VIC Assignment 2 Report.

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There are three main steps for detecting pedestrians in given frames: Feature extraction, Classification and finally Non Maximum Suppression.

Feature extraction

To detect pedestrians in a frame we extract features of the image using a Histogram Oriented Gradient (HOG) feature descriptor. HOG can be described by the distribution of intensity gradients or edge directions in an image. The image is divided into small connected regions called cells. A cell can contain several pixels and for each pixel, a histogram of the gradient is computed. The descriptor contains a histogram of the gradient of each and every pixel. Some further preprocessing is made for achieving better results.

Implementation: Used "**cv2.HOGDescriptor()**" of the opencv package.

Classification

After we come up with the feature vector, we can train an SVM classifier to classify whether a bounding box contains a pedestrian or not. In detection, our SVM model is used with a sliding window approach to localize pedestrians in a frame.

Implementation:
As machine learning is not the main focus, we used the pre-trained svm classifier "**cv2.HOGDescriptor_getDefaultPeopleDetector()**" of the opencv package.

Non Maximum Suppression

The result of the detection step can give more than one detection for a single pedestrian, hence we further apply an NMS (non-maximum suppression) algorithm allowing to drop redundant boxes for a given pedestrian. The algorithm is as follows :

Implementation: From scratch
Algorithm:
Input: A list of Proposal boxes B, corresponding confidence scores S and overlap

threshold N.
Output: A list of proposals D.

1. Select the proposal with the highest confidence score, remove it from B and add it to the final proposal list D. (Initially D is empty).
2. Now compare this proposal with all the proposals — calculate the IOU (Intersection over Union) of this proposal with every other proposal. If the IOU is greater than the threshold N, remove that proposal from B.
3. Again take the proposal with the highest confidence from the remaining proposals in B and remove it from B and add it to D.
4. Once again calculate the IOU of this proposal with all the proposals in B and eliminate the boxes which have a higher IOU than threshold.
5. This process is repeated until there are no more proposals left in B.

Score:

I achieved **12.6%** over the whole dataset.