Classification of Handwritten Numbers

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INTRODUCTION

ISSUE

Client known as FakeBank needs an initial method to recognize handwritten numbers for check deposits.

SOLUTION

Create a Convolutional Neural Network to recognize the digits and save the model for transfer learning.

GOAL

Create a method to recognize handwritten digits from 0-9 that can then be applied toward larger numbers later on.

METHODS

MNIST dataset that contains images of handwritten digits from 0-9 compiled from multiple sources

DATA USED

Data science Python libraries, neural network Python libraries

TOOLS USED

Logistic Regression for baseline

CNN

- Sequential configured with
- 2D Convolutional
- Dense

ResNet-50 (pre-trained CNN)

MODELS / NETS

DATASET INFO

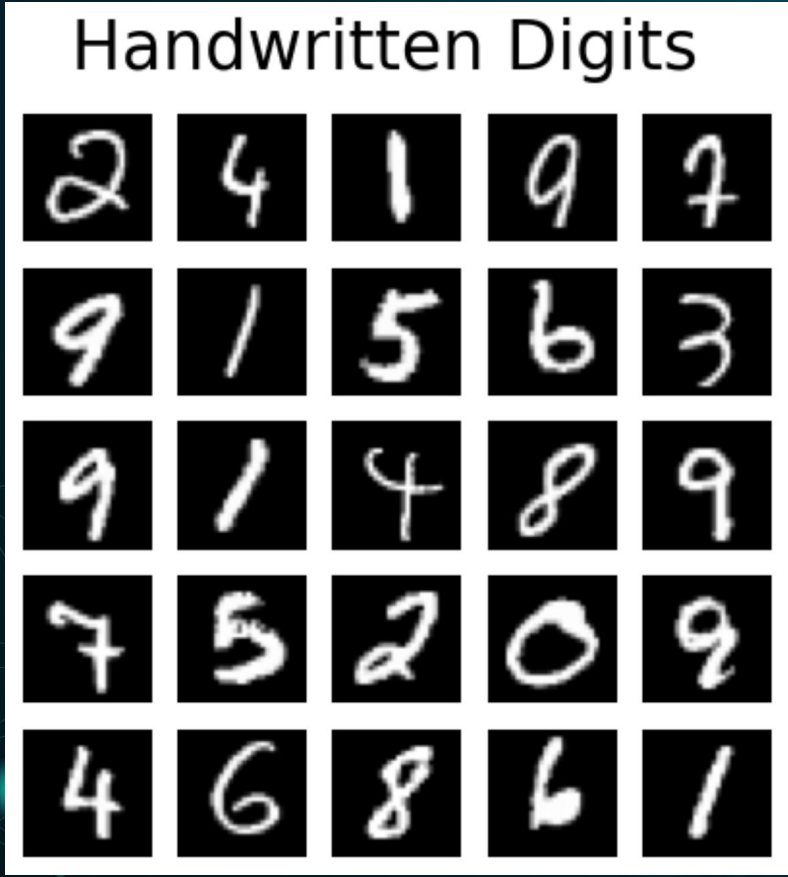
Number of digit images for training — **60,000**

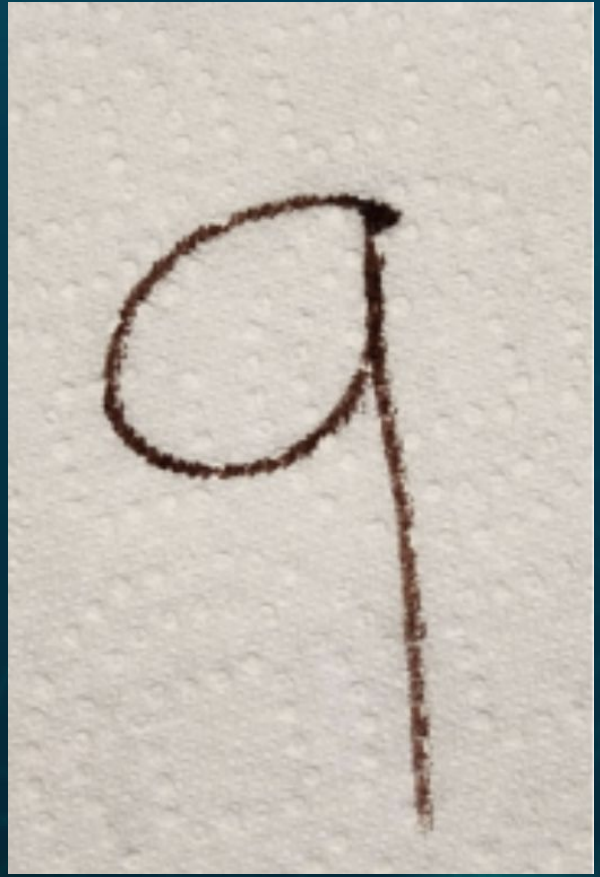
10,001 — Number of digit images for test

Pixels — **28x28**

206,922 — Trainable parameters

SAMPLE DATA





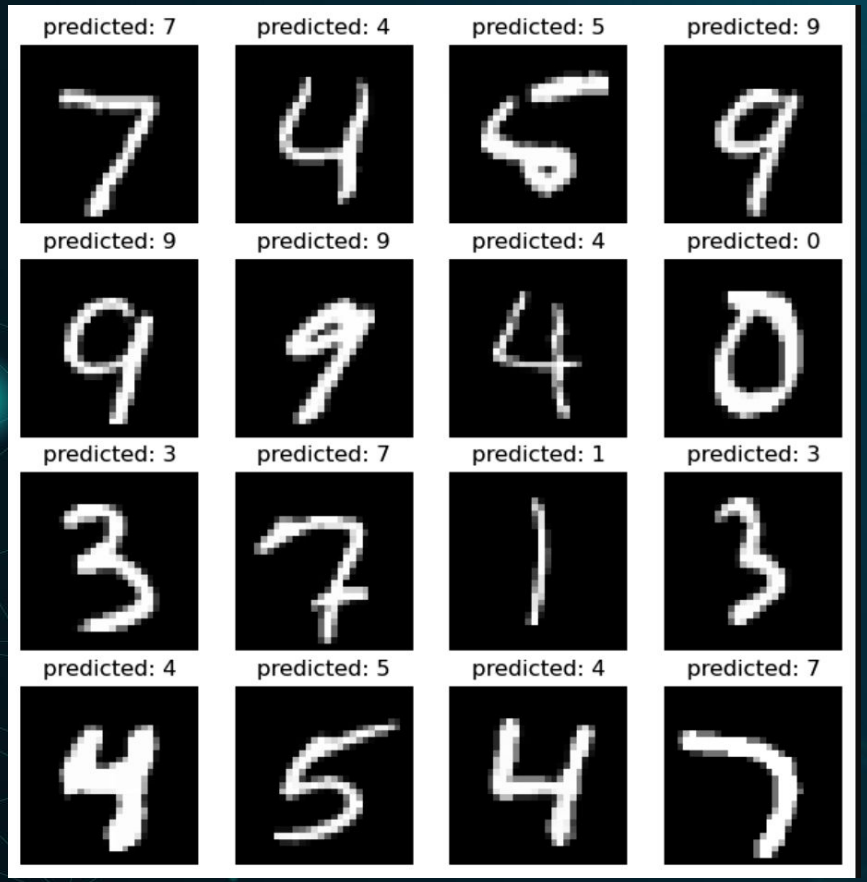
RESULTS

BASELINE ACCURACY SCORE: 0.897

CNN ACCURACY SCORE: 0.988

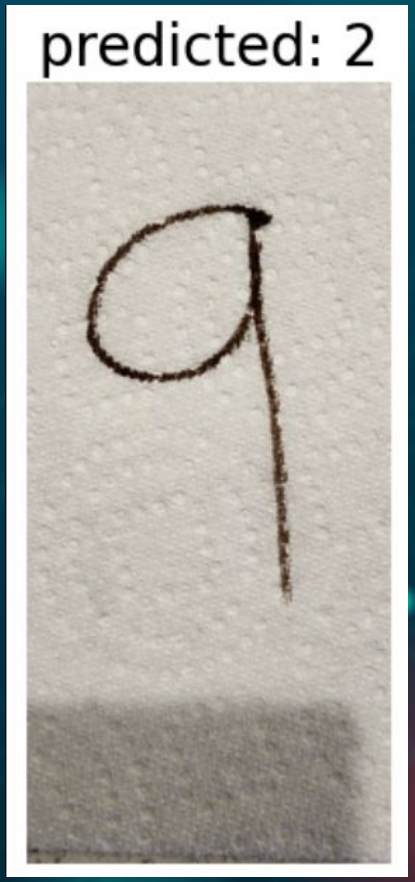
RESNET-50 CNN ACCURACY SCORE: 0.926

WHAT WENT RIGHT / WRONG

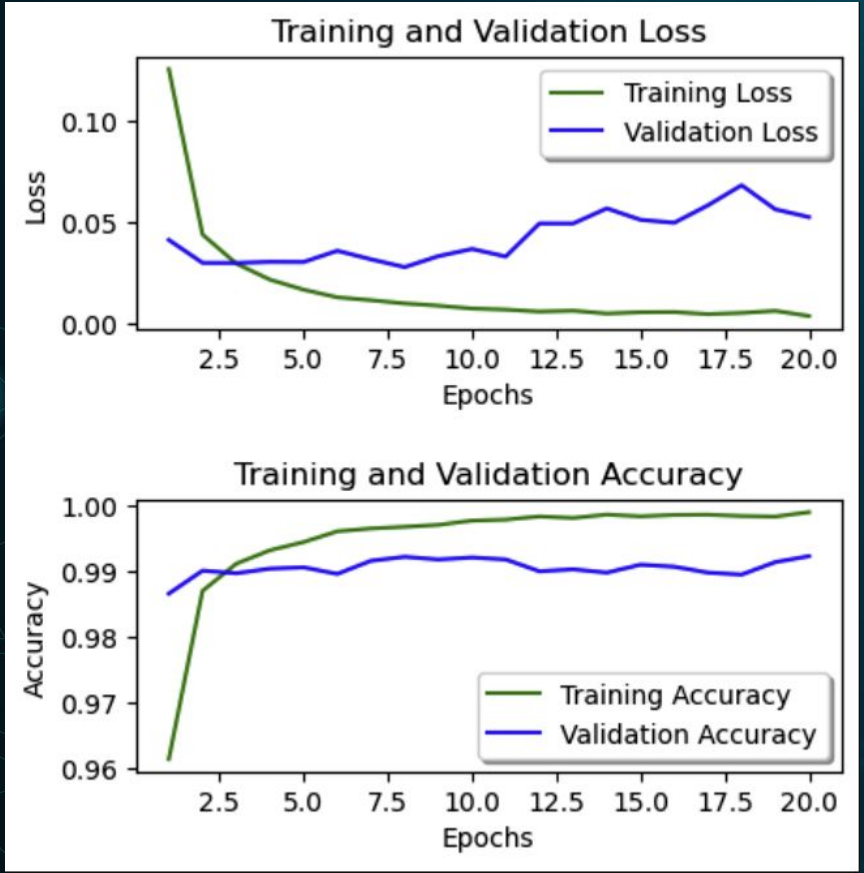


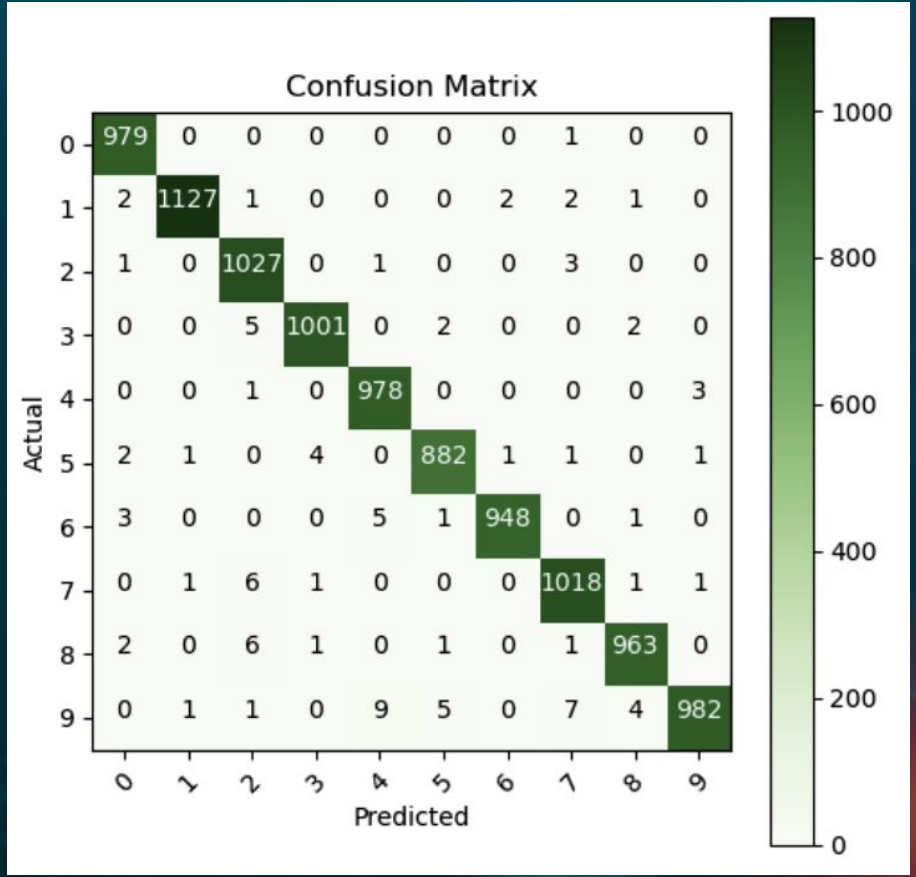
Handwritten digits from test set included in the MNIST dataset

Handwritten number written on paper towel



Loss and Accuracy / Confusion Matrix





CLIENT RECOMMENDATIONS

- FakeBank take CNN model trained with high accuracy
- Start gathering more data as to different backgrounds for better recognition of those such as the “number 9” example
- Integrate the CNN model and add to it from those new backgrounds
- Start combining numbers together and train model for recognizing large numbers

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THANKS!

Questions?

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