Traffic Sign Detection

1 OVERVIEW

Dataset / problem

Having a set of images of roads taken from cars, we now need to build a network able to identify the location and dimensions of traffic signs located in those pictures and classify them.

2 CLASSIFICATION PIPELINE

Pipeline

Filter bounding boxes by size

↓

Remove unconfident classifications

↓

Non-max suppression

Hyperparameters (boxes proposal)

- TEST_PRE_NMS_TOPK = 8000
- TEST_POST_NMS_TOPK = 2000
- PROPOSAL_NMS_THRESH = 0.7

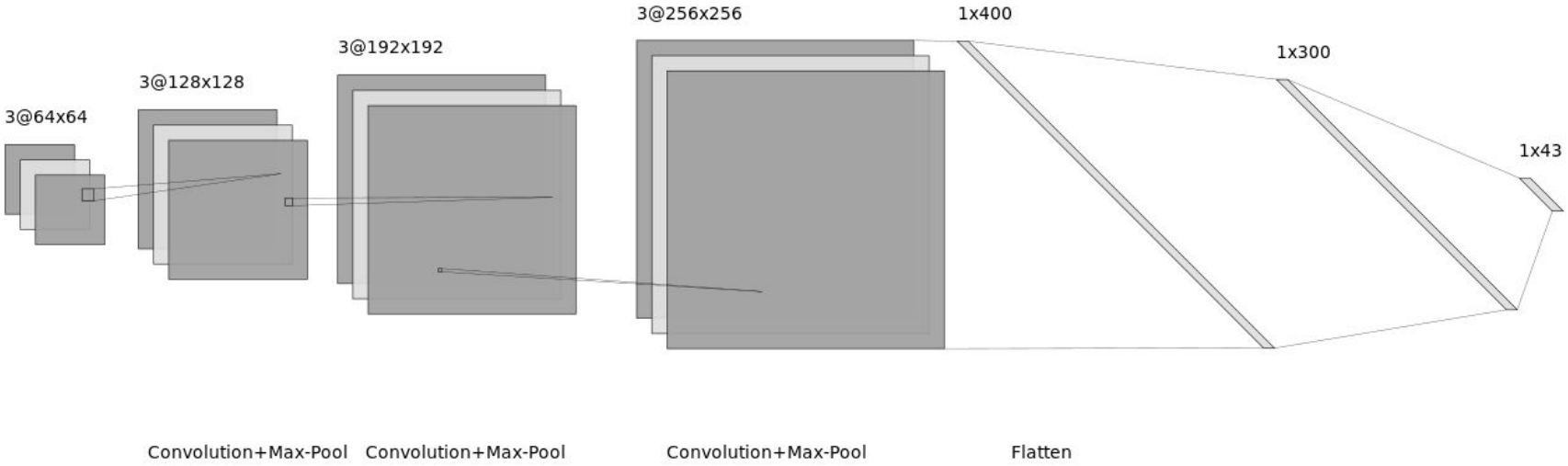
Hyperparameters (selecting boxes)

- Boxes between 15 and 255 kept
- Keep if CNN classified with confidence is 70% or over
- Non-max suppression overlap of 0.7

CNN model

- We added batch normalization to the inner layers
- Added MaxPooling(3,3) to inner layers
- Increased kernel size of our first layer, starting from 11 and ending to 3 in the following layers.
- Removed Dropout, empirically gave us worse results.

CNN model


3@64x64
3@128x128
3@192x192
3@256x256
1x400
1x300
1x43
Convolution+Max-Pool
Convolution+Max-Pool
Convolution+Max-Pool
Flatten

Final reults

mAP = 36.97%

Time = 1,400 seconds

3 OTHER THINGS TRIED

Binary classification

- Classifier to determine if an image is a sign or not
- Reduced the mAP value to 29.46%
- Would need further investigation but may be due to poor training data

Box position

- Take a look at the images
- Access candidate box coordinates
- Filter out those placed in the margins
- Reduced the mAP value to 23.60%

4 CONCLUSIONS

Advantage of dataset inspection

- Inspecting the dataset to see how large the signs appeared help to remove incorrect proposed location

The issue with lighting

- The system has an issue where it does not detect signs that are shadow/darkness

- Incorrectly detects the sun / glare as a sign

Thanks for listening

David Burrell
Miguel Pérez
Ignacio Martínez