Gülsüm Güdükbay
21401148

CS 484, Fall 2017

Homework Assignment 3: Image Segmentation (Report)

Spectral Mean Shift

(i)(iii) Different Parameter Values and Statistics

41004

LUV Window Size	Precision	Recall
0.03	0.124061	0.23866
0.032	0.122416	0.241435
0.034	0.1494	0.252536
0.036	0.111856	0.231483
0.038	0.139846	0.238756

299091

LUV Window Size	Precision	Recall
0.03	0.052506	0.238918
0.032	0.05378	0.204162
0.034	0.052647	0.218939
0.036	0.054389	0.227471
0.038	0.247393	0.202081

124084

LUV Window Size	Precision	Recall
0.03	0.146561	0.254171
0.032	0.16747	0.252002
0.034	0.158474	0.273774
0.036	0.135716	0.275609
0.038	0.142781	0.267518

135069

LUV Window Size	Precision	Recall
0.03	0.087321	0.328618
0.032	0.118552	0.314472
0.034	0.108793	0.290805
0.036	0.110826	0.305495
0.038	0.10891	0.282644

35070

LUV Window Size	Precision	Recall
0.03	0.124377	0.232604
0.032	0.119512	0.219183
0.034	0.120414	0.231493
0.036	0.138731	0.245939
0.038	0.128479	0.247393

(ii) Segmentation Results For the Final Parameter Value for 5 Images

LUV Window Size: 0.035

Image	Precision	Recall
41004	0.137975	0.249569
299091	0.156817	0.279780
124084	0.126734	0.246025
135069	0.051488	0.218939
35070	0.108662	0.289717

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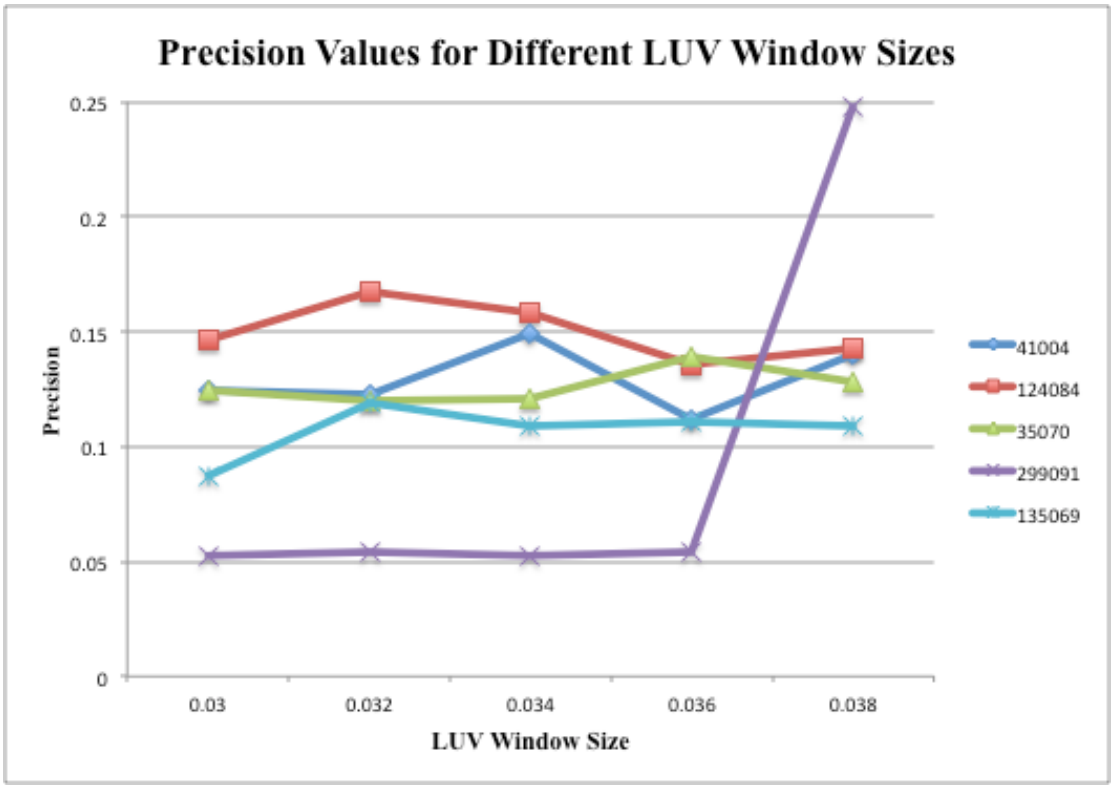
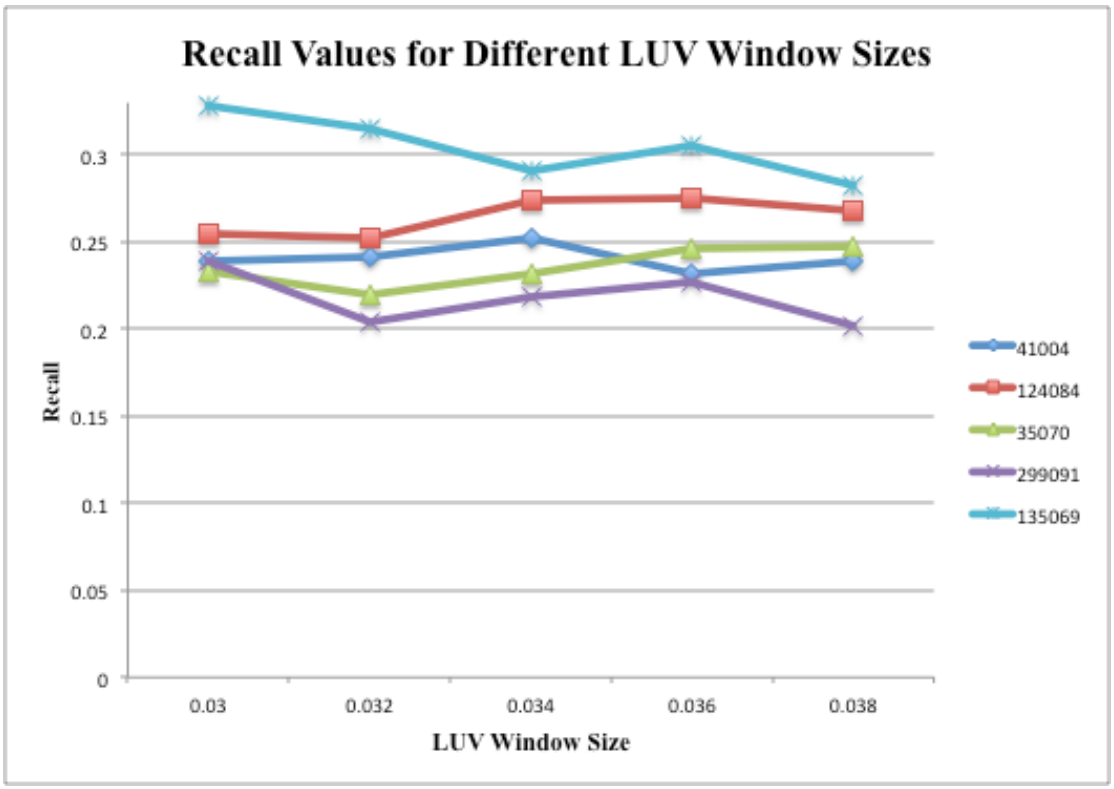
(iv) Illustration of Performance Statistics





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(vi) Discussion

1. What effect does varying r seem to have on the resulting segmentations?

If we increase the LUV window size, the precision values increased till a point (0.032). For one image, as the window size increased, precision increased significantly. Recall generally decreased for all images when window size increased.

2. What effect does adding position information as spatial features to color features have on the resulting segmentations?

The feature vector containing only LUV information gave false positives, therefore increased recall. Also, the precision values were so very less than the segmentations with spatial information added.

3. What are the advantages and disadvantages of using each type of feature vector?

Advantages of using only LUV feature vector: Faster than the other one. Increased recall.

Disadvantage: A lot of false positives were detected.

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Spectral + Spatial Mean Shift

(i)(iii) Different Parameter Values and Statistics

Varying LUV Window Size (xy_window = 0.13)

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LUV Window Size	Precision	Recall
0.031	0.186022	0.22134
0.033	0.146101	0.251196
0.035	0.176975	0.243158
0.037	0.168478	0.252153
0.039	0.088491	0.134641

299091

LUV Window Size	Precision	Recall
0.031	0.112553	0.227471
0.033	0.098886	0.132986
0.035	0.199179	0.131322
0.037	0.15124	0.208117
0.039	0.078781	0.175858

124084

LUV Window Size	Precision	Recall
0.031	0.21771	0.269686
0.033	0.201386	0.286036
0.035	0.206592	0.289122
0.037	0.196479	0.291375
0.039	0.212407	0.265349

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LUV Window Size	Precision	Recall
0.031	0.539101	0.176279
0.033	0.438467	0.161861
0.035	0.476684	0.150163
0.037	0.49255	0.152884
0.039	0.485264	0.192601

35070

LUV Window Size	Precision	Recall
0.031	0.352522	0.241323
0.033	0.325564	0.255514
0.035	0.265262	0.219525
0.037	0.136803	0.111216
0.039	0.143742	0.136946

(ii) Segmentation Results For the Final Parameter Values for 5 Images
LUV Window Size: 0.035

Image	Precision	Recall
41004	0.137975	0.249569
299091	0.156817	0.279780
124084	0.126734	0.246025
135069	0.051488	0.218939
35070	0.108662	0.289717

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Varying XY Window Size (luv_window = 0.035)

41004

XY Window Size	Precision	Recall
0.11	0.197714	0.182105
0.12	0.176975	0.243158
0.13	0.176975	0.243158
0.14	0.176975	0.243158
0.15	0.176975	0.243158

299091

XY Window Size	Precision	Recall
0.11	0.181897	0.131322
0.12	0.191735	0.131322
0.13	0.199179	0.131322
0.14	0.19962	0.131322
0.15	0.19962	0.131322

124084

XY Window Size	Precision	Recall
0.11	0.228314	0.238655
0.12	0.253698	0.237487
0.13	0.206592	0.289122
0.14	0.232176	0.329246
0.15	0.232176	0.329246

135069

XY Window Size	Precision	Recall
0.11	0.476684	0.150163
0.12	0.476684	0.150163
0.13	0.476684	0.150163
0.14	0.476684	0.150163
0.15	0.476684	0.150163

35070

XY Window Size	Precision	Recall
0.11	0.350301	0.154129
0.12	0.138068	0.032741
0.13	0.265262	0.219525
0.14	0.265262	0.219525
0.15	0.265262	0.219525

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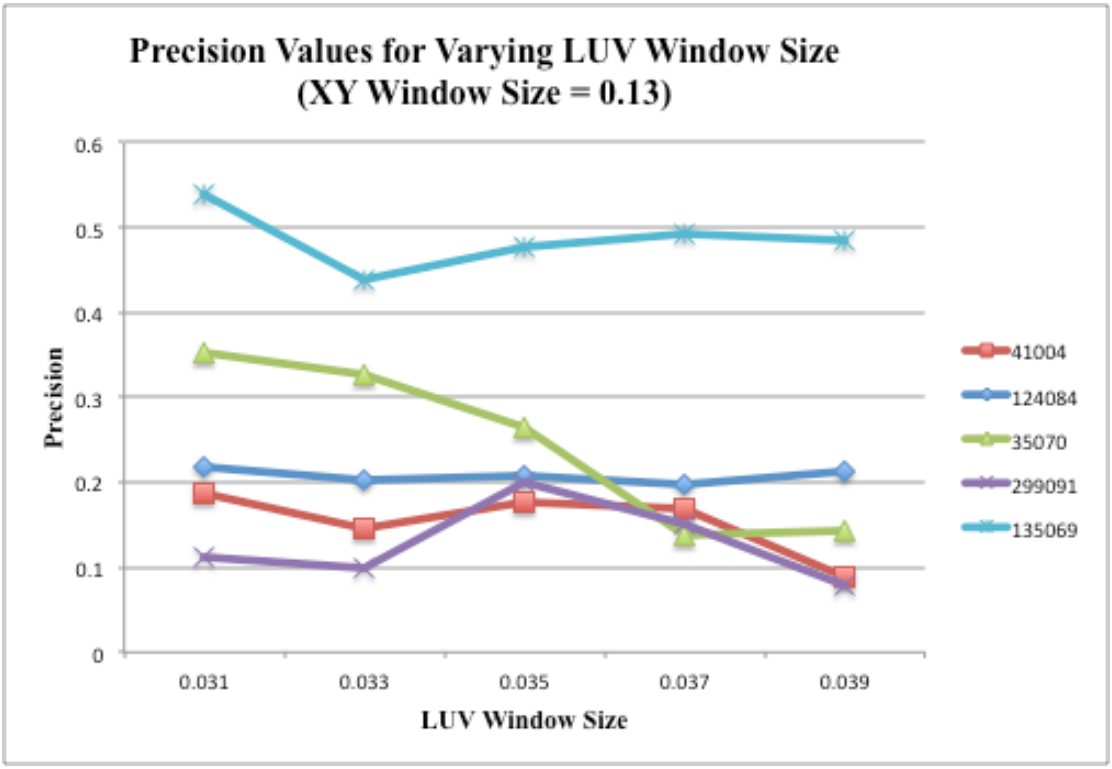
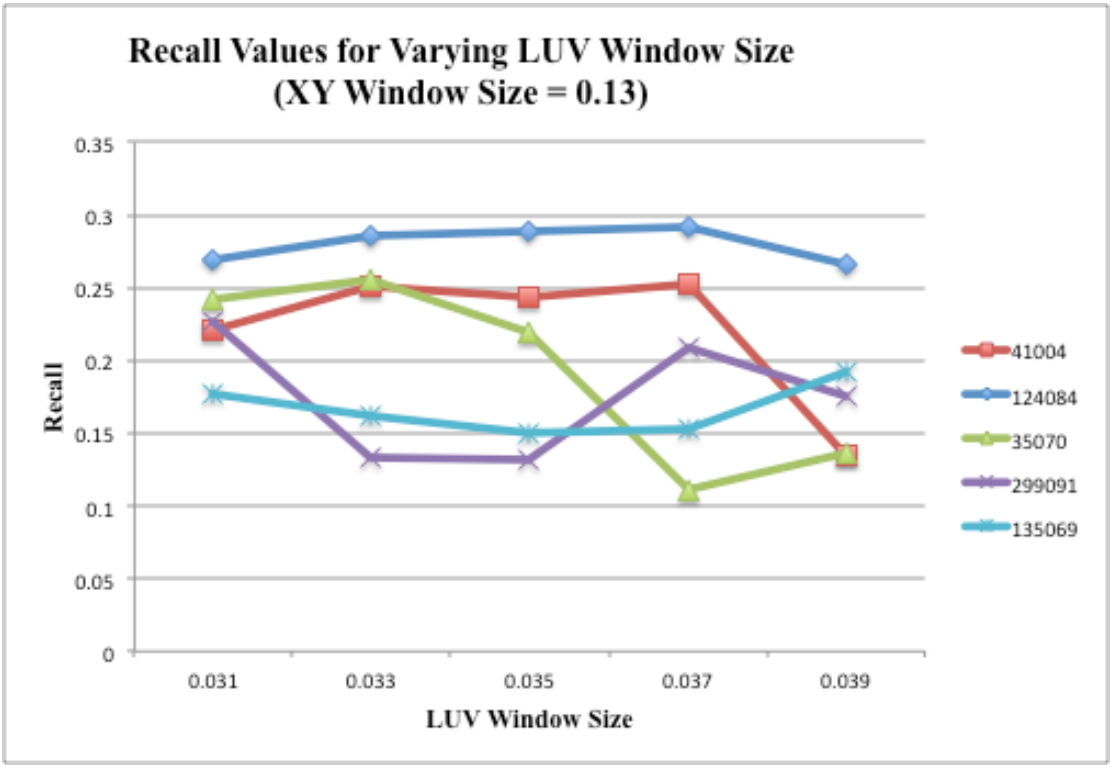
(iv) Illustration of Performance Statistics





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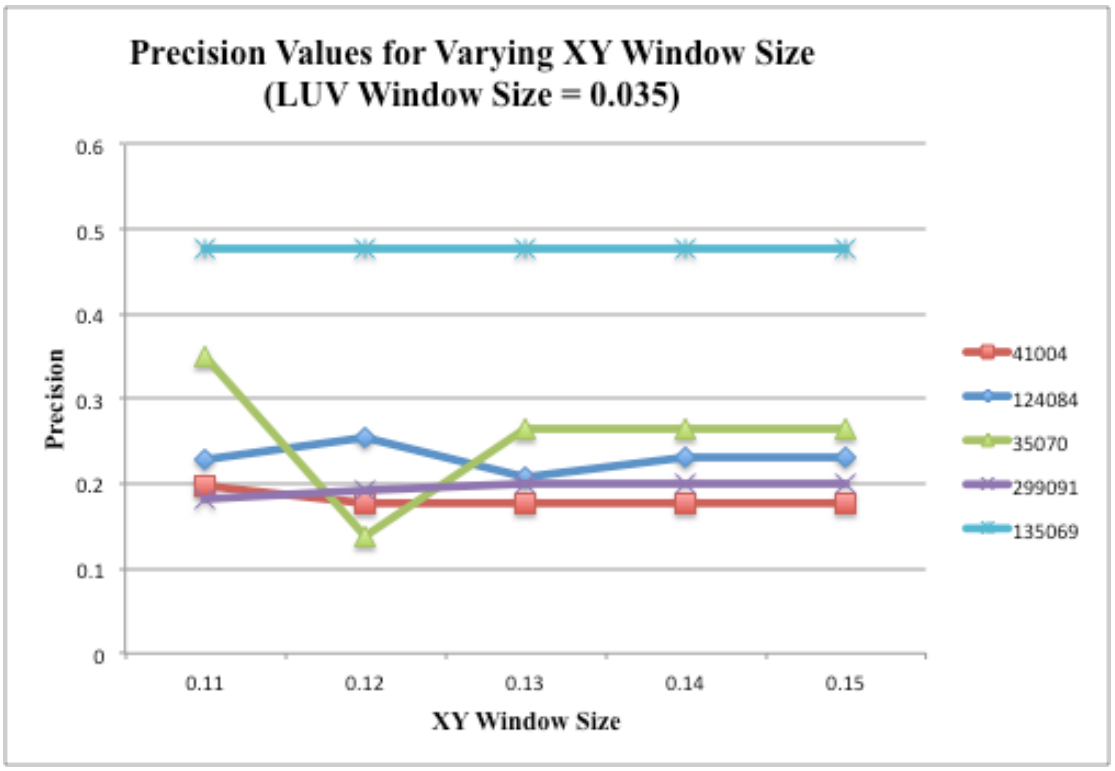

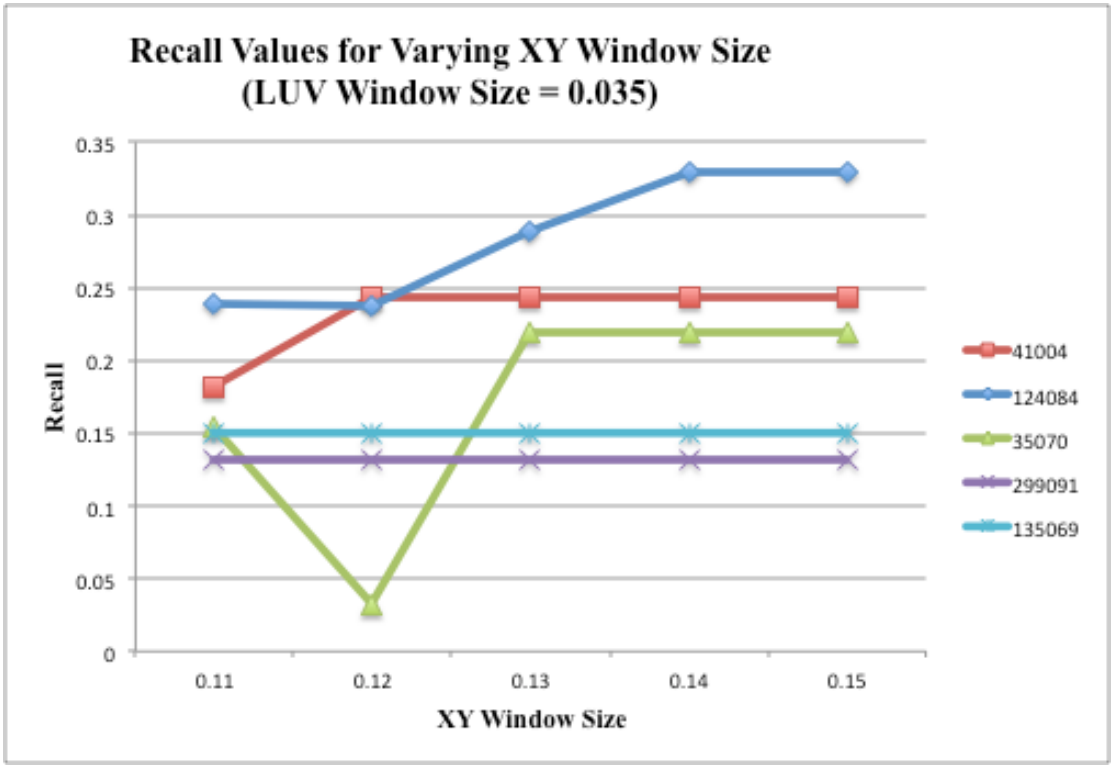

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(vi) Discussion

1. What effect does varying r seem to have on the resulting segmentations?

If we increase the LUV window size, the precision values decreased generally (or increased till a point (0.035). Recall generally decreased for all images when window size increased.

If we increase the XY window size, the precision values stayed constant generally (or decreased till a point (0.12). Recall generally increased or stayed constant for all images when window size increased.

2. What effect does adding position information as spatial features to color features have on the resulting segmentations?

The feature vector containing only LUV information gave false positives, therefore increased recall. Also, the precision values were so very less than the segmentations with spatial information added.

3. What are the advantages and disadvantages of using each type of feature vector?

Advantages of using only LUV feature vector: Faster than the other one. Increased recall.

Disadvantage: A lot of false positives were detected.

Advantages of using only LUVXY feature vector: Increased precision, less false positives.

Disadvantage: Much slower than the first one, since it is a 5 dimensional space.