CS736(Medical Image Computing) Project

Group:

160050046	Ankit
160050055	Sushant Tarun

Topic: Segmentation Algorithms Comparison

We implemented various segmentation algorithms and compared them based on silhouette values and also based on ratio of number of pixels labelled correctly to total number of pixels.

The algorithms compared were k-means, Fuzzy C-means, EM, Bayesian Graph s-t cuts.

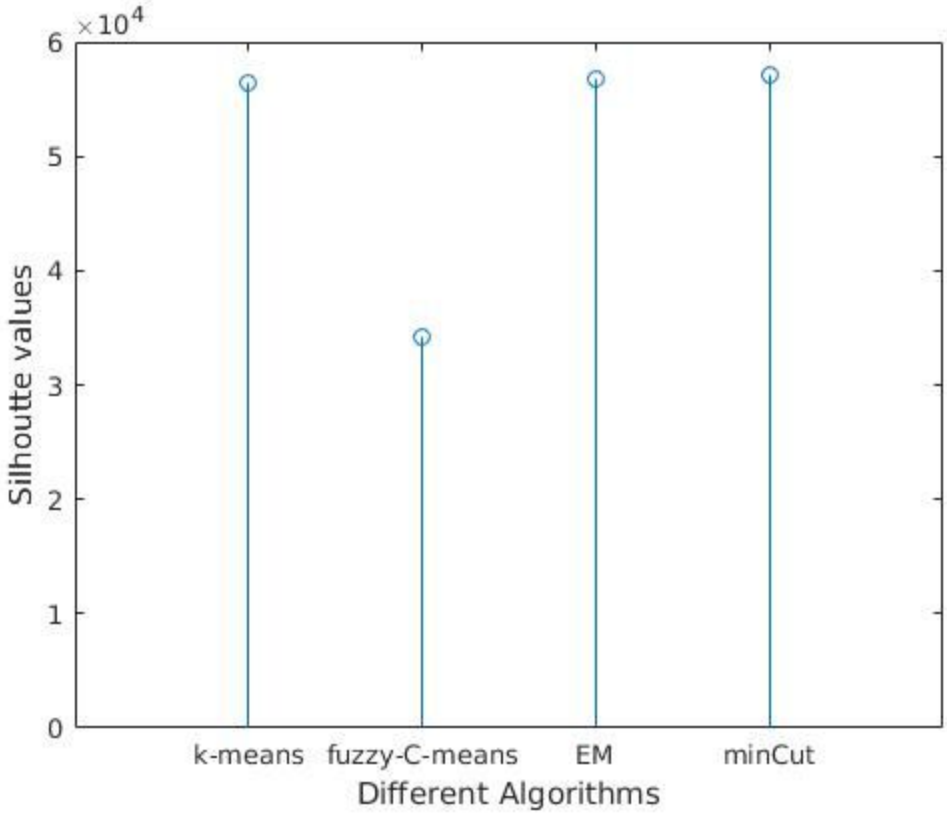
We applied our algorithms on phantoms of varying noise levels and also brain MRI image.

We also implemented two algorithms namely, genetic algorithm(for segmentation) and sobel method(for edge detection) but we couldn't use them for comparison with the others because of time constraint of genetic algorithm and non-convertibility of edges to segmentation.

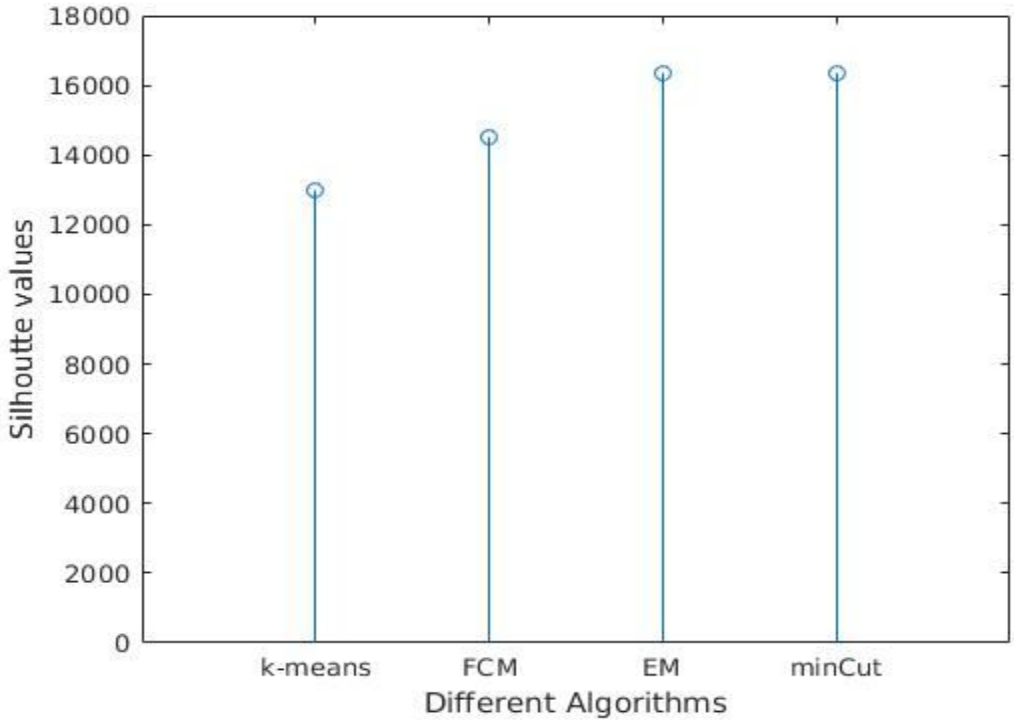
How to run:
To get the silhouette values run Comparison.m
To get the error ratio values run Comparison.m
For genetic algorithm run genetic.m
For sobel operator run sobel.m

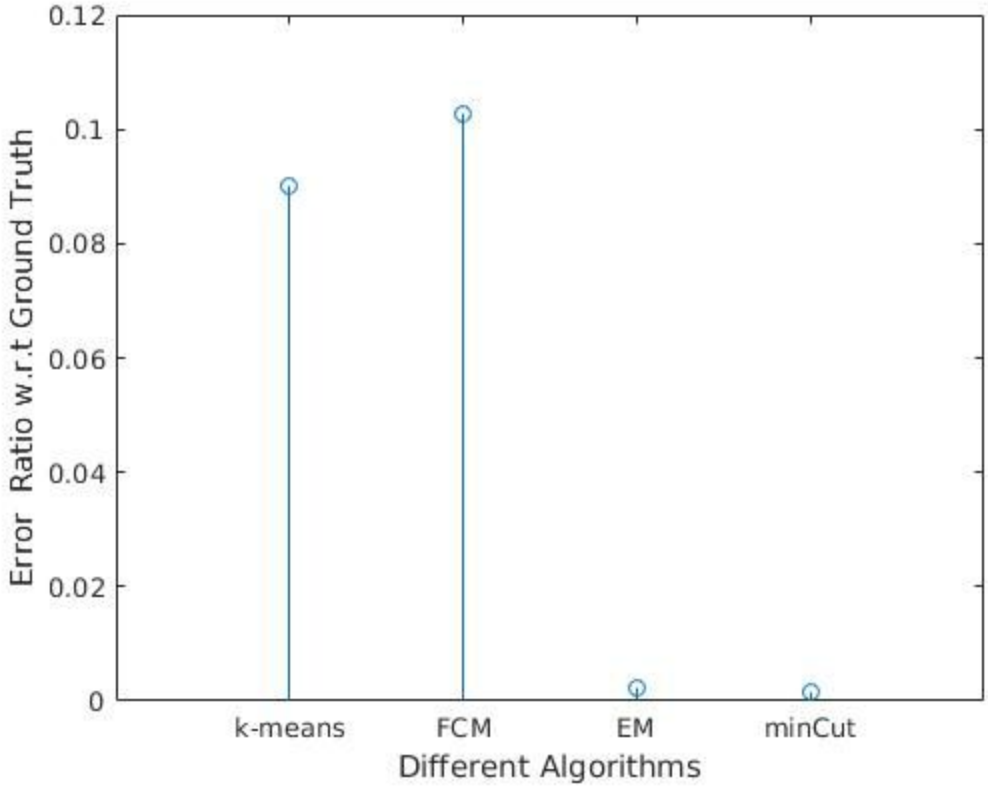
The comparative results are as follows:

Brain Image:

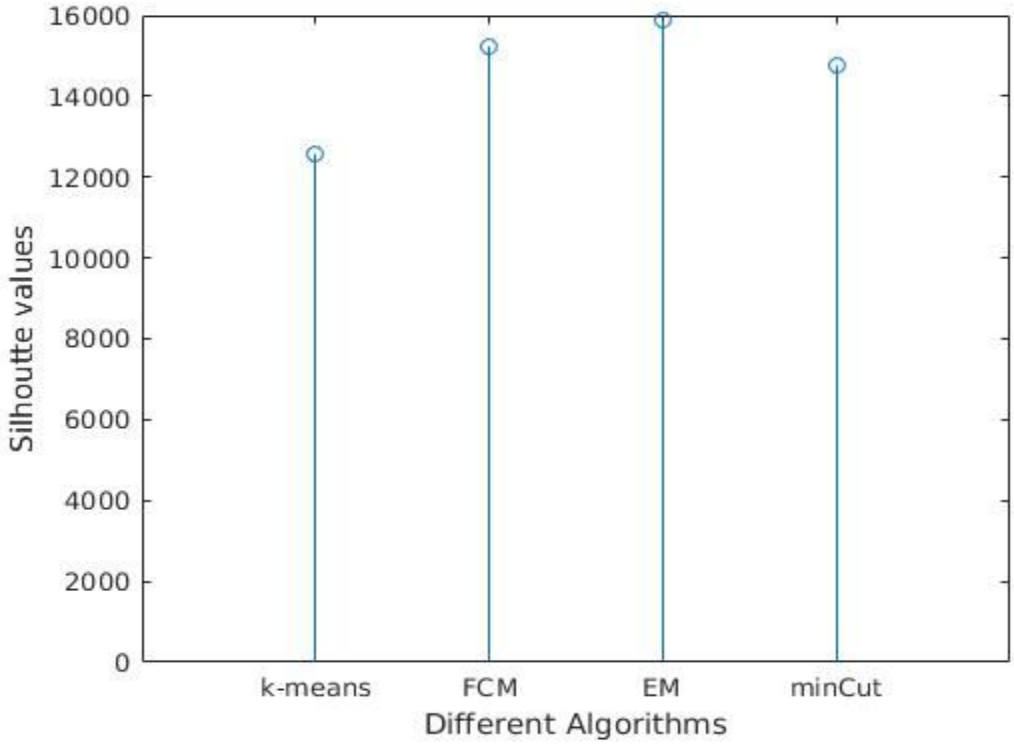

×10^4
6
5
4
3
2
1
0
Silhoutte values
k-means
fuzzy-C-means
EM
minCut
Different Algorithms

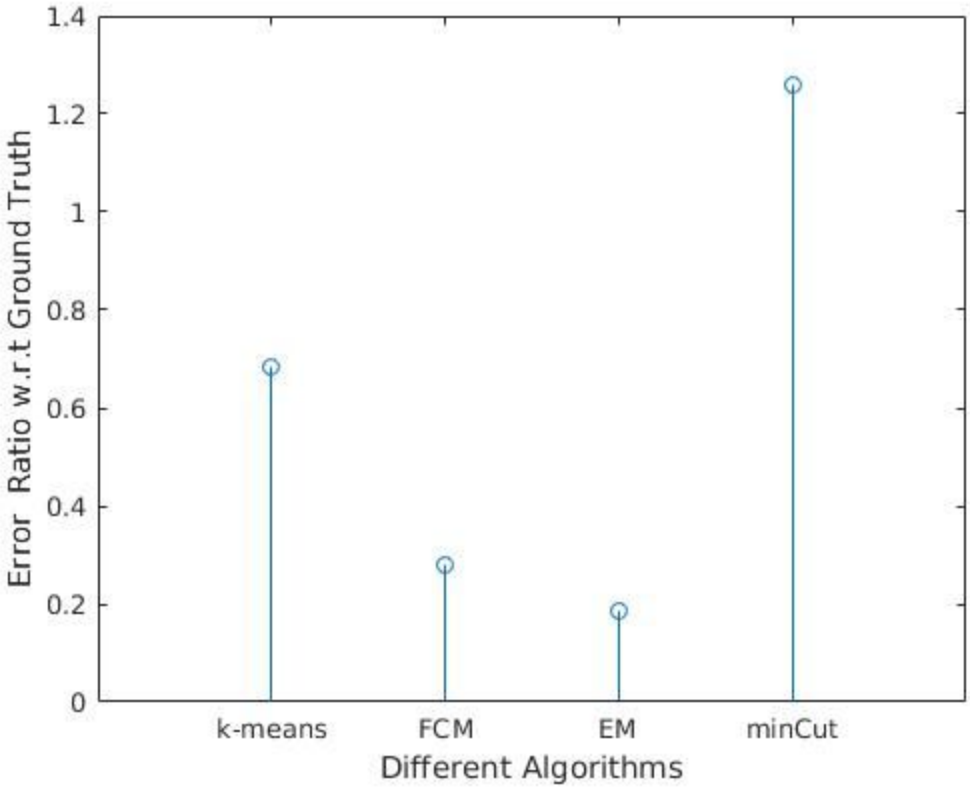
Phantom Image with No noise:



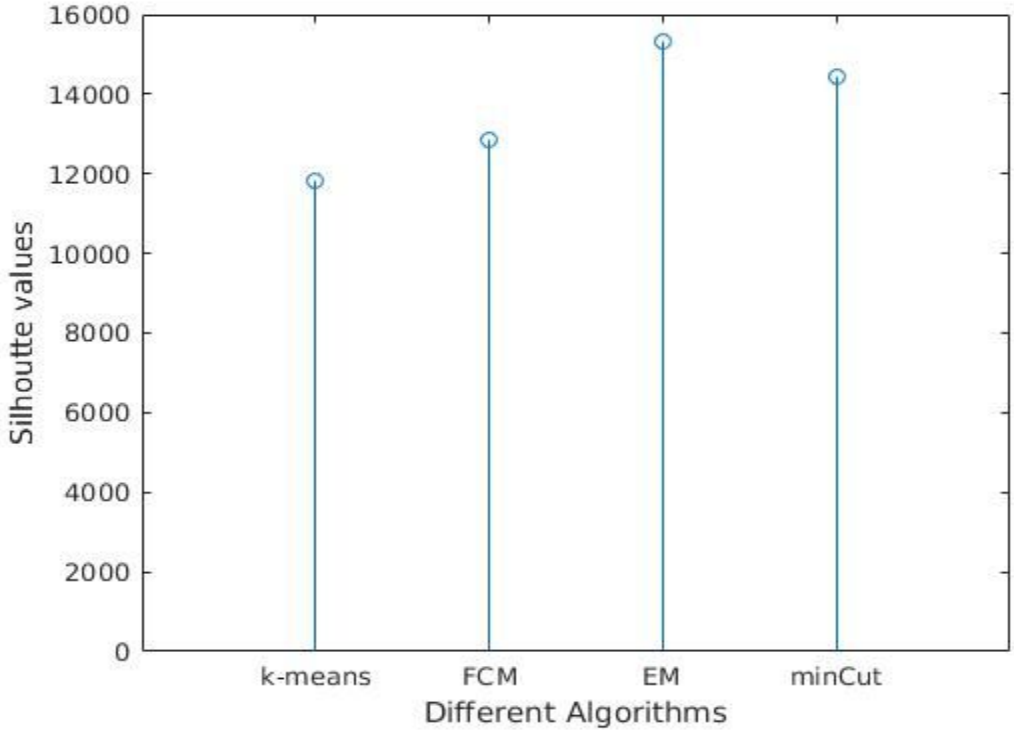


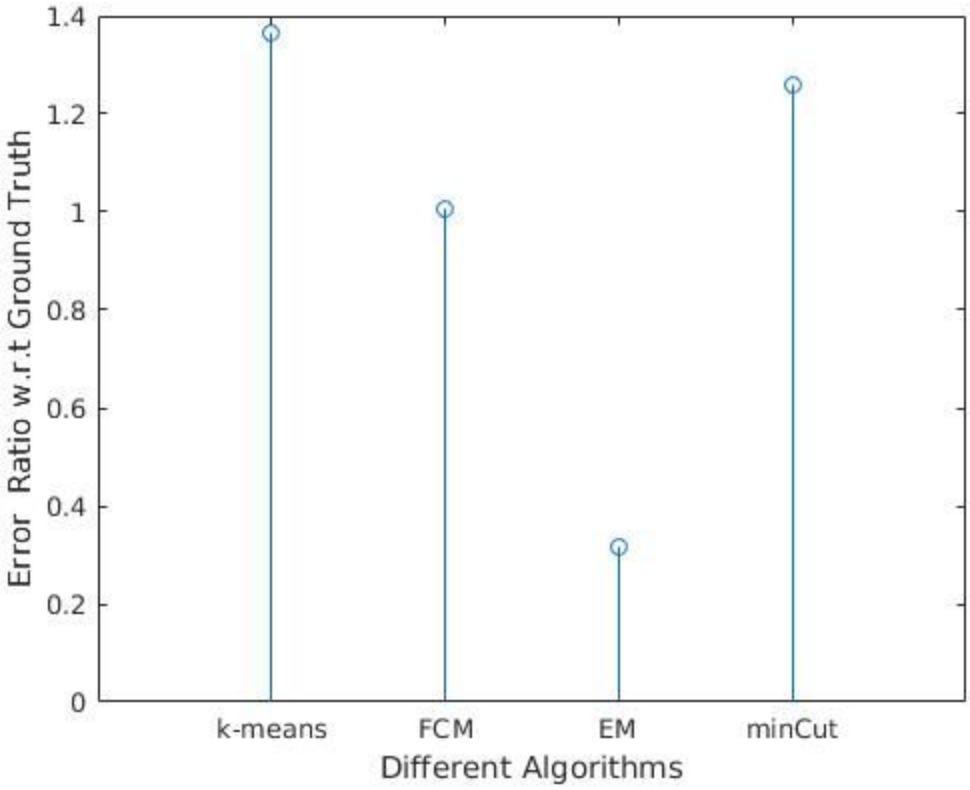
Phantom Image with gaussian noise of mean=0 and sigma=0.0001



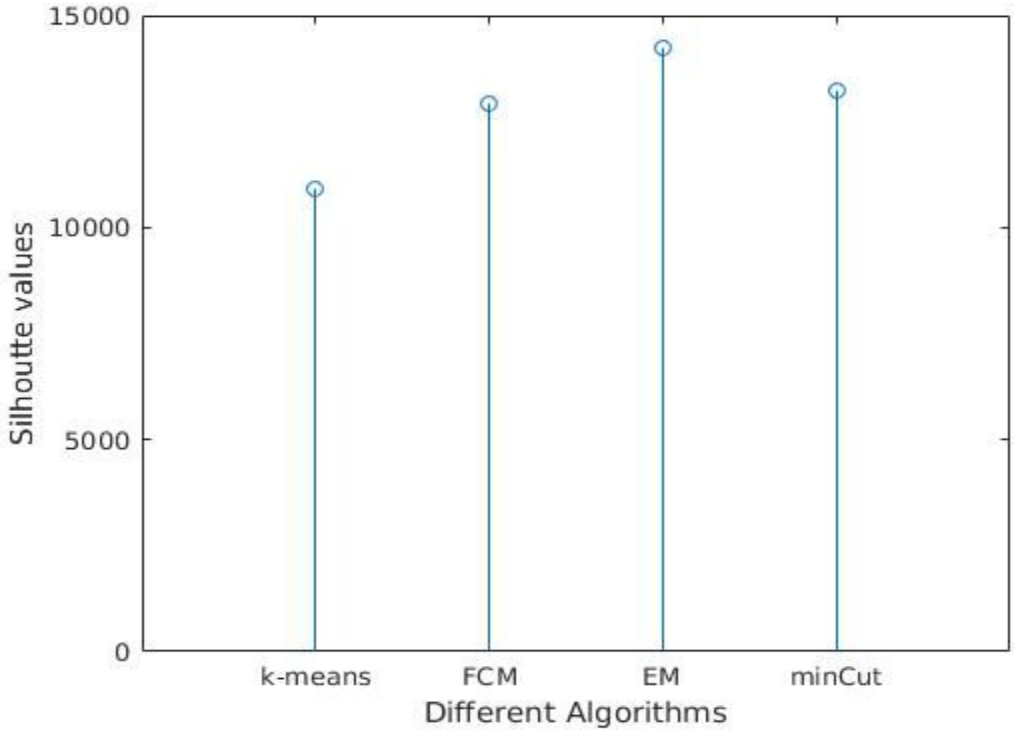


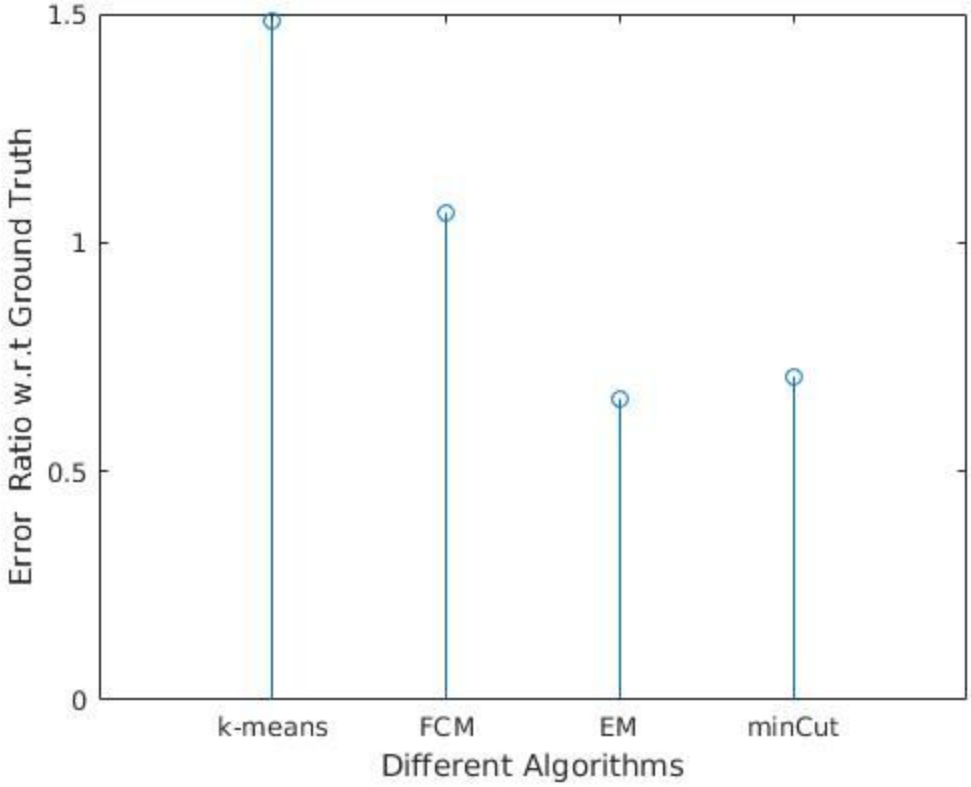
Phantom Image with gaussian noise of mean=0 and sigma=0.0005



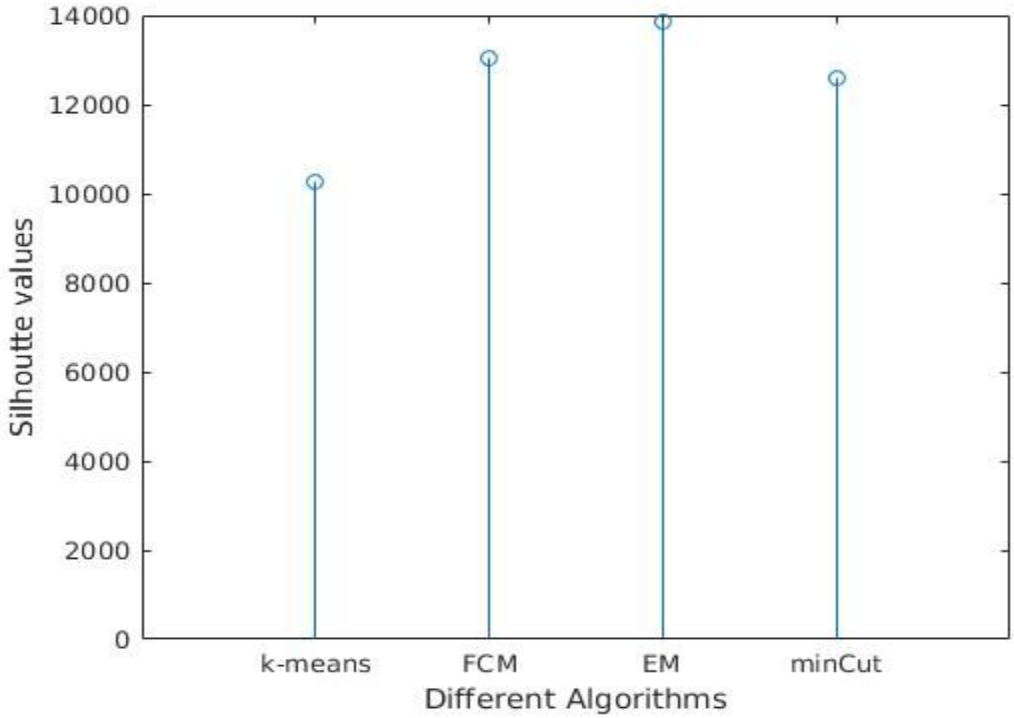


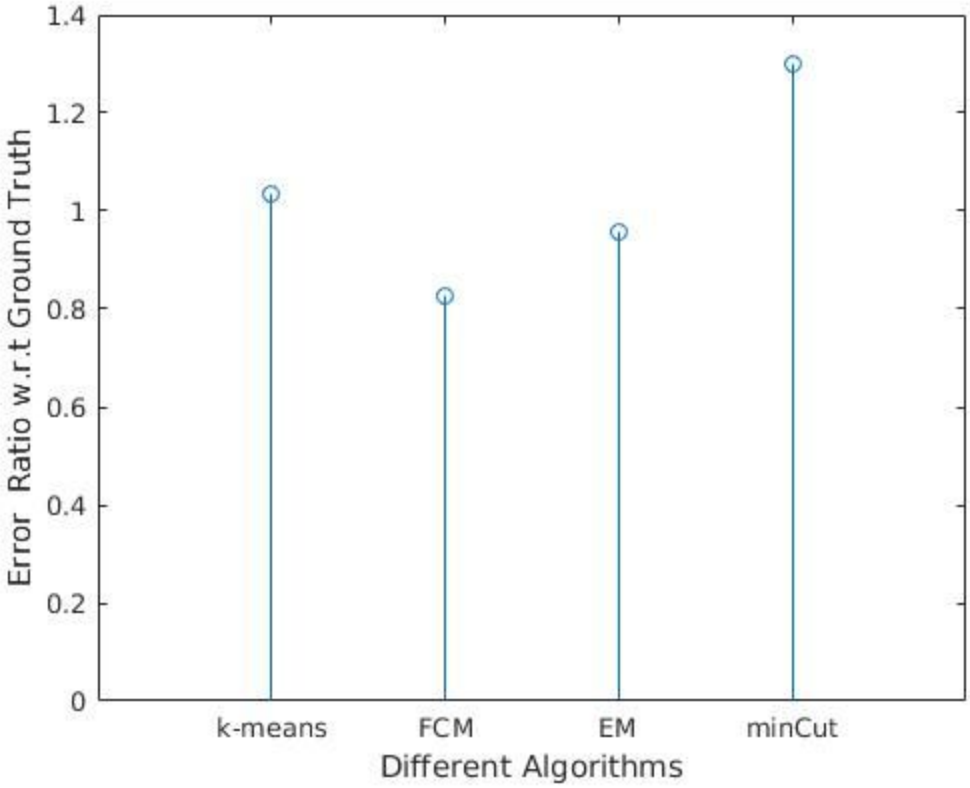
Phantom Image with gaussian noise of mean=0 and sigma=0.0025





Phantom Image with gaussian noise of mean=0 and sigma=0.01





Conclusion:

More the silhouette value better the segmentation.
Less the error ratio better the segmentation.

From all the graphs it can be concluded that EM gives the best Segmentation results.