O where the party at?

Assignment 1B

Deep Learning in Computer Vision

June 2019

You've been invited to a party by a friend and have been given the address. However, you suffer from severe Dyscalculia and cannot read house numbers. You have therefore decided to create an algorithm that automatic can detect and read house numbers. Fortunately, you're the world champion of image detection using deep learning and know exactly what to do!

To train your model you should use the Street View House Numbers (SVHN) dataset http://ufldl.stanford.edu/housenumbers/. PyTorch has a version of this dataset built in where all the digits have been cropped and re-sized to 32x32 images. This is perfect for training! The labels in this dataset are integers between 0 and 9. You also need to train your classifier on images that do not contain

Figure 1: Examples from the SVHN dataset. Left: Full images with bounding boxes. Right: cropped images centered around a single digit.

digits. Otherwise you will always detect a digit, which is not very useful. You have a free choice on which images you use for this. You can for example use other built-in datasets such as CIFAR10 and/or crop parts from the full size training images where there is no digits. This is an important step to avoid false

positives. (Hint: create another class for negative samples meaning 'no digit')

For testing purposes you should use the full non-cropped test images in a sliding window way. These can be found on: http://ufldl.stanford.edu/housenumbers/. We have also uploaded the full size training and test images to `/scratch/SVHN`.

Your tasks are:

- Train a convolutional neural that can classify single digits
- Use your network with a convolutional implementation of the sliding window algorithm to detect bounding boxes around digits.
- Keep only the best bounding boxes by using non-maximum supression and Intersection over Union (IoU).
- Use IoU with a suitable threshold to if you have found a digit correct.

In the report you should document your process, evaluate the performance and comment on your results.