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CS 216

HW3

1)

Original Image:

K = 2:

K = 5:

K = 10:

K = 10 & Red Scaled by 1000 before color quantization (+ scaled by 1/1000 afterward):

Scaling a particular color before quantization seems to have no particular impact on the color quantization. This procedure simply scales up the mean centroid value in that particular dimension (color).

Listed below are centroid values for scaled & unscaled color quantization.

Unscaled (k=10):

0.626822776300513	0.433278422089561	0.347911388898768
0.0481418285938037	0.0425792336935516	0.0627713698181030
0.353630755581888	0.288371437025088	0.281313504462037
0.896374860238158	0.722323502084616	0.595168672656368
0.177440553657326	0.166869774041071	0.189132158107777
0.548603864921943	0.495001184315853	0.482311584113361
0.254315510815947	0.223808671715718	0.236926655821780
0.472401340856818	0.359553171249406	0.328308451474381
0.781671357926960	0.559467928717993	0.439923911897659
0.115845689972198	0.107584861931968	0.125091640548352

Scaled red by 1000 (k = 10):

47.7446517375834	0.0469145792229775	0.0701790266971383

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909.110075481028	0.681864995050012	0.537350378187557
430.244528385821	0.332346469058428	0.311144853489399
194.860164214593	0.182127101623097	0.202825567025945
268.169129618660	0.231068185831276	0.238189617093982
627.234800592531	0.457092549350989	0.380481149402751
343.947879650715	0.281709977830778	0.277382792628213
517.557305846119	0.389363865608270	0.345770303316532
758.848470448691	0.551070947719105	0.441678110280199
122.738524708523	0.118964571379617	0.140178819643181

2)

Original Image (input):

Output Images:

Horizontal and Vertical Gaussian Derivatives (sigma = 1, 2, 4)
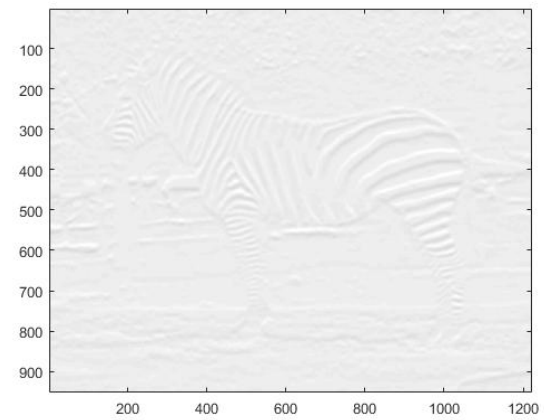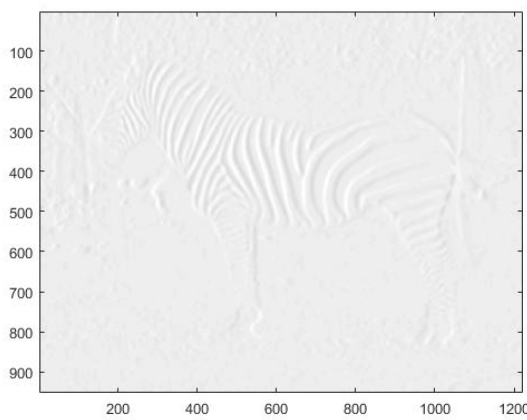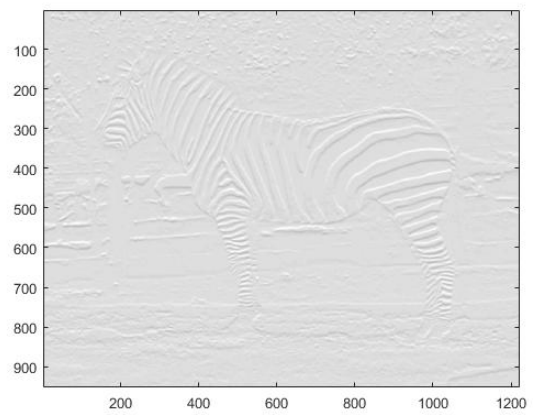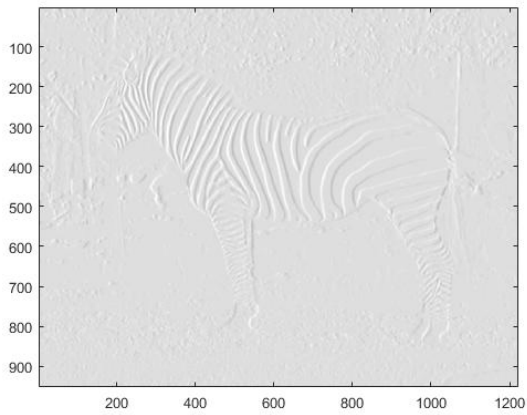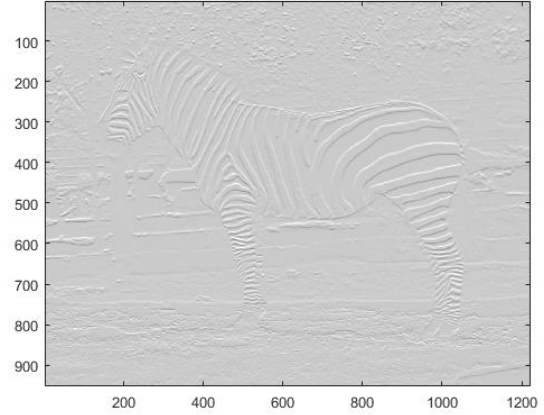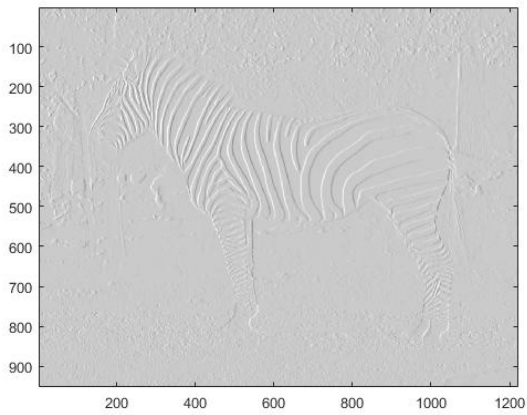
Center Surround:
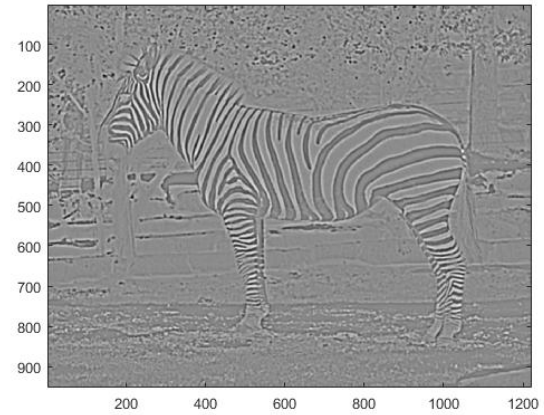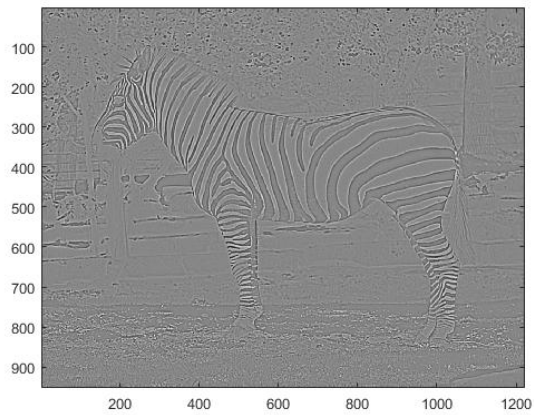
3)

Original Image:
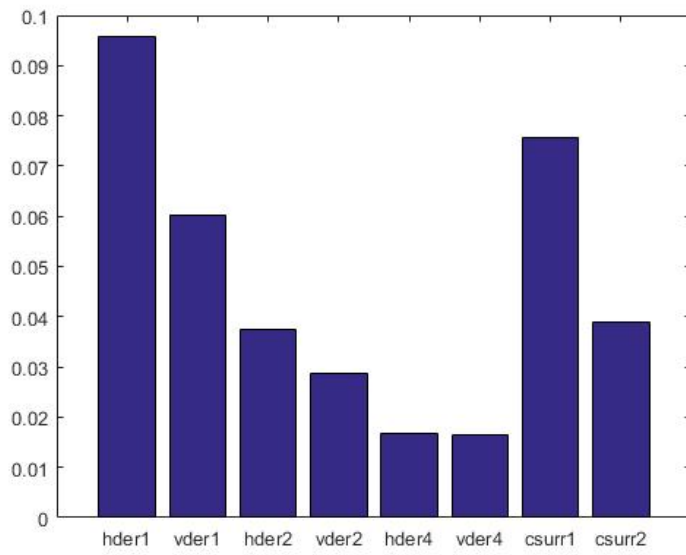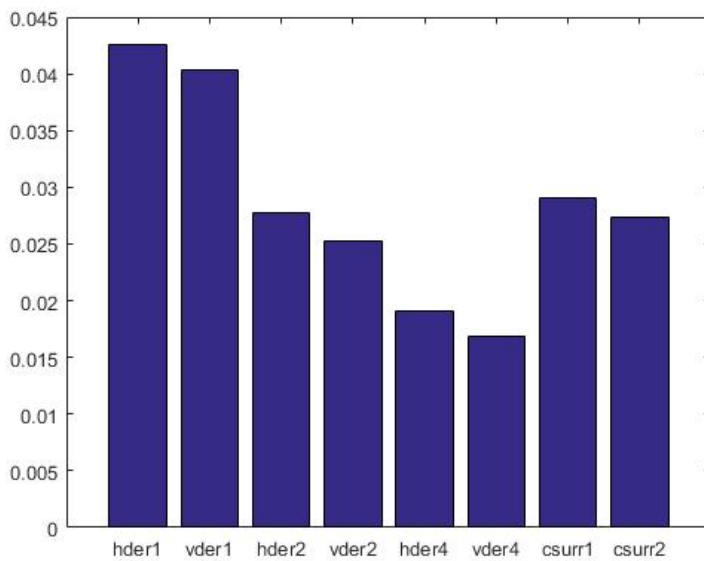

Zebra Neck Image:

Zebra Neck Mean Response Vector:
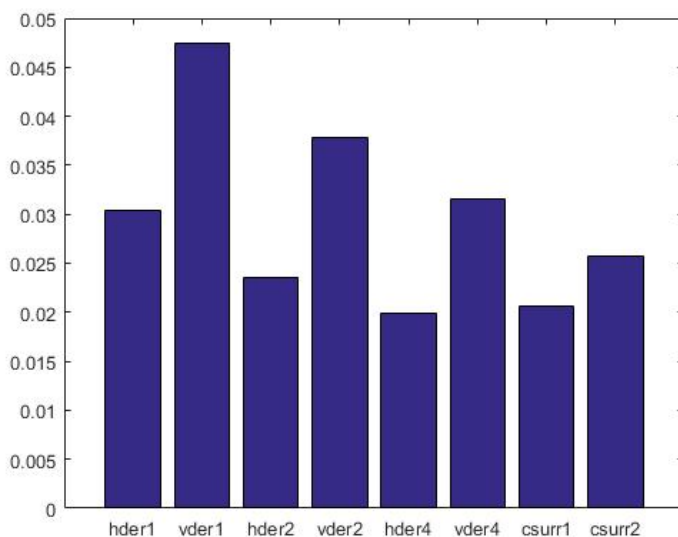
Tree Leaves Image:

Tree Leaves Mean Response Vector:

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Grass Image:

Grass Mean Response Vector:

In all bar graphs the highest horizontal / vertical absolute mean response value belongs go Gaussian derivative with sigma = 1. This is the least smoothed image with sharpest edges. Therefore, it makes sense that it contains the highest absolute mean response values. The absolute mean response values decrease as sigma values are increased (the image becomes more smooth / homogeneous).

In zebra's neck image the absolute mean response values drop drastically as sigma is increased because the stripes become much less salient as the image is smoothed. The horizontal absolute mean response value is higher than vertical mean response value for image of zebra's neck because the stripes on zebra's neck have larger horizontal component than vertical component.

Tree leave image is more homogeneous than zebra's stripes. The absolute mean response values for tree leaves are all below 0.045, while the absolute mean response values for zebra's neck reach as high as 0.95. As the image is smoothed the absolute mean response values drop.

Grass image is even more homogeneous than tree leaves and has some of the lowest absolute mean response values. The vertical absolute mean response values are higher than the horizontal absolute mean response values because of the way grass is lit up by light. Upper portion of the image is

significantly brighter than the lower portion of the image. There is no such notable distinction between left and right parts of the grass image. Hence, the higher vertical absolute mean response values.

I chose all images to be ~40x40 pixels for consistency.
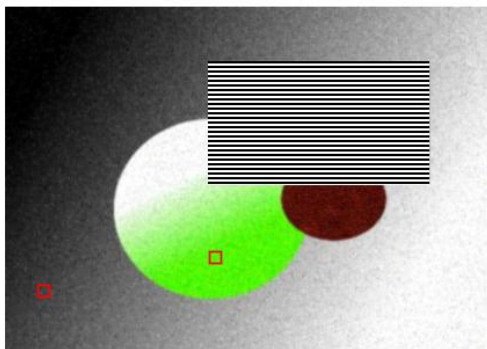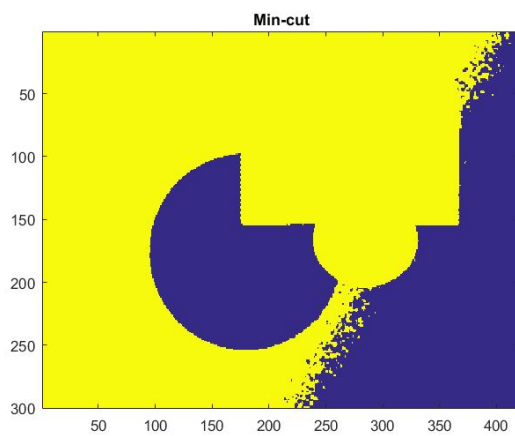
4)

Texton Image of Zebra:
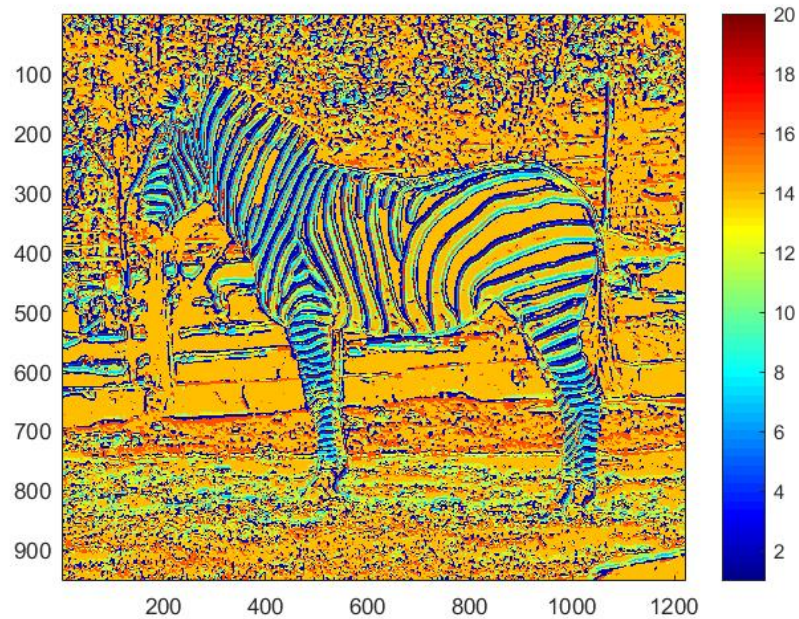
5) Note: HW3_Part5 code and test images are located in GCmex folder in the submission zip.
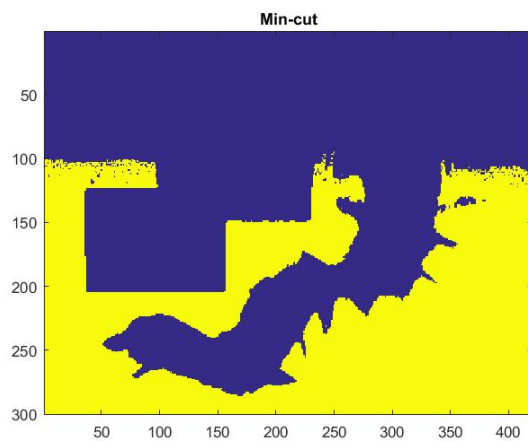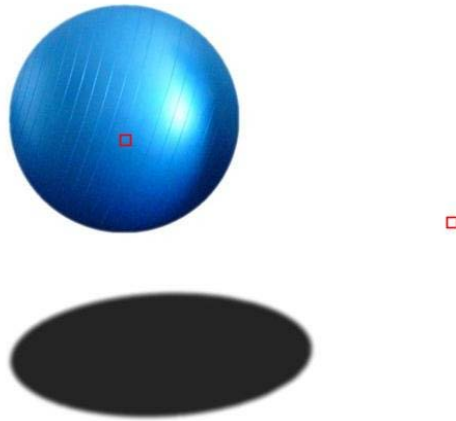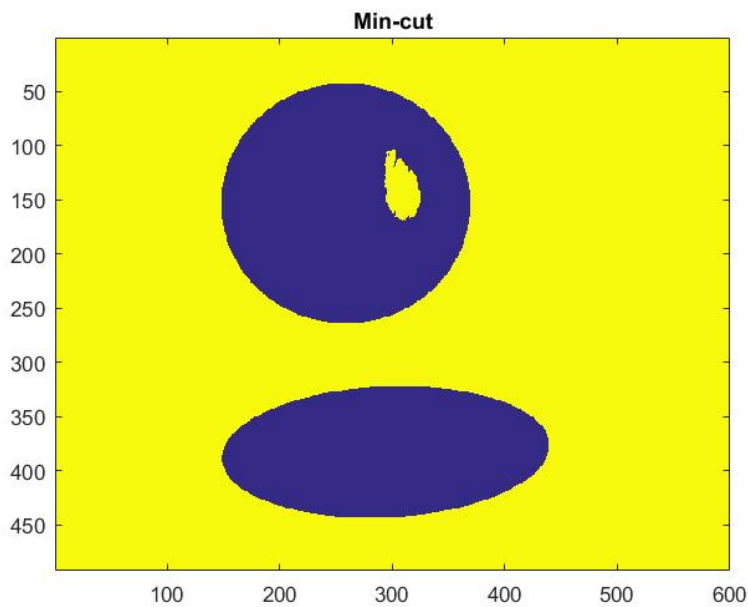
Segtest1:

Segtest 1 Mincut:

Segtest2:

Segtest2 Mincut:

Additional Test Image:

Test Image Mincut:

The algorithm did not perform very well in segtest1 and segtest2 because neither the foreground nor the background are uniform in color. The algorithm performed better in additional image because the background color is uniform.

6)

I would like to write a MNIST dataset based digit recognizer for my final project.