Vehicle detection from color images

Militaru Cristian
Gr. 30431

1. Possible solutions

Color-based detection

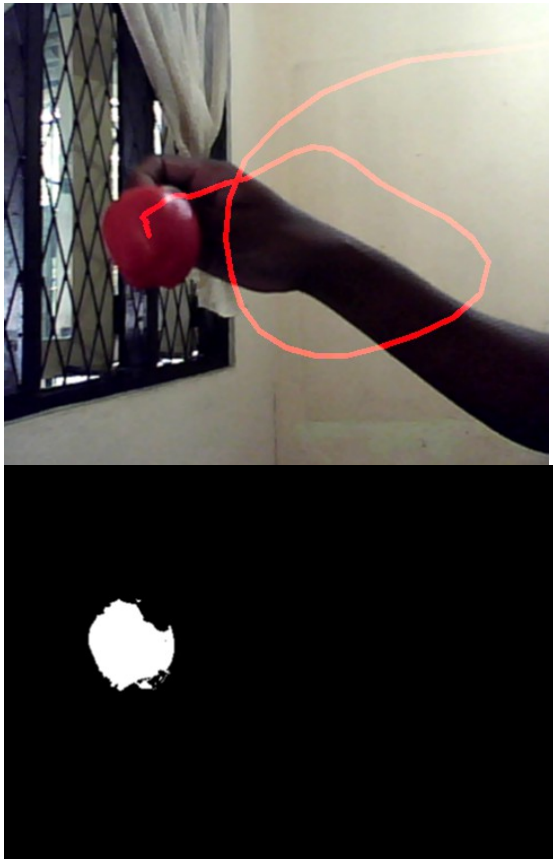
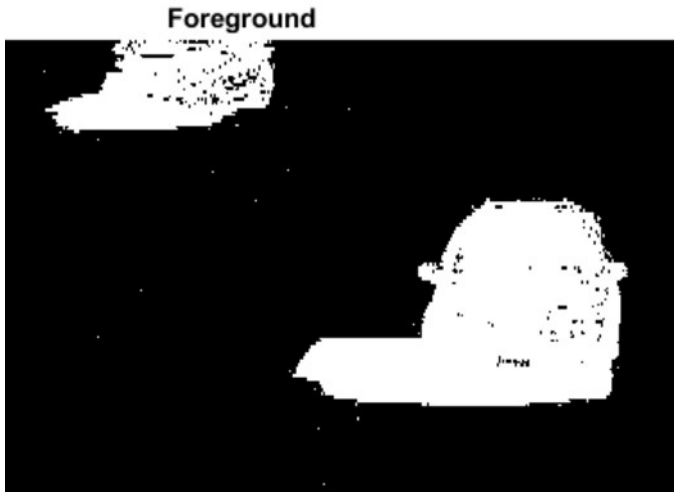


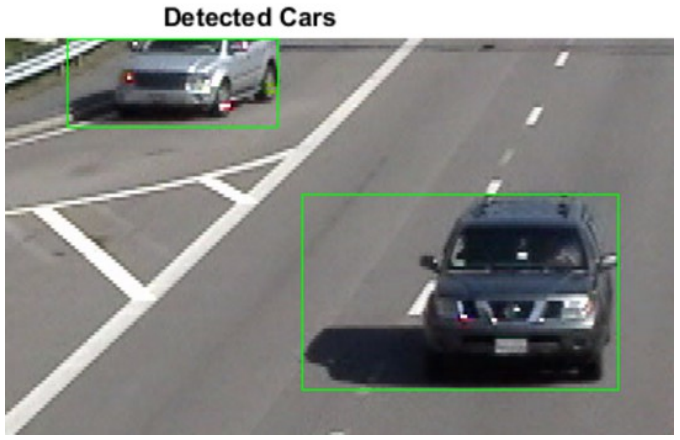
Fig: Tracking (up) and segmentation of the apple (bottom).

- Simple
- Requires to know the color range of the object

Implementation in OpenCV

Detecting Cars Using Gaussian Mixture Models





- Requires a video from a stationary camera
- Extracts the foreground from the background
- The foreground detector is trained from the first frames of the video.

Implementation in MatLab

Cascade Object Detector

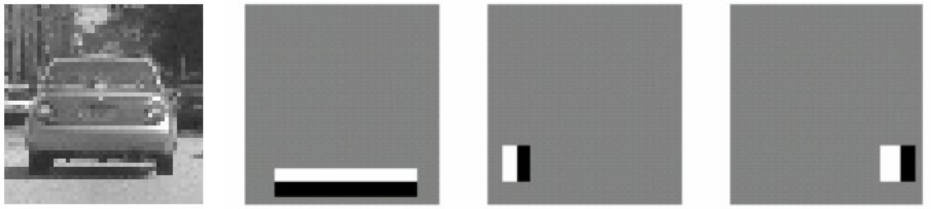
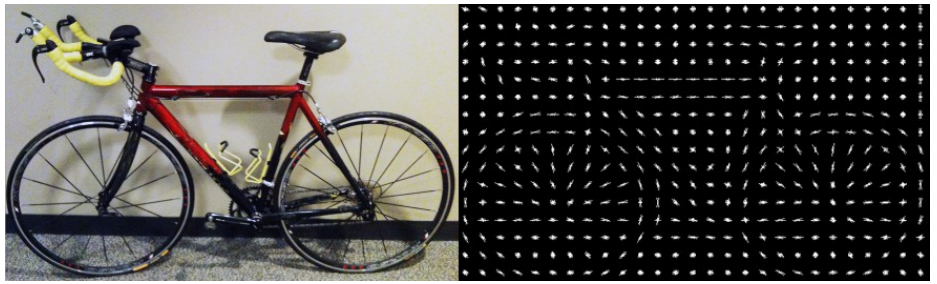


Figure 2 First three filters selected by Adaboost

Haar features



Histogram of oriented gradient features

- It requires only images (positive – containing the object - and negative).
- It works best if the object is viewed from the same side.
- Does it work only with grayscale images?
- Is it scale invariant?

Implementation in MatLab

Using Color for Object Recognition

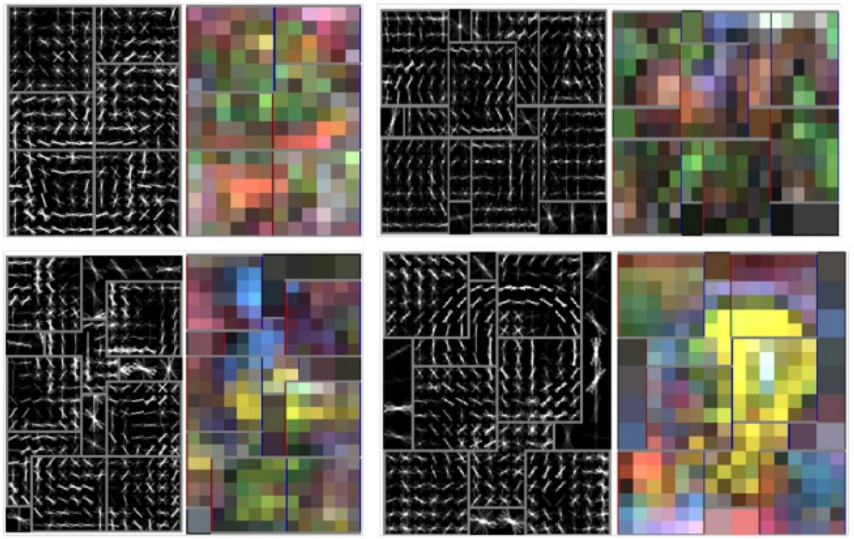


Figure 3. Visualization of learned part-based models with color attributes. Both the HOG and color attribute components of our trained models are shown. Each cell is represented by the color which is obtained by multiplying the SVM weights for the 11 CN bins with a color representative of the color names. Top row: the HOG and color attribute models for pottedplant and horse. Bottom row: Marge and Tweety models. In the case of horse, the brown color of the horse together with a person sitting on top of it is prominent. Similarly, the model is able to capture the blue hair of Marge and orange feet of Tweety.

- Works with images.
- Requires color constancy: the effect of different natural lightings should be eliminated. [see this - requires multiple polarized images - or this - complicated - or this - simple]
- „In this project we focus on fine-grained visual object categories in which the categories are somewhat similar to each other and focus is on the little differences between the categories.” It is not color invariant. (the classes of birds can be determined using color, but for vehicles the color is irrelevant).
- Another approach is presented here

2. Datasets

- PASCAL VOC challenges: annotated images with different classes of objects (including cars)