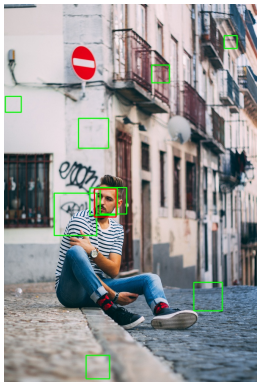
No Entry Sign Challenge Report

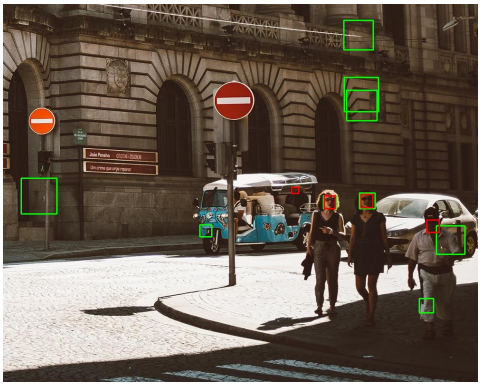
1 The Viola-Jones object detector

1.1 Ground truth and visualisation



(a) NoEntry1.jpg

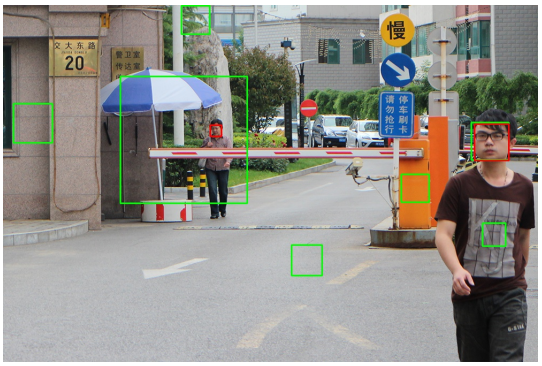
(b) NoEntry5.jpg



(c) NoEntry11.jpg

(d) NoEntry2.jpg

(e) NoEntry4.jpg



(f) NoEntry7.jpg

Figure 1: Six images with the bounding boxes of the ground truths (in red) and actually detected instances (in green) from the frontal face detector

1.2 IOU, TPR and F_1 score

When assessing the true positive rate (TPR), the first practical difficulty that arises is how to define a bounding box as being positive. I opted to define bounding boxes as positive if they had an intersection-over-union value of 50% or greater.

On any detection task, it is possible to achieve a TPR of 100% by detecting everything as positive. By doing so, it eliminates the chance of there being any false negatives. Since TPR is defined as

$$\text{TPR} = \frac{\text{TP}}{\text{TP} + \text{FN}}$$

if you eliminate all false negatives (i.e. $\text{FN} = 0$), the fraction will become

$$\text{TPR} = \frac{\text{TP}}{\text{TP} + 0} = \frac{\text{TP}}{\text{TP}} = 1$$

thus providing you with a TPR of 100%.

Table 1: True positive rate and F_1 score of the frontal face detector on each image

Filename	True positive rate	F_1 score
NoEntry0.jpg	Undefined	0.00
NoEntry1.jpg	1.00	0.20
NoEntry2.jpg	0.25	0.18
NoEntry3.jpg	Undefined	Undefined
NoEntry4.jpg	1.00	0.28
NoEntry5.jpg	Undefined	0.00
NoEntry6.jpg	Undefined	0.00
NoEntry7.jpg	0.50	0.22
NoEntry8.jpg	Undefined	0.00
NoEntry9.jpg	Undefined	0.00
NoEntry10.jpg	Undefined	0.00
NoEntry11.jpg	0.50	0.31
NoEntry12.jpg	Undefined	0.00
NoEntry13.jpg	Undefined	0.00
NoEntry14.jpg	Undefined	0.00
NoEntry15.jpg	Undefined	0.00

2 Building and testing my own detector

2.1 Training performance

ROC graph

2.2 Testing performance

3 Integration with shape detectors

4 Improving my detector

References