Image Segmentation

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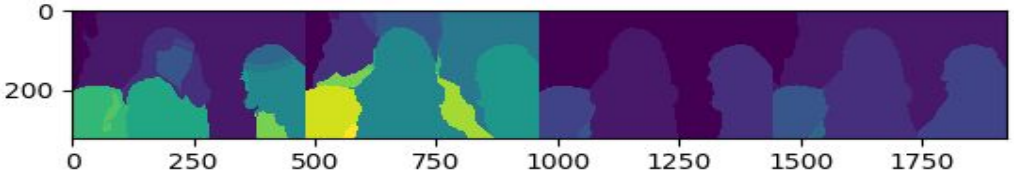
2)Visualize the image and the ground truth segmentation:

Original Image:

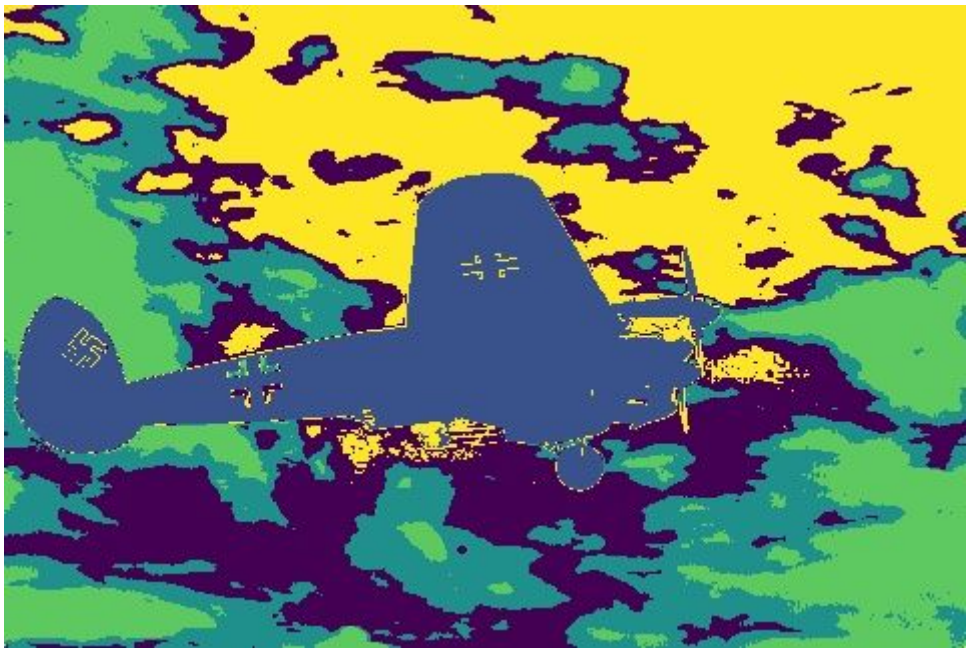
Ground Truth Segments:



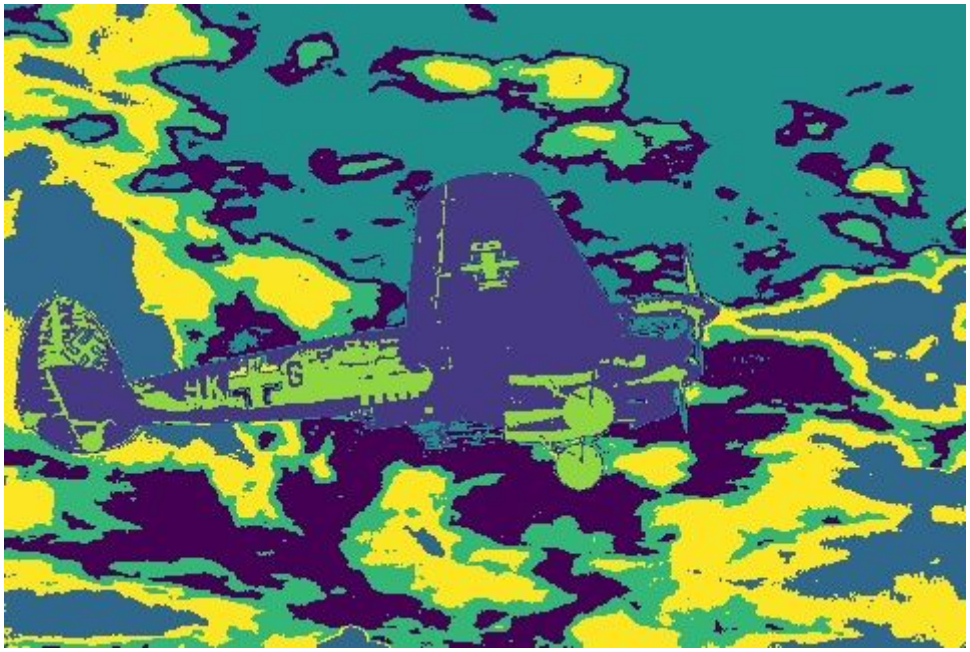
3)Segmentation using K-means:

-After loading our image and the corresponding ground truth (.mat file), We do reshape our image to a shape of (#Pixels*3) , 3 for the (R, G, B) array for each pixel.
-We run k-means on this newly shaped data between k= {3,5,7,9,11} clusters.
-Here are some samples of a clustered test image after reshaping it back and displaying:
K=3:

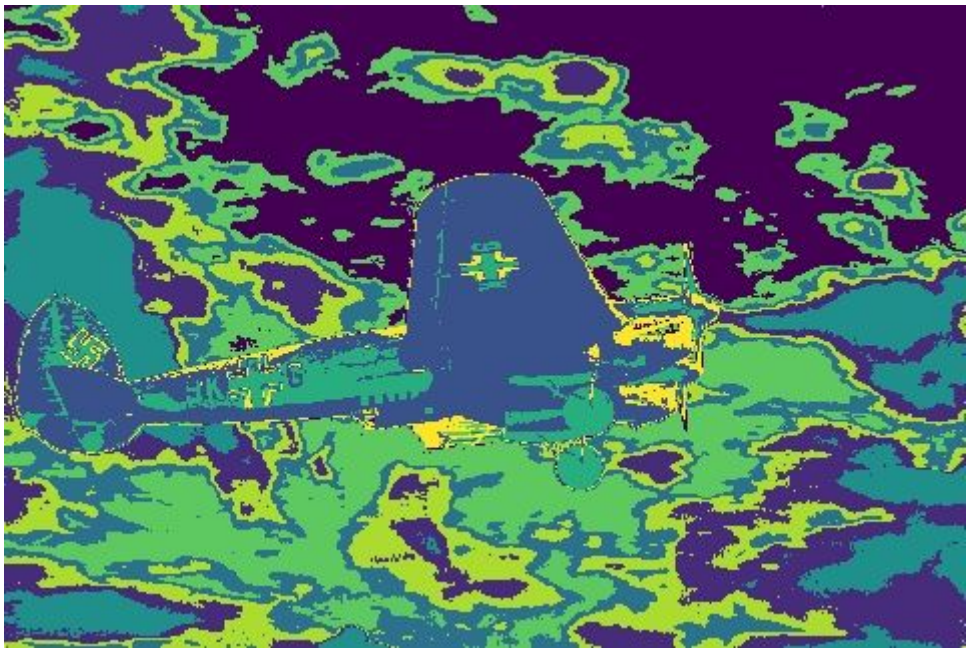
K=5:



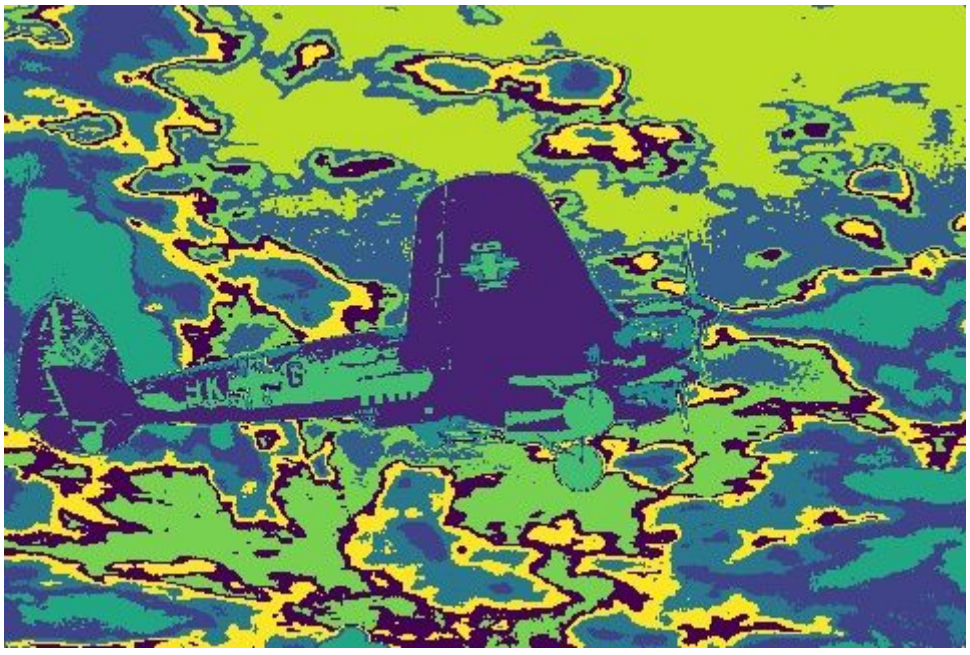
K=7:



K=9:



K=11:



b) Evaluation:

-Using the ground truth given we calculate clusters evaluation by F-measure method and Conditional Entropy
Lower value of Conditional Entropy is better !

here are some of our average results:

-Image: 100007.jpg
for k = 3 the evaluation of the image 100007.mat:
Confusion matrix:
[[12429 5873 608 457 6666]
[18931 641 4812 28 249]
[29 69367 112 731 33468]]

f-measure = 1.1788445170926989
entropy = 1.1031543938593658

for k = 5 the evaluation of the image 100007.mat:
f-measure = 0.5889697094880633
entropy = 1.0492599398216487

for k = 7 the evaluation of the image 100007.mat:
f-measure = 0.4488857451300241
entropy = 0.835700934547515
for k = 9 the evaluation of the image 100007.mat:
f-measure = 0.34406622987241176
entropy = 0.5828753190827131

for k = 11 the evaluation of the image 100007.mat:
f-measure = 0.2784738593789222
entropy = 0.46982752372918546

-Image:100039.jpg
for k = 3 the evaluation of the image 100039.mat:
f = 2.182629173689134
entropy = 1.764483450714026

for k = 5 the evaluation of the image 100039.mat:
f = 1.1967527919587582
entropy = 1.6359907739288364
for k = 7 the evaluation of the image 100039.mat:
f = 0.8058875203544104
entropy = 1.6129209775411382
for k = 9 the evaluation of the image 100039.mat:
f = 0.4698498162430155
entropy = 1.596153425326353
for k = 11 the evaluation of the image 100039.mat:
f = 0.5192763088810783
entropy = 1.4943121761573168

-Image:100099.jpg
for k = 3 the evaluation of the image 100099.mat:
f = 1.478908418121623
entropy = 1.1575999701421327
for k = 5 the evaluation of the image 100099.mat:
f = 0.8533017014131605
entropy = 1.0509820561918568
for k = 7 the evaluation of the image 100099.mat:
f = 0.5025439216096685
entropy = 1.0202341781198216
for k = 9 the evaluation of the image 100099.mat:
f = 0.44881284849101927
entropy = 0.9869572150207709
for k = 11 the evaluation of the image 100099.mat:
f = 0.3066175419837418
entropy = 0.9799759103012059

-Image:10081.jpg
for k = 3 the evaluation of the image 10081.mat:
f = = 5.046894245790263
entropy = 1.34690353628151
for k = 5 the evaluation of the image 10081.mat:
f = 2.9496194261712345
entropy = 1.1380489585926485
for k = 7 the evaluation of the image 10081.mat:
f = 2.0028477734801458
entropy = 1.0710491594880593

for k = 9 the evaluation of the image 10081.mat:
f = 1.444726010832322
entropy = 1.0785762694927

for k = 11 the evaluation of the image 10081.mat:
f = 1.0442765592967334
entropy = 0.936768806294014

4)Big Picture:

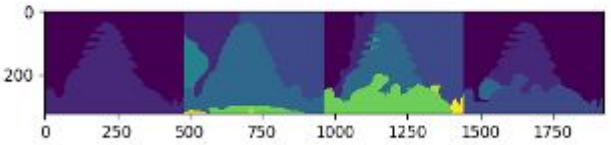
a)

a)Using K-means with k=5

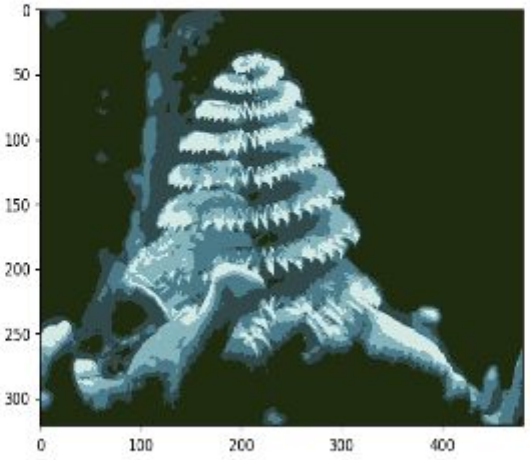
1-

Original

Ground truth



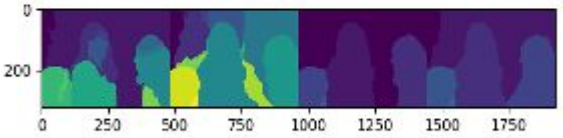
Result



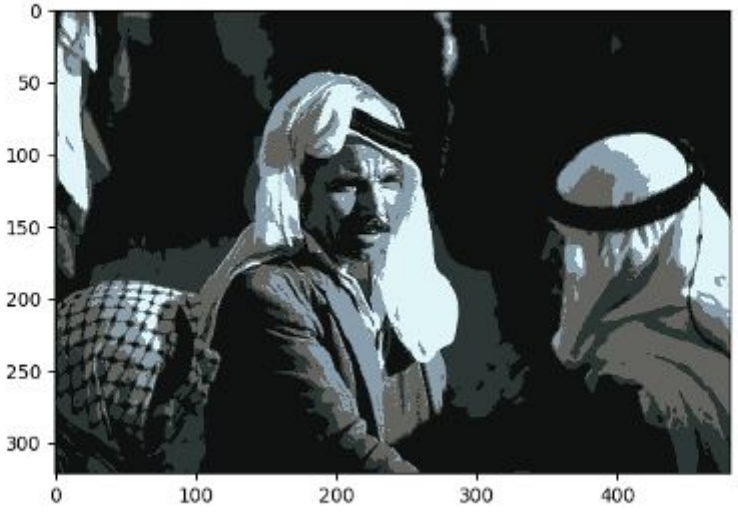
2-

Original

Ground Truth



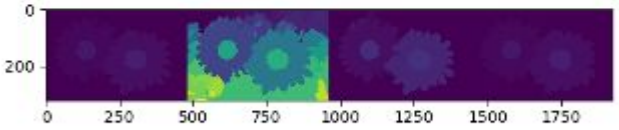
Result



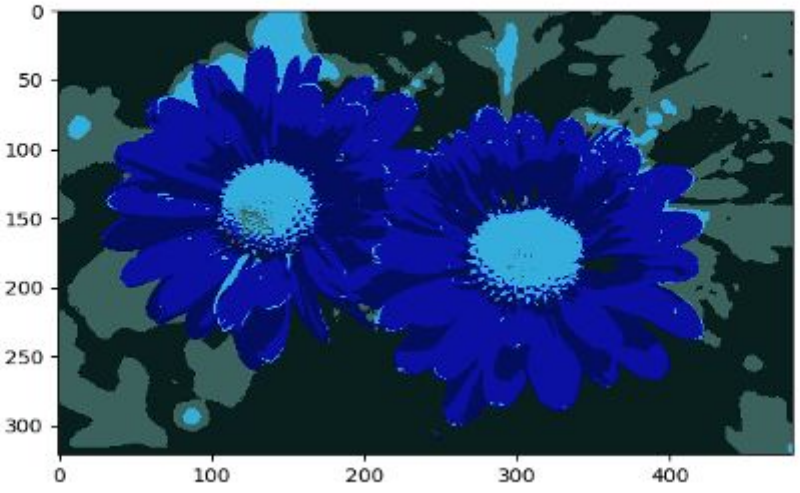
3-

Original

Ground Truth



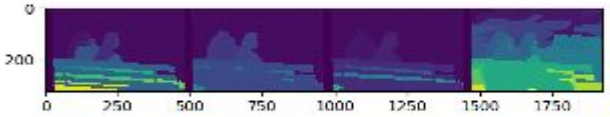
Result



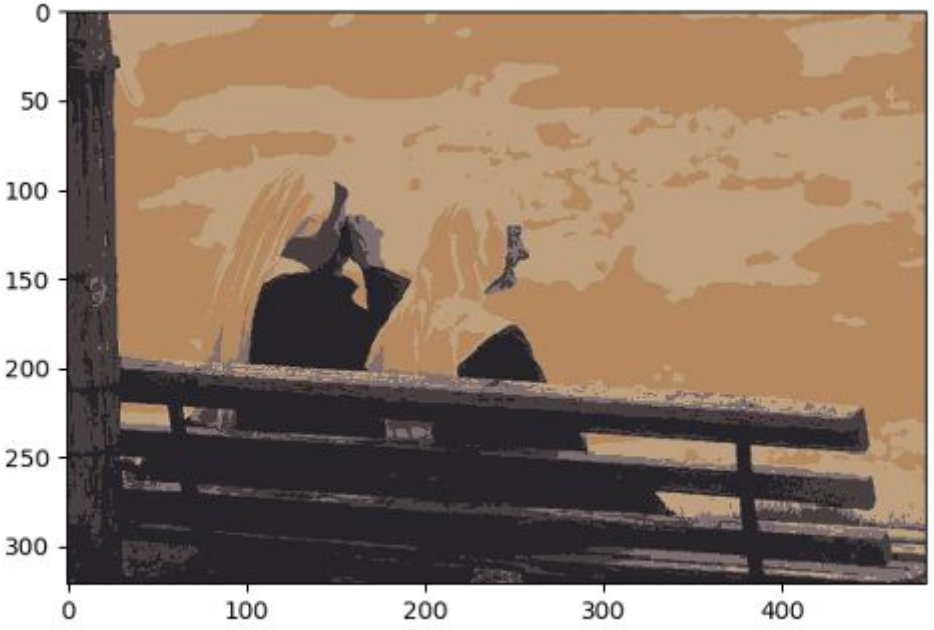
4-

Original

Ground Truth



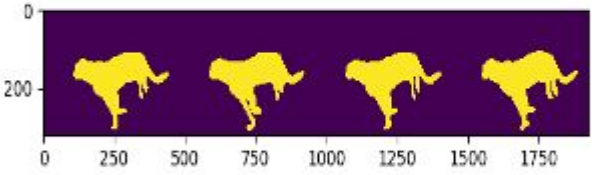
Result



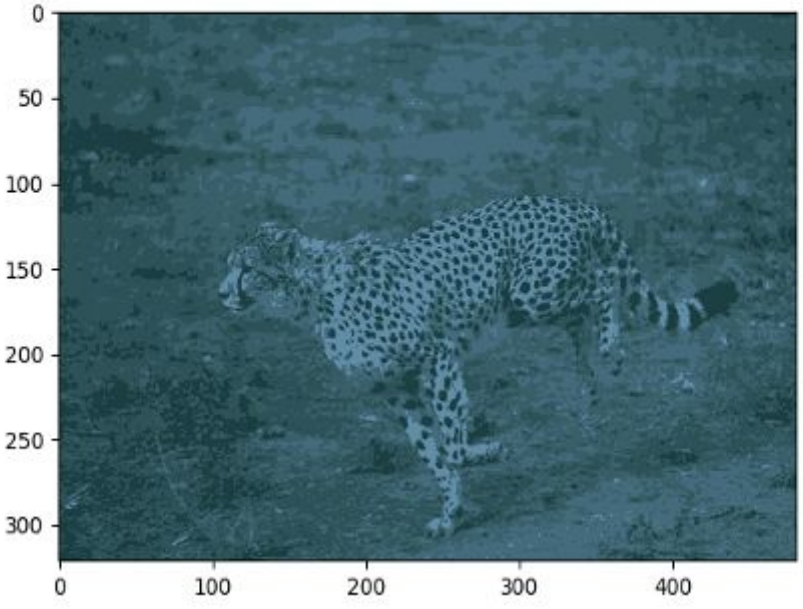
5-

Original

Ground Truth

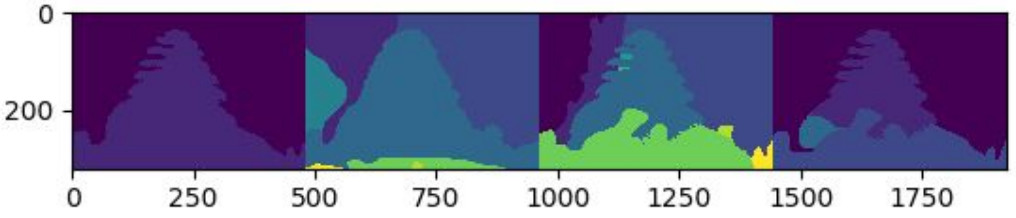


Result



b)Using N-Cut with 5NN graph:
Original:

Ground Truth:



Result: