Vehicle Detection and Classification from Images

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Reminder of Our Project Goals


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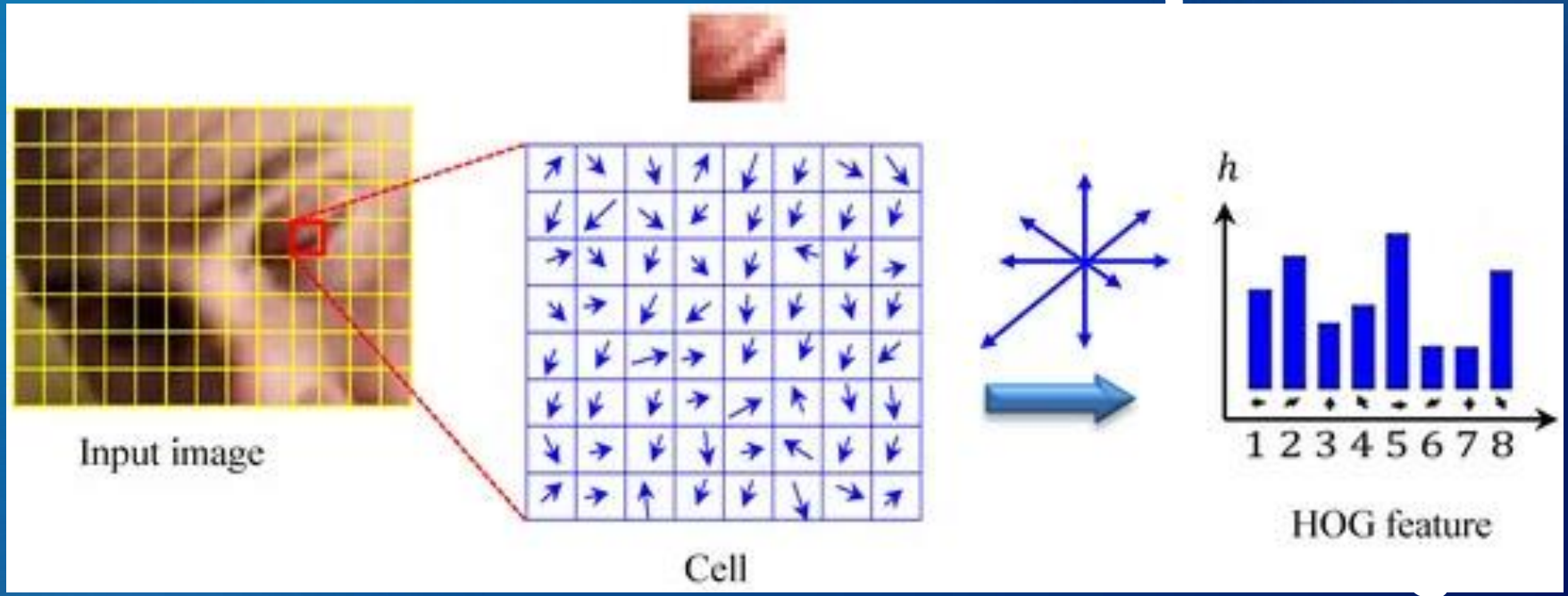
Detection

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

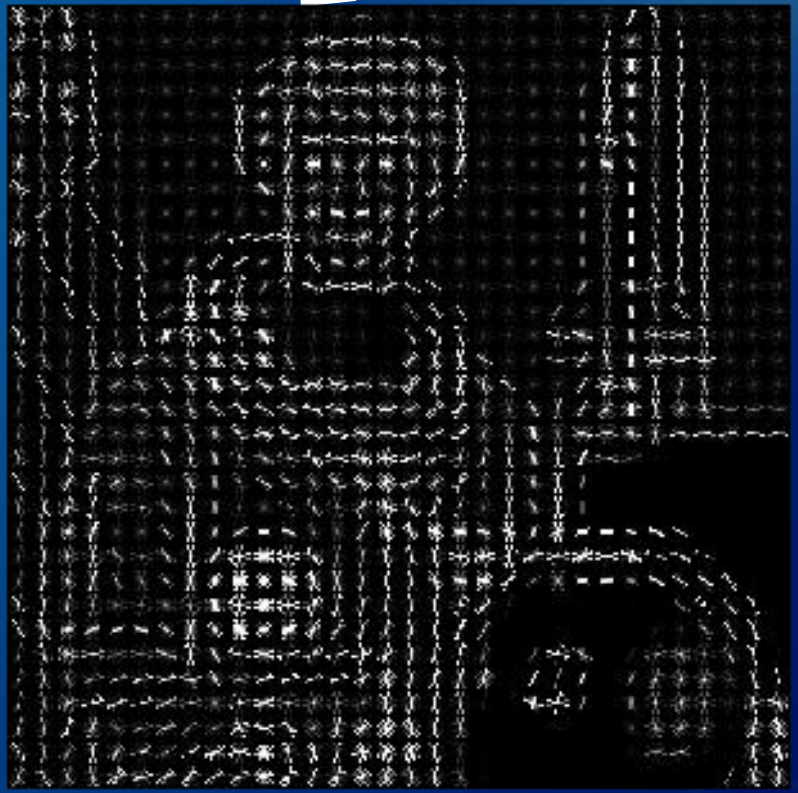
HOG Features



HOG Features

Input image

Histogram of Oriented Gradients



Dataset

Non-Vehicles

Vehicles

- 64x64 images

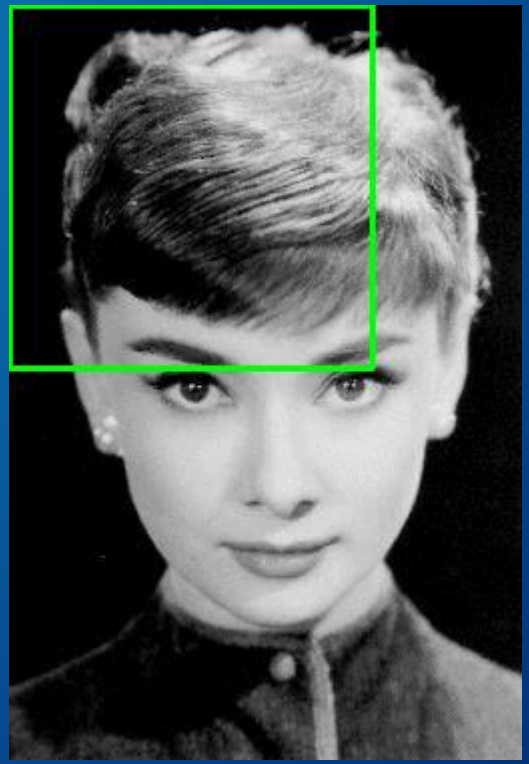
- 56201 vehicles
- 181788 non-vehicles

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/data)
- 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

Classification

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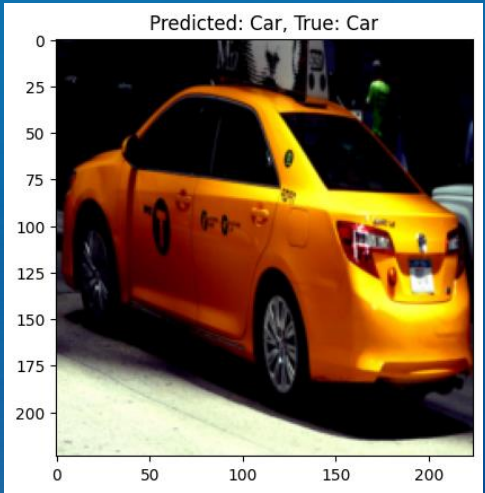
Classification

- ResNet50 is chosen an 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)

Classification



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Thanks!

Q&A