

Vehicle Detection and Classification from Images

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The background is a solid dark blue. In the top-left corner, there are several light blue bokeh circles of varying sizes. In the top-right corner, there are white geometric shapes, including a triangle and a line connecting several points, with large white numbers 3, 7, 5, 0, and 9 scattered around them. In the bottom-right corner, there are more light blue bokeh circles. On the left side, there is a white square containing the number 01 in dark blue.

01

Introduction

Reminder of Our Project Goals

The background is a solid dark blue. In the top-left corner, there are several light blue bokeh circles of varying sizes. In the top-right corner, there is a network of thin white lines connecting small dots, with large white numbers 3, 7, 5, 0, and 9 scattered around it. In the bottom-right corner, there is a cluster of light blue bokeh circles. In the bottom-left corner, there is a faint network of thin white lines connecting dots.

02

Detection

Progress in the Detection Task

Detection

- A vehicle/non-vehicle SVM classifier is trained on HOG features
- Detection is done with sliding windows

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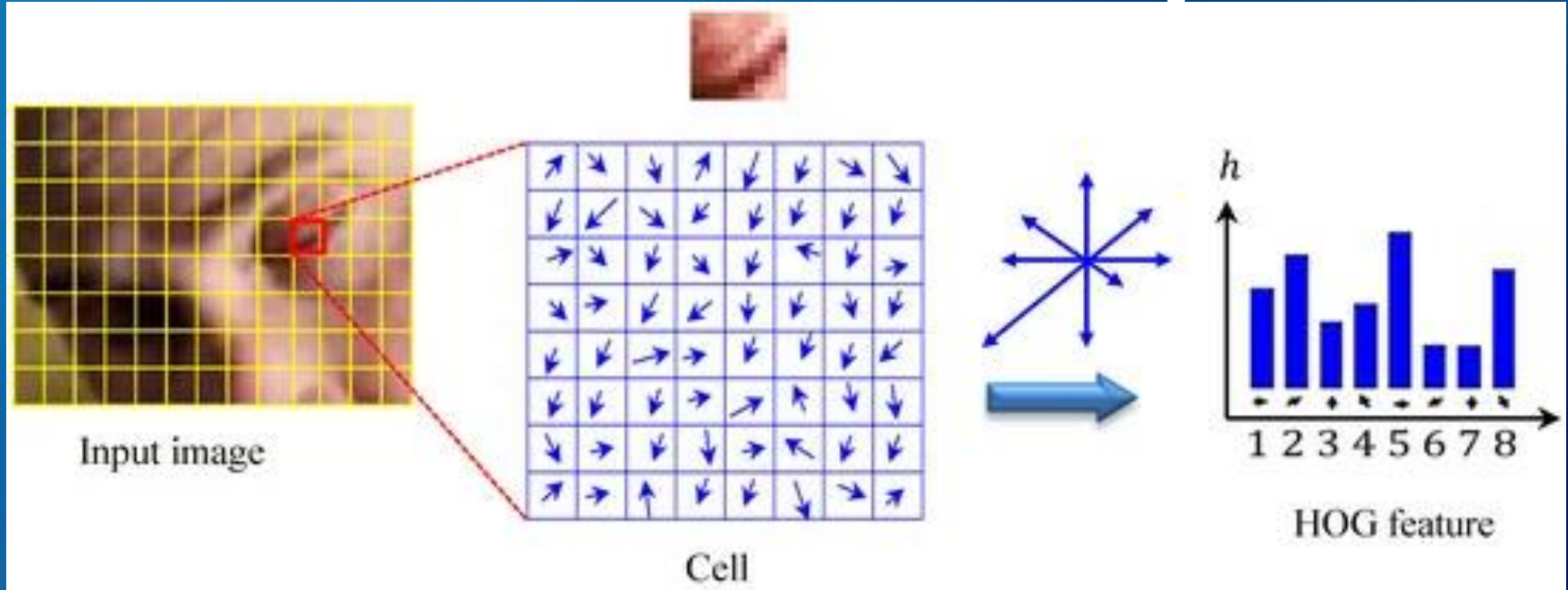
7

0

8

HOG Features

5



HOG Features

Input image



Histogram of Oriented Gradients



Dataset

Non-Vehicles



Vehicles



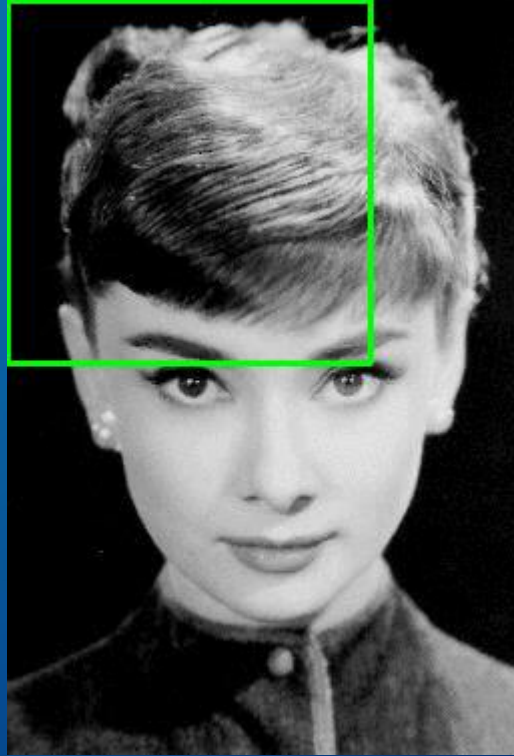
- 64x64 images
- 56201 vehicles
- 181788 non-vehicles

Model training

- An SVM with rbf kernel and 576 parameters is trained.
- Training takes ~10 minutes

	precision	recall	f1-score	support
vehicle	0.89	0.73	0.81	39253
non-vehicle	0.92	0.97	0.95	127340
accuracy			0.92	166593
macro avg	0.91	0.85	0.88	166593
weighted avg	0.92	0.92	0.91	166593

Sliding Window



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Sliding Window





03

Classification

Progress in the Classification Task

Classification

- Dataset from TAU Vehicle Type Recognition Competition on Kaggle (<https://www.kaggle.com/competitions/vehicle/da>)
- Normally, it consists of 17 classes, but only 6 are used (Motorcycle, Car, Bicycle, Van, Bus, Truck)
- Dataset can be widened by combining other datasets or data augmentation

5

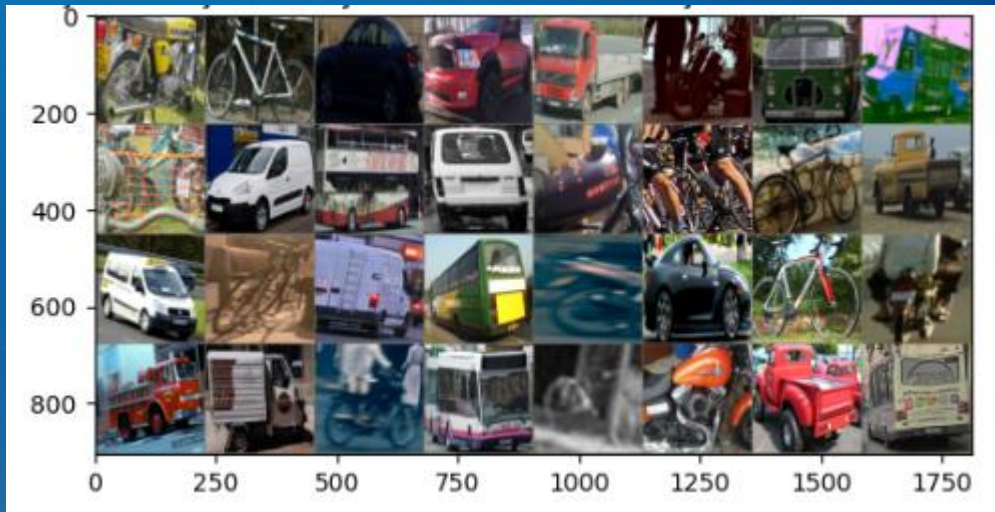
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Classification



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Classification

- ResNet50 is chosen as experimental training has been done
- The model seems to be trainable with default parameters
- Next Steps:
 - Data augmentation
 - HP tuning for real training
 - Obtaining the metrics (Precision, recall, F1)

5

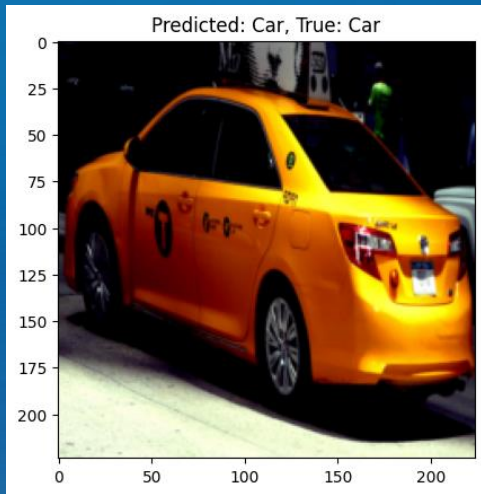
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Classification



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The background is a solid blue color. It features several white numbers (0, 1, 2, 3, 4) and geometric shapes (polygons, lines) scattered across the slide. Some numbers are large and bold, while others are smaller. The geometric shapes are composed of thin white lines connecting small dots.

Thanks!

Q&A

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