Math Reading Made Easy

Anthony Palumbo - Principal Data Scientist

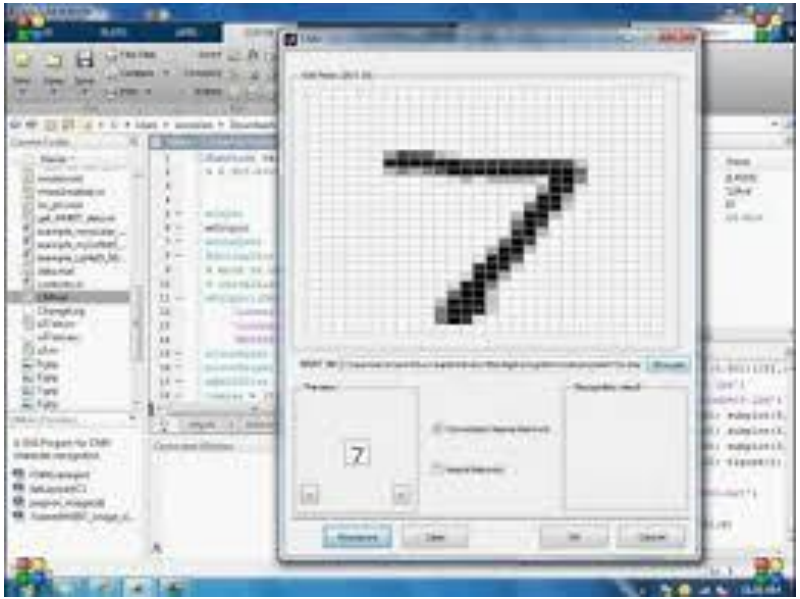
Situation

-People like to look at typed work for math

-Hand-written math is hard to read for students, teachers and parents

What is Number Recognition?

-Uses pixel brightness numbers to create a shape



Opportunity

-Other expensive readers

-Abbyy FineReader ≈ $130.00

-Nuance's OmniPage 18 ≈ $104.58

-Very expensive Touch screen computers

-averages ~$1,000

Request/Proposal

-App that takes pictures and transcribes the math

-Very easy to use

- Need signs

    -eg: +,-,=

App Features

-Can sense where numbers begin and end

    -pixel # above a low threshold

-Can detect amount of space between numbers

    -ie: 50 vs 5 0

- Has > 90% accuracy

    - 5 and 3 are the numbers that were confused most often

    -4 and 9 are close as well at 40

Planned Updates

- Better way to differentiate problem numbers

- Include more signs after initial launch

    -eg:,Σ, ρ

Questions?

Confusion Matrix

5 and 3 biggest problem

4 and 9 problem

Actual

Predicted

```
[780.,   0.,   5.,   2.,   0.,  15.,   7.,   3.,   3.,   1.]
[  0., 899.,   8.,   6.,   4.,   1.,   1.,   2.,   9.,   4.]
[  5.,   3., 731.,  20.,   8.,   6.,  17.,  16.,  13.,   6.]
[  4.,   4.,  21., 757.,   1.,  40.,   3.,   7.,  13.,  11.]
[  3.,   6.,   8.,   0., 777.,   0.,   6.,   1.,   9.,  34.]
[ 10.,   5.,   9.,  28.,  10., 672.,  17.,   3.,  18.,   7.]
[  6.,   3.,  12.,   1.,   9.,   9., 792.,   1.,   4.,   0.]
[  1.,   3.,  12.,   4.,   6.,   2.,   0., 800.,   3.,  48.]
[  4.,  11.,  15.,  13.,   7.,  30.,   3.,   5., 707.,   7.]
[  8.,   6.,   2.,  10.,  24.,   7.,   1.,  24.,  13., 728.]
```