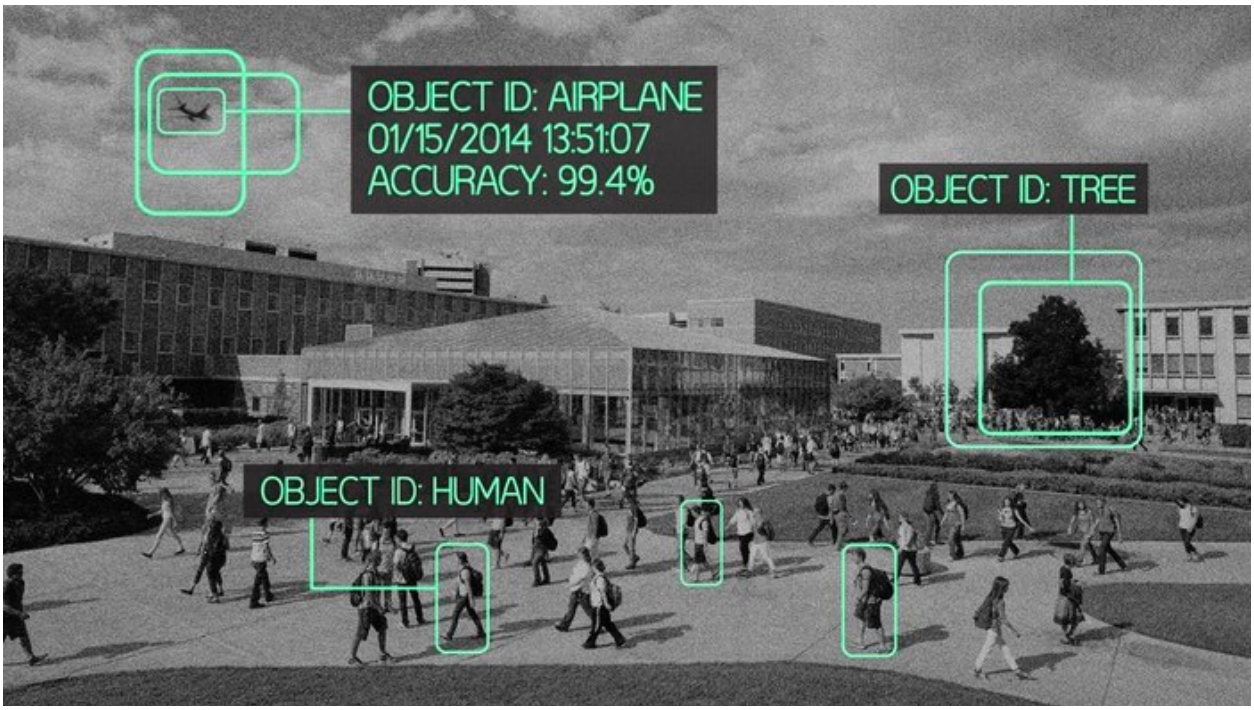
Computer Vision

Exemplar SVM and DPM



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Fall 2015

Assignment 5

Q1.0 Consider a pixel stride of 1 pixel, the maximum number of windows that can be classified is (M-h+1)x(N-w+1).

Q1.1 Assume that we are using a spam filter with the following stats:

	Classified +	Classified -
Positive	10	5
Negative	15	100

Accuracy =84.6%. Assume that everything was classified negative. Accuracy = 88.5% which would lead us to believe that the accuracy is in fact better even with zero predictive power. Therefore we use the recall parameter in conjunction with the accuracy metric, which gives us a better estimate about the predictive power of our model.

Recall = TP/(TP+FN)

Q1.2 In case of EXEMPLAR SVM, every training data is trained against a large number of negative examples. Thus, for 1000 bounding boxes, we train 1000 SVMs.

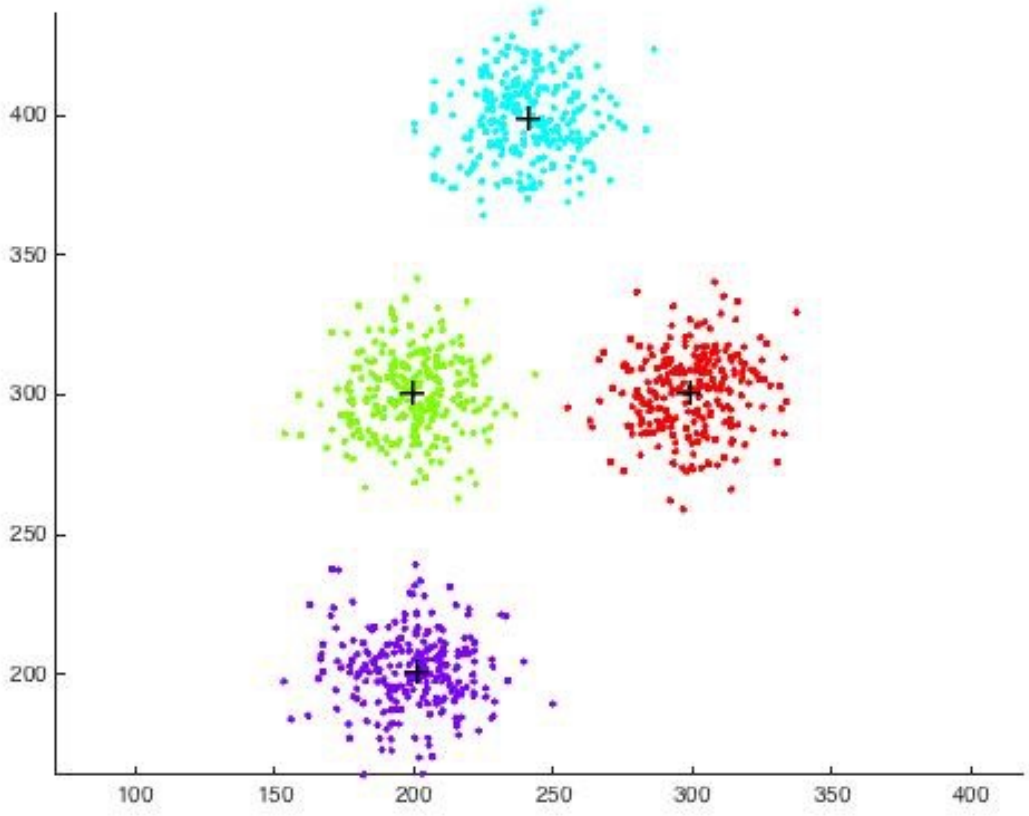
For Dalal-Triggs detectors, we train ONE SVM to recognize item and NON item.

Q 2.1.1 CODE: MeanShift.m

Q2.1.2 saved the required matrices

Q2.1.3 Increasing the bandwidth results in a large number of points within the same cluster, which results in fewer number of clusters. In the limiting case, all the points would belong to one cluster. On decreasing the bandwidth, the number of clusters increase as the mean tends to find the local crowded regions within the limit of the bandwidth, which results in a large number of such clusters.

In the given question, since the points were visualizable, the bandwidth was chosen by trial and error such that proper clusters were formed. Appropriate Bandwidth=30.



Q2.2.1 CODE: nms.m

Q 2.2.2 The non maximal suppression implemented chooses the best K modes based on the confidence value of the SVM that is given in the last column of the "boxes". The boxes having K maximum values of confidence values is selected.

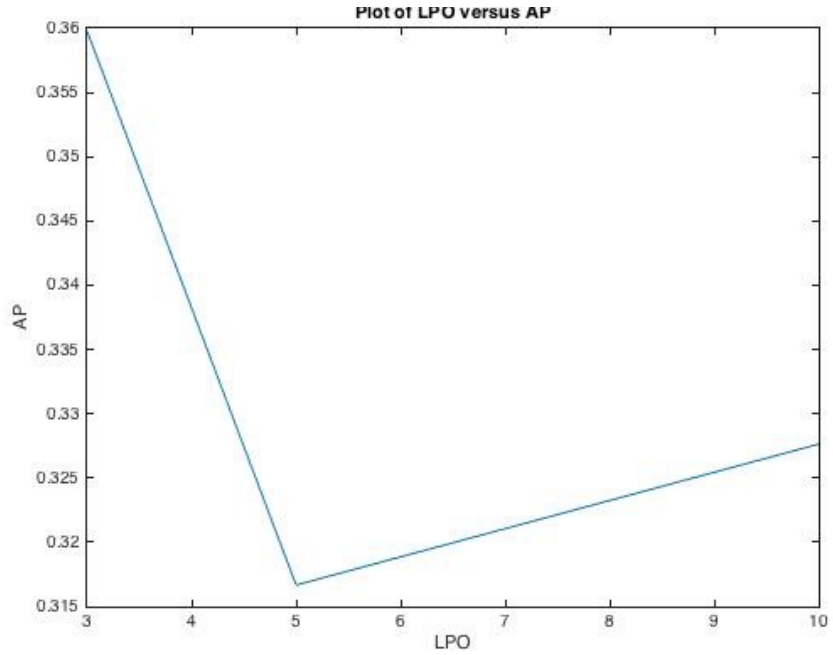
Q2.2.3

Q3.0 CODE: batchDetectImageESVM

Q3.1 For a given task and class, the precision/recall curve is computed from a method's ranked output. Recall is defined as the proportion of all positive examples ranked above a given rank. Precision is the proportion of all examples above that rank which are from the positive class. The AP summarises the shape of the precision/recall curve, and is defined as the mean precision at a set of eleven equally spaced recall levels.

DEFINITION REFERENCE: The PASCAL Visual Object Classes (VOC) Challenge Mark Everingham · Luc Van Gool · Christopher K. I. Williams · John Winn · Andrew Zisserman

Q 3.2



Ideally, on increasing the number of octaves, the AP is expected to decrease, as the recall factor tends to decrease with increase in the number of octaves, and thereby reduction of image size. However due to the limited size of the test dataset, we do not see a trend here.

Q 3.3

Figure showing the mean image of each cluster

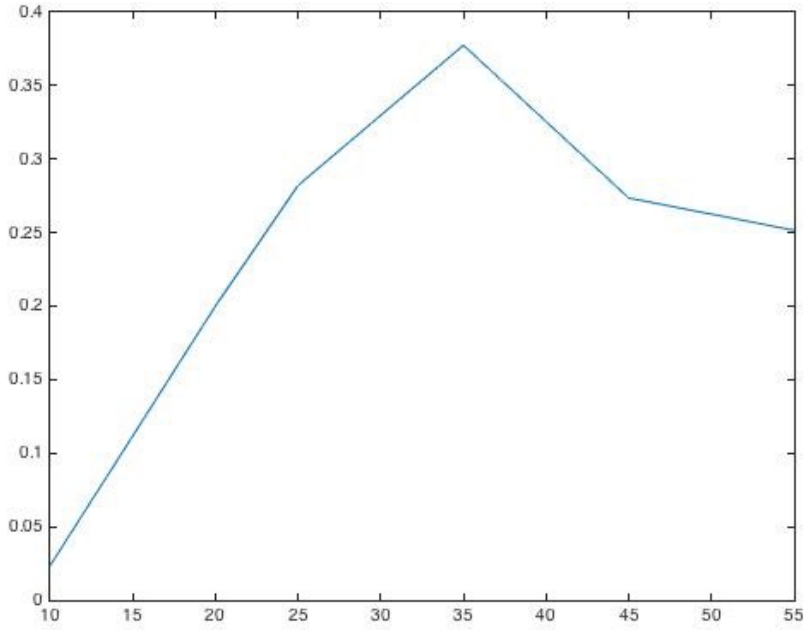
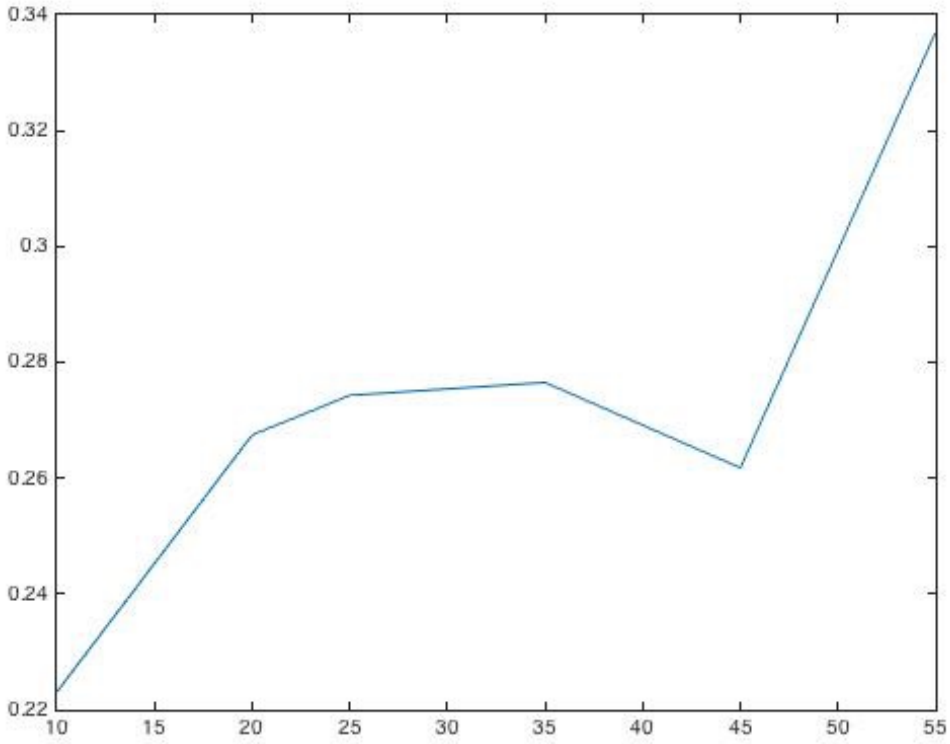


Figure showing variation of AP with K

Note that the new compacted set of detector has the same AP (~0.3) as the set of uncompacted detectors.

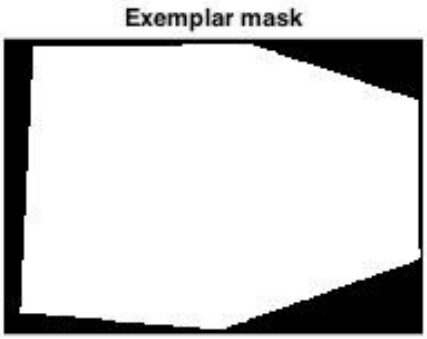
Q3.4 USING GABOR FILTER BANK:

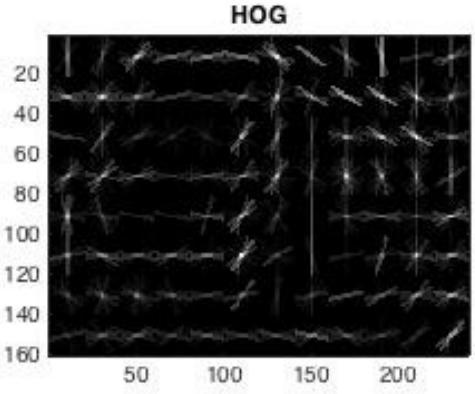


NOTE: The above shown graphs are only a general trend. Since alpha random pixels are sampled, the clustering is not constant and therefore the graph varies every time it is run.

Q4 EXTRA CREDITS: RUN CODE: Q4_Seg1.m

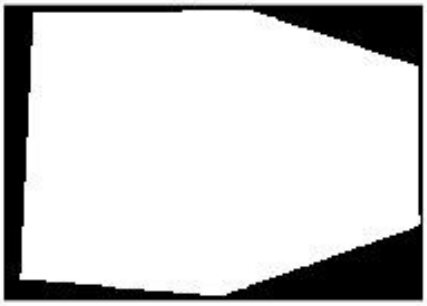
EXEMPLAR 1:





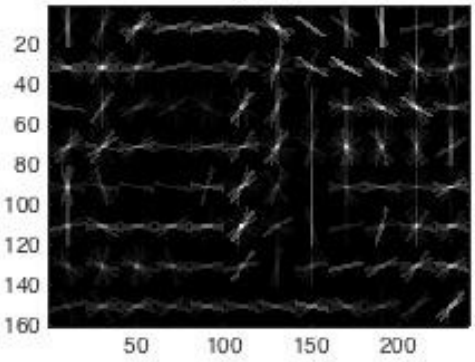
Exemplar

Exemplar mask



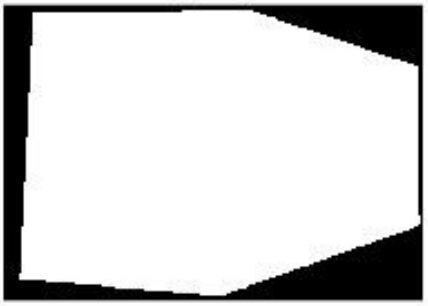
Segmentation Transfer

HOG



Exemplar

Exemplar mask



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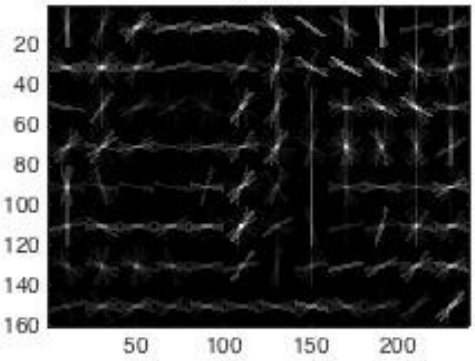

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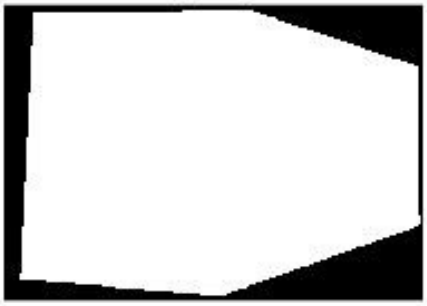

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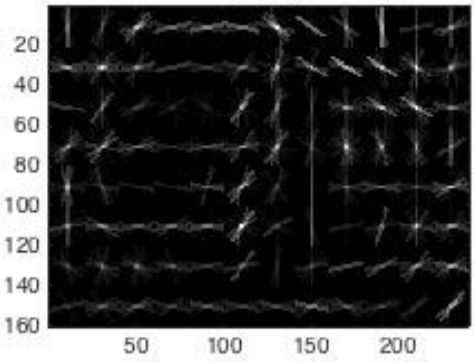

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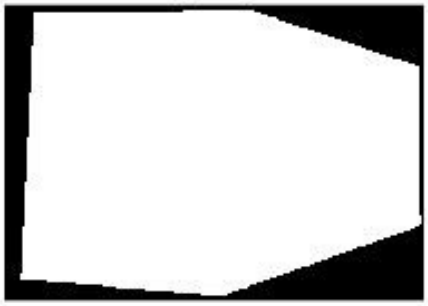

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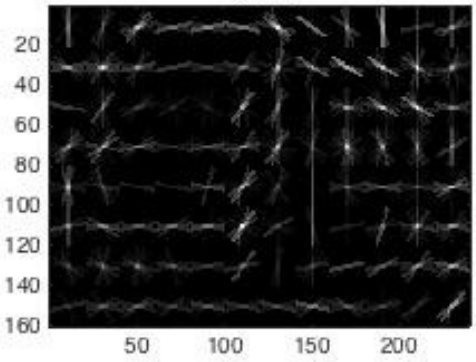

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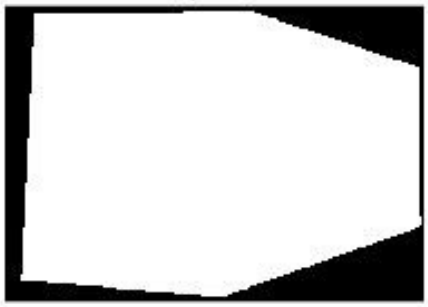

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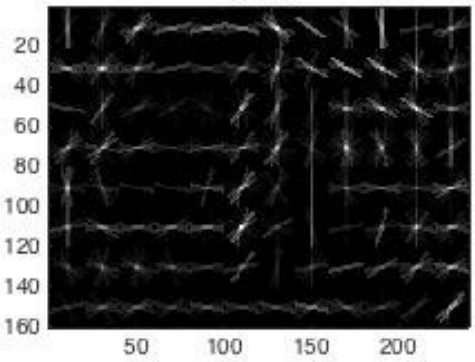

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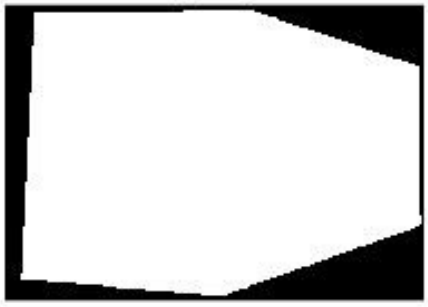

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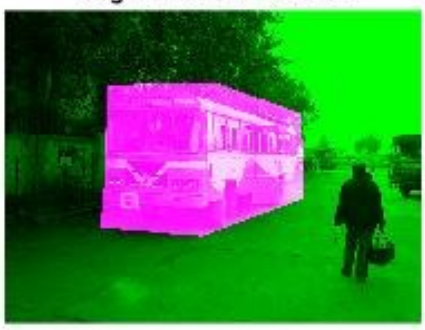

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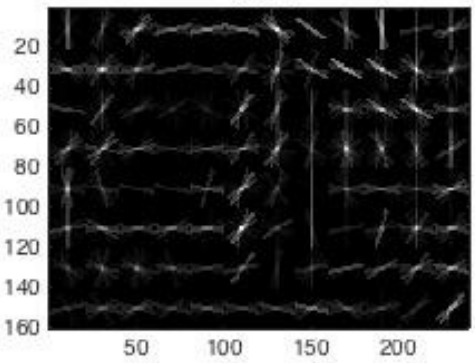
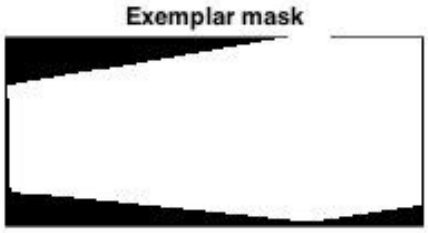
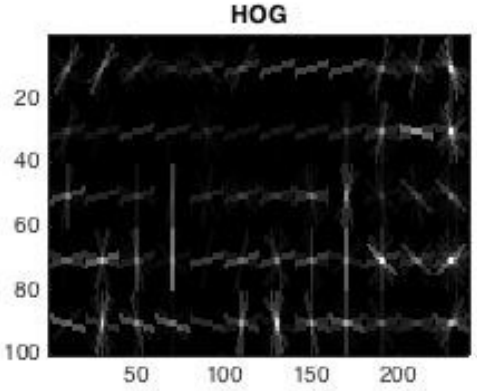


EXEMPLAR 2:


Exemplar


Exemplar mask


Segmentation Transfer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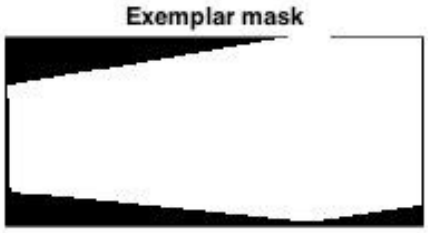
Exemplar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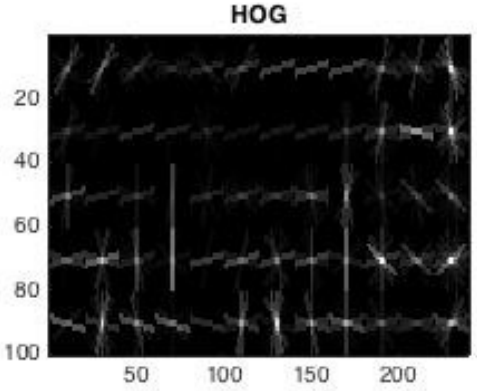
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Exemplar

Exemplar mask

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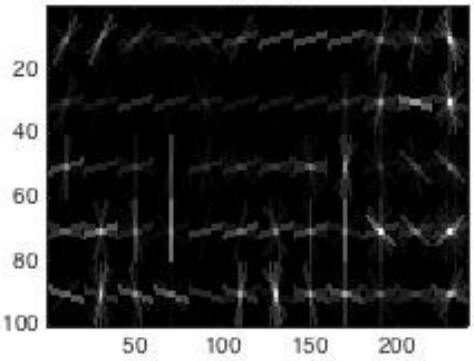

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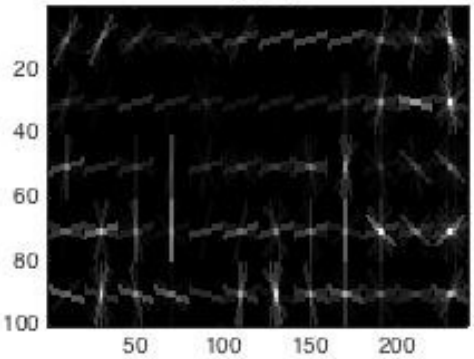


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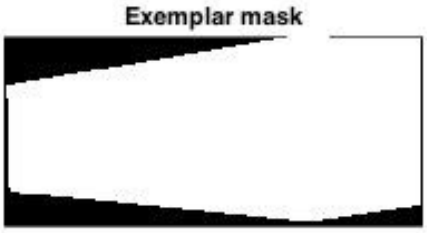
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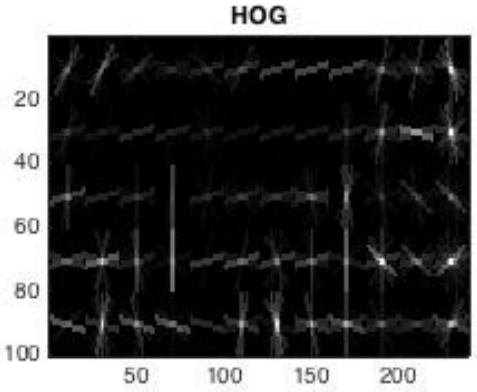
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