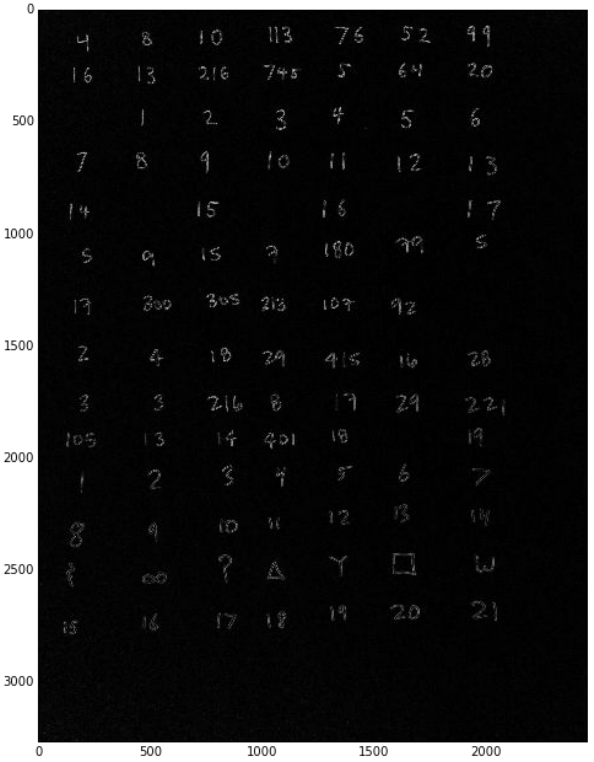
Segmentation





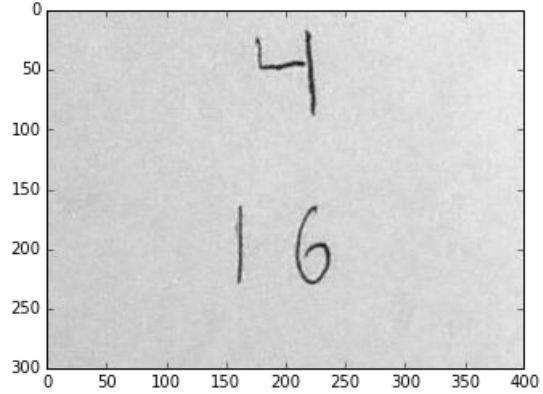


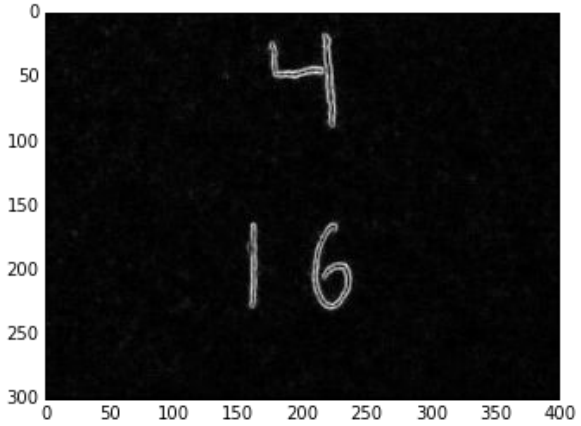
Global Threshold

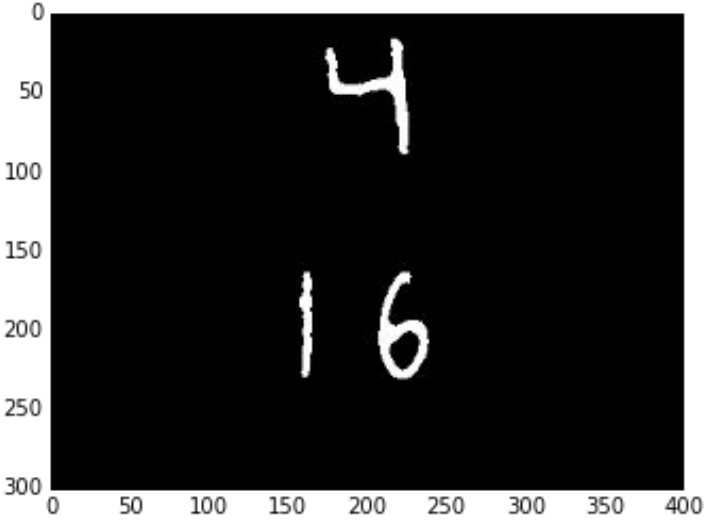


Gradient

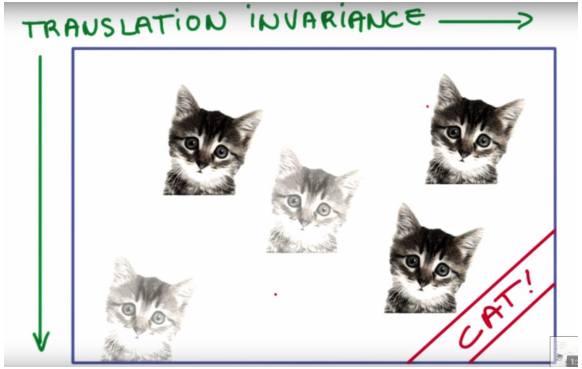
Segmentation

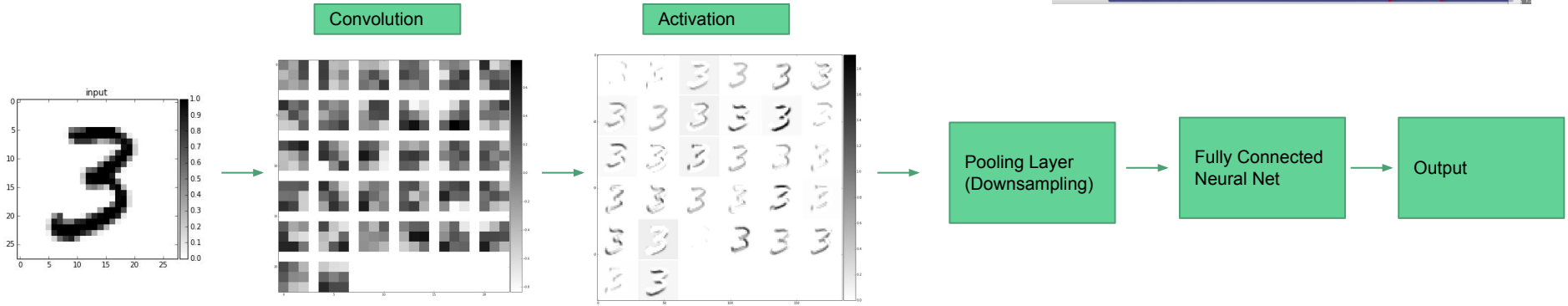




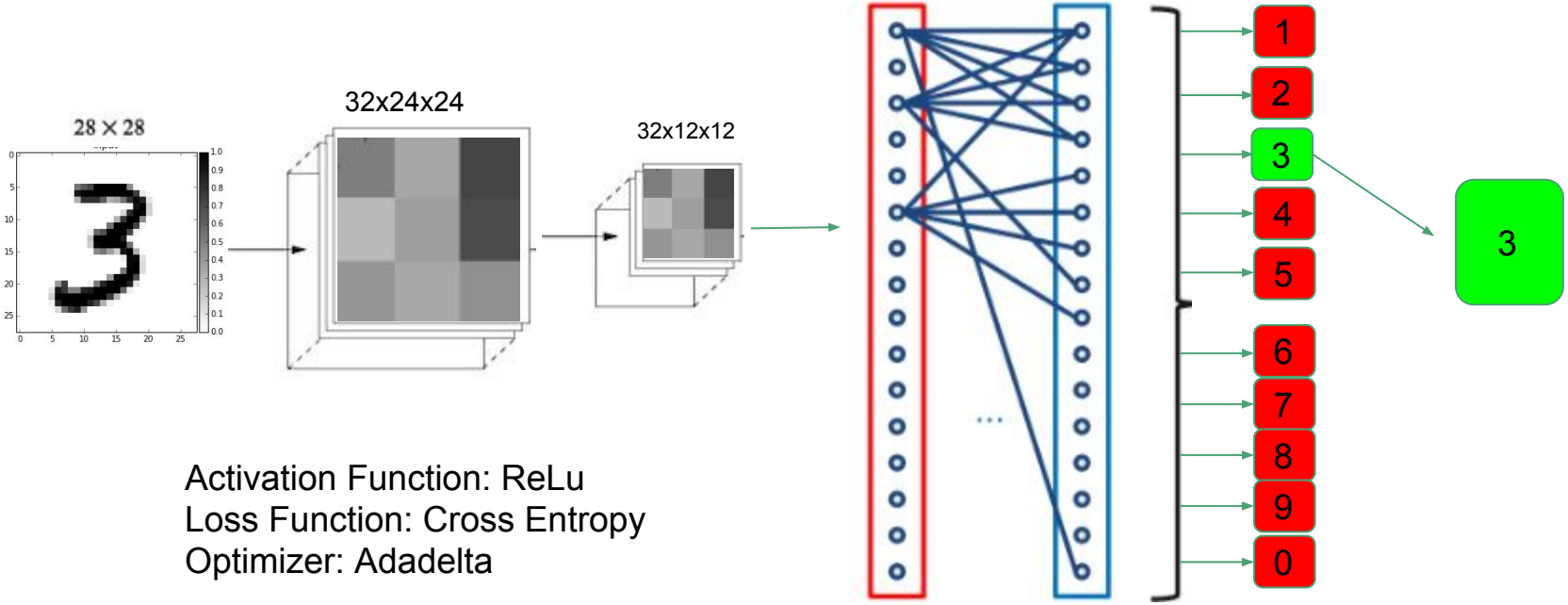


Convolutional Neural Network





ConvNet Architecture: Built with Keras



Activation Function: ReLu
Loss Function: Cross Entropy
Optimizer: Adadelta

Tableization

- Identify cells (single vs multi digit numbers)
- Classifying cells into rows and columns
- Initialize numpy matrix
- Fill matrix with image labels
- Convert into pandas dataframe

```
tableizer(segmentation_results)
```

Hold onto your seats, it’s time for a

LIVE DEMO!!

Other Applications

- Accounting and budgeting
- Homework checking for tutors on Chegg
  - If Chegg is reading this, we’re available for hire
- Collecting phone number from sign-in sheets at events
  - Or from that cute girl at the bar ;)

Further Development

- Currently works better with one size of digits
  - Increase training set
- Improve segmentation method
- Reading other characters:
  - Decimals and negatives
  - Handwritten letters
  - Subscripts
  - Mathematical symbols

Appendix: Neural Network

Report:

	precision	recall	f1-score	support
0	0.98	0.99	0.99	980
1	0.99	0.99	0.99	1135
2	0.98	0.97	0.97	1032
3	0.98	0.98	0.98	1010
4	0.97	0.99	0.98	982
5	0.99	0.98	0.98	892
6	0.98	0.98	0.98	958
7	0.98	0.97	0.98	1028
8	0.97	0.98	0.98	974
9	0.98	0.96	0.97	1009
avg / total	0.98	0.98	0.98	10000