CLASSIFICATION AND DETECTION WITH CONVOLUTIONAL NEURAL NETWORKS

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CONVOLUTIONAL NEURAL NETWORK (CNN)

- VGG16
  - Pre-Trained on ImageNet data
  - Top 3 FCL removed and replaced with 3 FCL custom layers
  - 11 Classes with a softmax activation

PREDICTION FILTERING

- Digit threshold filtering

- Mean & Centroid distances
  - Mean filtering based on standard deviation from all the centroids
  - Average centroid distance for each detected digit filtering

- Non Maxima Suppression (results on next slide)
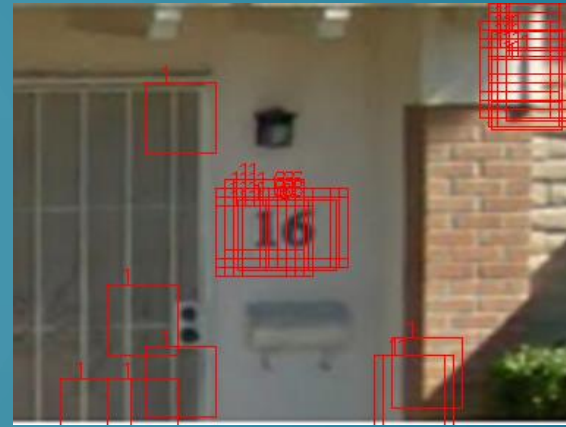
POSITIVE RESULTS

- Different fonts

- Scale invariance

- Orientation & Rotation

- Lighting (shadowing on bottom image)

EXAMPLE VIDEO

NEGATIVE RESULTS

- Text disrupted recognition

- Mean cluster filtering worked but removed the only positive result

- Didn't train on skewed digits

- Sliding window scaling was not robust enough

LESSONS LEARNED

- GPU vs CPU
  - 7s vs 50s per image
- Start simple
  - Work on less complicated images first
- Prototype quickly
  - Create smaller train/validation/test sets to iterate over more parameter/model combinations quickly