Team Name: The Visionaries

Assignment - 1

Summary of the proposal (Object Detection)

One of the typical problems in computer vision is, it is not good at perception. We're planning to tackle the problem of perception by crowd-sourcing.

- We are trying to employ an object detection mechanism which detects the cars in an image, fails in detecting the same car taken from different angles/perceptions.
- We give the images rejected by the algorithm to a crowdsourcing platform, to make sure that the car which we're searching for, isn't really in the image.
- This approach results in significant increase in accuracy of the task we're trying to perform by spending relatively very less cost than employing a crowd to label each and every test case.
- Similar kind of approach can be applied even in face detection.

What's the problem? (Detecting objects in cluttered environment)

We have state-of-the-art algorithms to solve this situation. But any of these solutions couldn't produce considerable accuracy in cluttered environment or varied lighting conditions.

Situations when computers fail to do the task by themselves:

- If we have an image of a particular car, taken in sunlight, to track down analyzing traffic cameras. Computers couldn't detect it at night without having its number plate.
- To detect a particular object from a different view/angle.

The typical solution

An overview of typical solution detection a particular object:

- Get a huge dataset of the object we want to detect.
- Select the features we are interested in, specially HAAR features of HOG descriptor in our case.
- Train a cascade object detector using these features and dataset, which consists of positive images (images containing our object) and negative images(any other image excluding the positive ones).
- Run this trained cascade detector on a test image to detect the object.

Our Solution using CrowdSourcing

In general, this object detection using haar features is about 75% accurate.We plan to pass the images that have been rejected (True negatives) by the algorithm to a crowdsourcing platform where workers draw a bounding-box around the particular object if they find one.

Thus, increasing the performance of our algorithm with the help of crowdsourcing. Suppose, someone from the security department wants to track a specific car from the video they got from the security camera, they wouldn't miss any frame where the car was, if they've used this approach, which obviously would be very helpful.

The Literature Review

A typical solution to detect cars in images, which we have implemented on 'UIUC Car Database' has an accuracy of 78 - 85%. You can find it here.

The paper about HOG(Histogram of Gradients) features can be found here.

UIUC car database can be found here.