Computer Vision 2016 Spring HW # 1 write-up

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Q1.

By clustering many response vectors into a few groups, we could extract some features of picture as a form of point (clusters' center). Then, when we investigate some pictures in same class, we could know what and how many features the picture of that class usually has.

Q2.

X-axis of histogram is texton label, which represents texton cluster the response vector belong to.

Q3.

Parameters value:

W = 0.52

S, K = 10

$U_h = 0.4, U_l = 0.1$

Overall accuracy observed with various filter size and number of clusters:

Gabor filter size	Number of clusters	Accuracy
19 X 19	8	0.63
19 X 19	15	0.69
19 X 19	25	0.71
7 X 7	25	0.60
13 X 13	25	0.66

Classifier showed accuracy around 65%, and the best performance was 71% with 19 X 19 gabor filter size and 25 clusters. However, k-means clustering's result is different for each trial under same circumstances. And because of this, accuracy is also different for each trial.

There was a tendency that classifying accuracy get better when number of clusters get larger.

In my guess, this is because when there are many cluster, classifier could extract much more features from class, so classifying result get better.

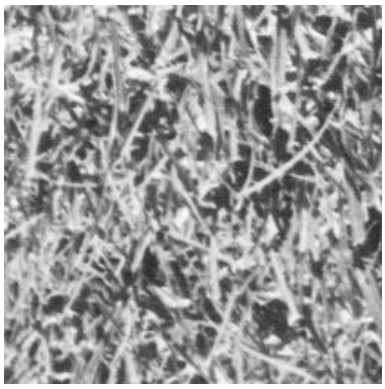
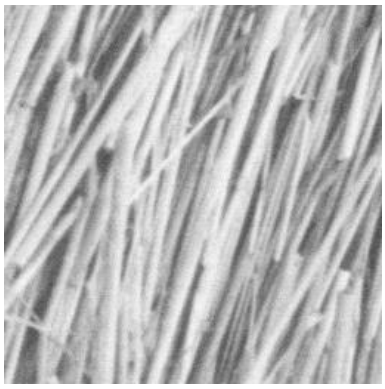
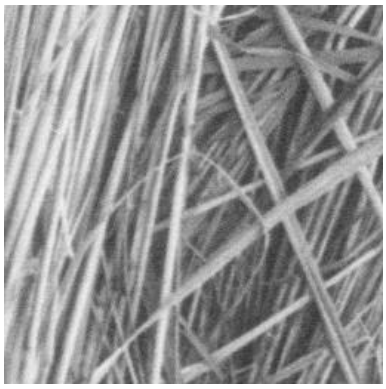
Also, there was another tendency that classifying accuracy get better when gabor filter size get bigger.

In my guess, this is because when the filter size is bigger, classifier could extract much detailed features from class, so classifying result get better.

This classifier occasionally confused grass with straw, and fairly often confused chip and seed with canvas.

Interestingly, there was a common characteristic among straws that this classifier classified as grass.

They look darker than well classified straws. Grass pictures have many dark zone, so I guess this classifier incorrectly determined these straws because of dark part.

Grass3 **Straw6** **straw12**

Grass 3 is generally well-classified grass picture. It has many dark zone.

Straw 6 is also generally well-classified straw picture. It has less dark zone.

Straw 12 is often misunderstood as grass. It looks darker than straw 6.

If there were more and various class images and computing power enough to perform clustering to a lots of vectors, this classifier's performance would be much better.

Also, if we apply PCA to extract important vectors from feature space, or classifying subclass in one class and extract features respectively, it's performance would be better.