Computer Vision

Assignment 2

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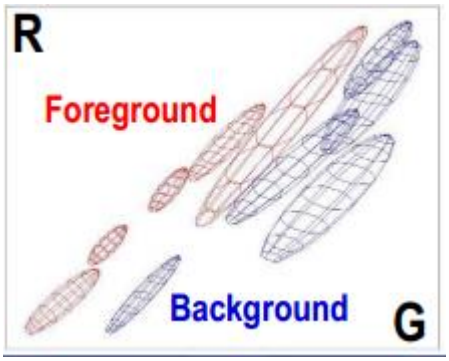
Graph Cut

GMM Models:

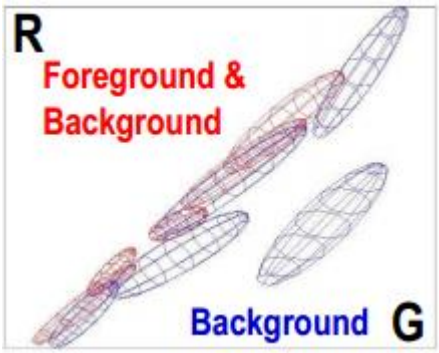
Gaussian Mixture models is applied on foreground and background regions independently. Background may contain different patterns, they all cannot be put in single Gaussian so we estimate foreground and background differently and then we take a pixel, and then we compare it with 2 GMM's and find the posterior probability of a pixel with both models and log of this value is taken as a weight between source/sink and pixels.

Weight: -log(p(c(x)|foreground/background)).

Initial



Final



Pair-wise Weights:

Here we used 4 connected neighbors, and edge weight depends on the pixel color values. Euclidian distance is considered. Here we considered YUV color model to measure the distance. And distance is measured between only U and V component as Y signifies brightness.

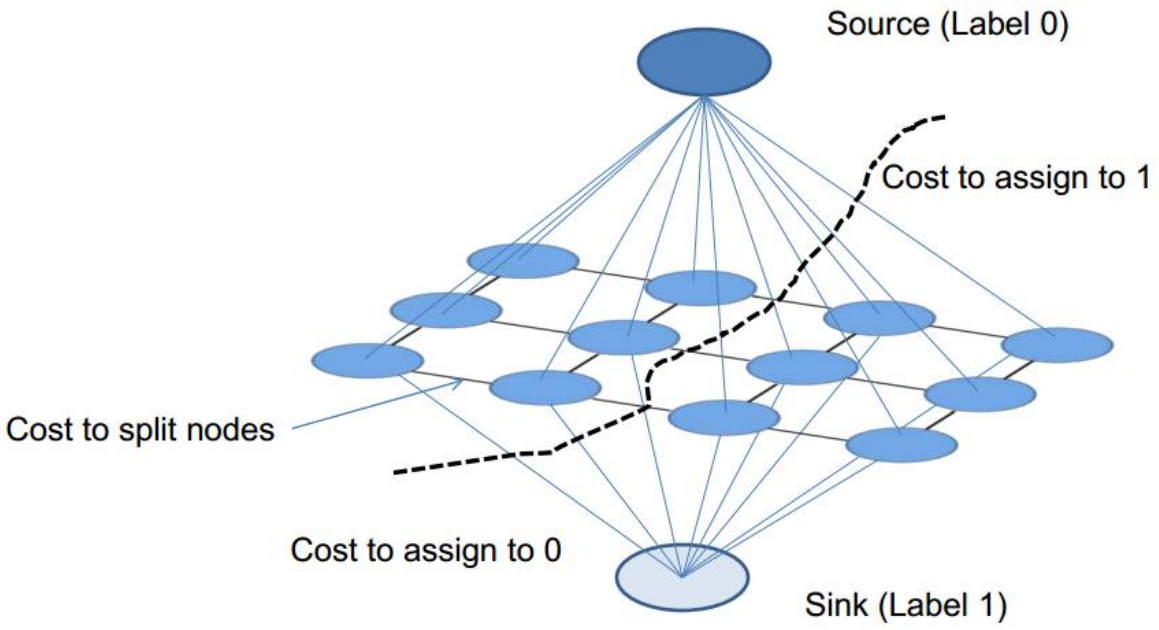
Weight function=$2 + 3 * e^{(Distance/2)}$

Graph Cut:

Max flow or Min cut problem

From the above constructed graph (with strong weights b/w similar pixels), is cut in such a way, energy is minimized. Maxflow libraries are used to do the graph cut part. Graph-cut divides pixels into 2 parts. One those that are connected to S, and other that are connected T. These are the labels of the pixels.

Using this info as fg, bg pixels, we segment the image. For, Grab-cut the input is again given to GMM and process is repeated for 5-10 times.



Result:

Input Image:

Microsoft Inbuilt Grab-cut output:

Output(Steps 1-5):