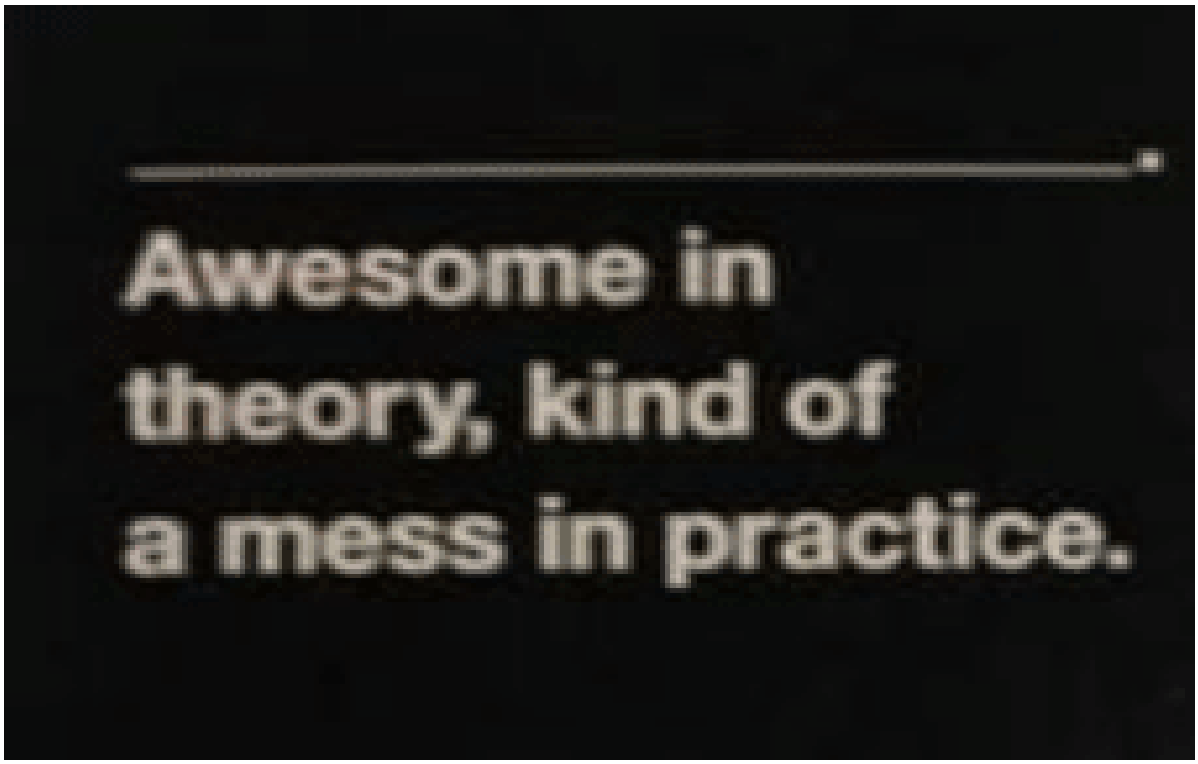
Let's Do The Segmentation



By this moment you have learned about how to remove the bias field from the image. After this we can work on clustering the pixels of the brain.

What is our goal ?
Our goal is to come up with partitioning of pixels into three categories such that pixels of the same tissue are in the same cluster and that of two different tissues are in two different clusters.

How will we know which pixels belong to which tissue ?
Well the magnetic field intensity (which is related to the pixel intensity) of pixels of the same tissue will be similar. In other words, the pixels of the same tissue will be closer (using the L2 Norm). So essentially this is our usual clustering problem.

Objectives of this task

1. Learning mixture modeling (Including but not limited to understanding why they are better than K - Means Clustering Methods)
2. Understanding Gaussian Mixture Modeling (A type of mixture modeling)
3. Understanding Expectation - Maximization Method

4. Implementing it
5. Creating Report/Documentation of your results and methods learned.

Resources

1. https://www.microsoft.com/en-us/research/uploads/prod/2006/01/Bishop-Pattern-Recognition-and-Machine-Learning-2006.pdf (Chapter 9)
2. https://drive.google.com/file/d/1oDeqXBFYn2WZeY-27UqZmDwsvpnX77fl/view (Page 46 - 71 (inclusive))

I would suggest going through these two resources. The theory part would take time to grasp. I would especially suggest you to understand EM from a general point of view and then try to apply it to GMM. Once you have understood this theory, you have to implement it. Again this algorithm is also updates based so not difficult to code as such.

> **The above task is a must to get the certificate from my side. Once you are done with overall documentation of the whole project, you can ping me for another additional assignment (this assignment will involve reading a research paper, markov random fields and understanding and implementing a simple (very complicated to understand at first though) algorithm that is derived from this paper).**