MIC Assignment 3

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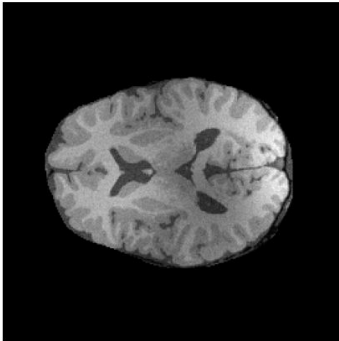
Segmenting a Brain MRI
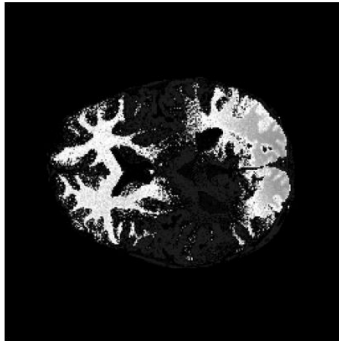
Initializations used

- The chosen value of q = 2.
- The initial estimation of the centroids is done with **kmeans++**. The initial values are:
  - `array([0.580275 , 0.2508946, 0.4717287], dtype=float32)`
- The initial membership assignment is done with a normal FCM. The membership images are as shown:
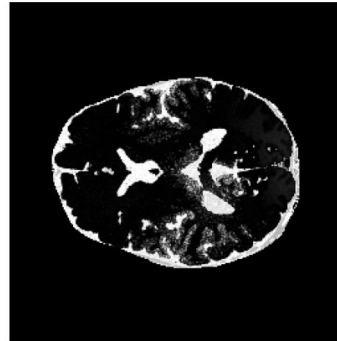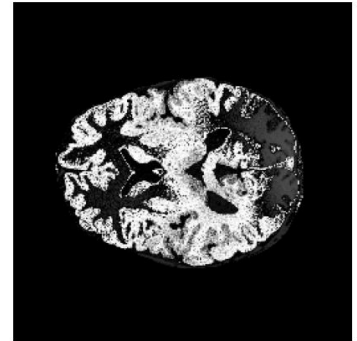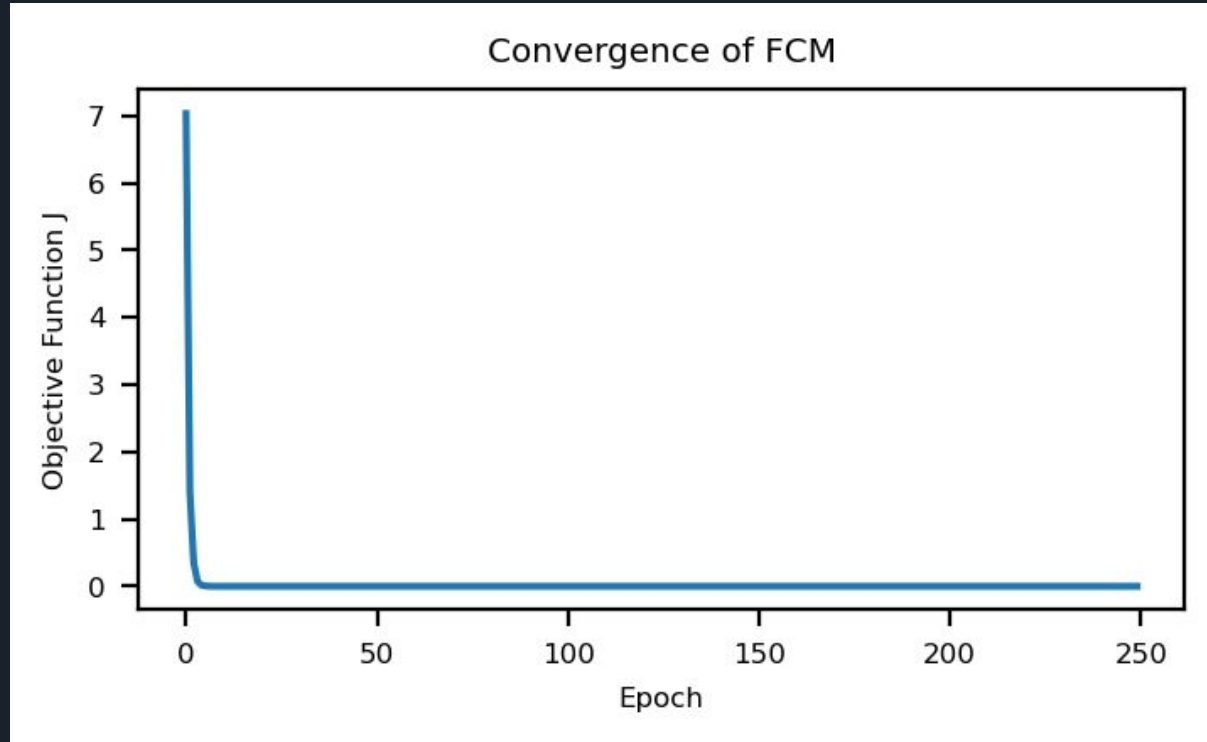

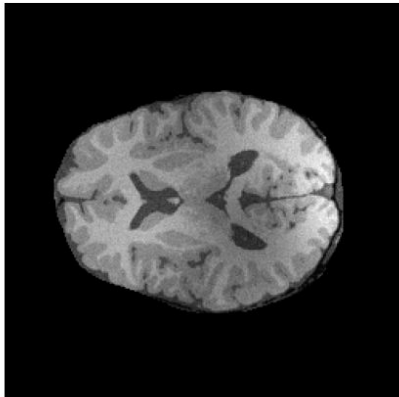Corrupted MRI   Membership (Class 1)   Membership (Class 2)   Membership (Class 3)
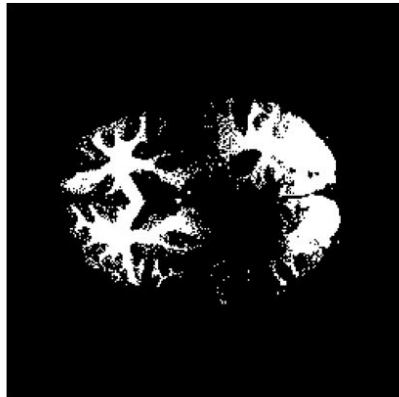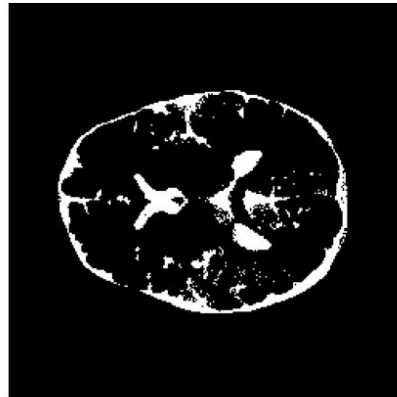
Objective function vs Epochs:
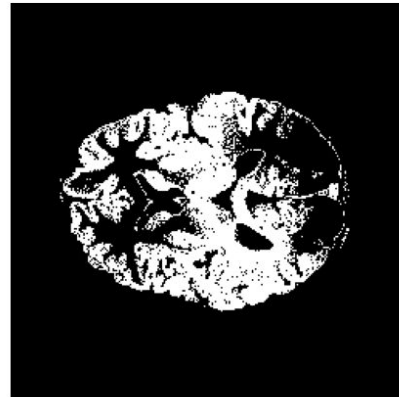
The Results

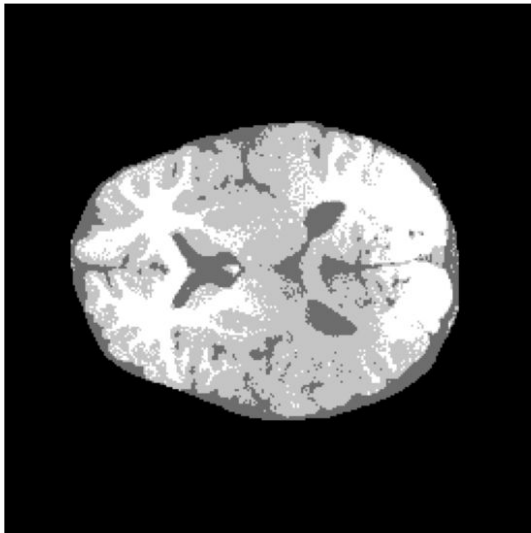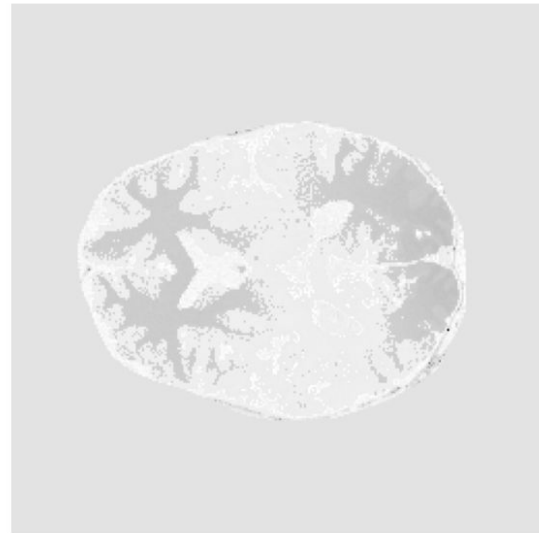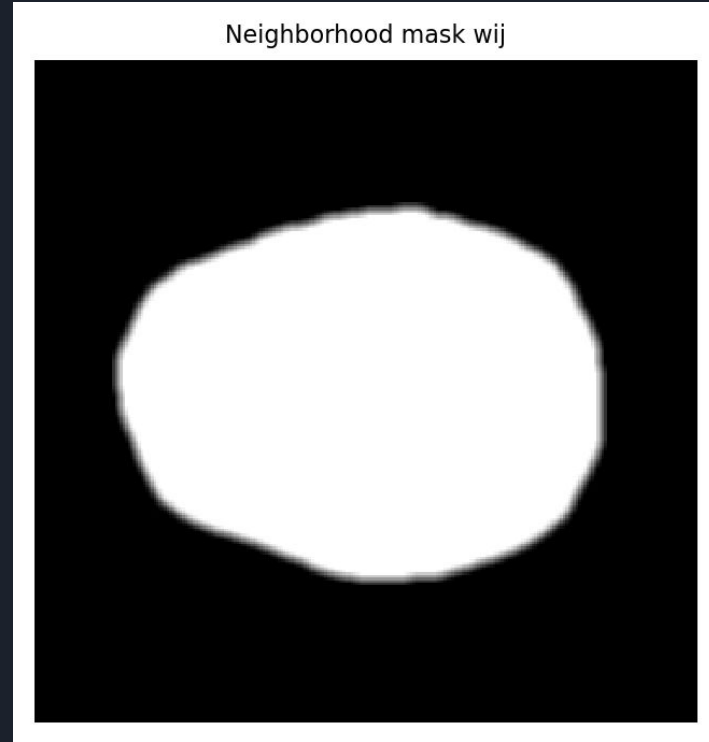| Corrupted MRI | Membership (Class 1) | Membership (Class 2) | Membership (Class 3) |

The Results

Bias Field Estimate   Bias-Removed Image   Residual Image

Neighborhood Mask, with a 5 x 5 overlap grid

Neighborhood mask wij
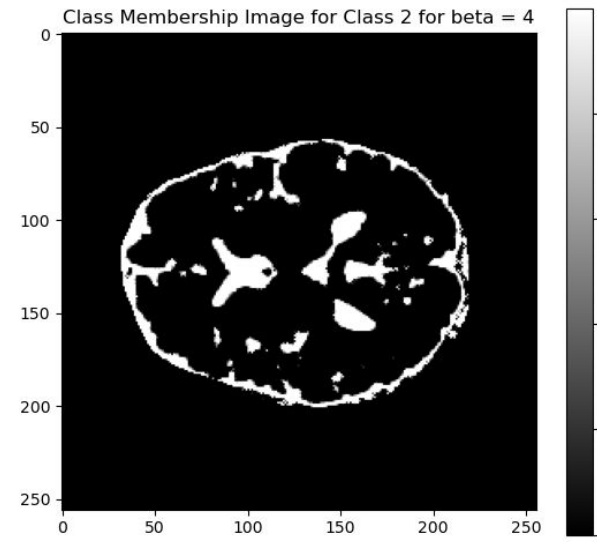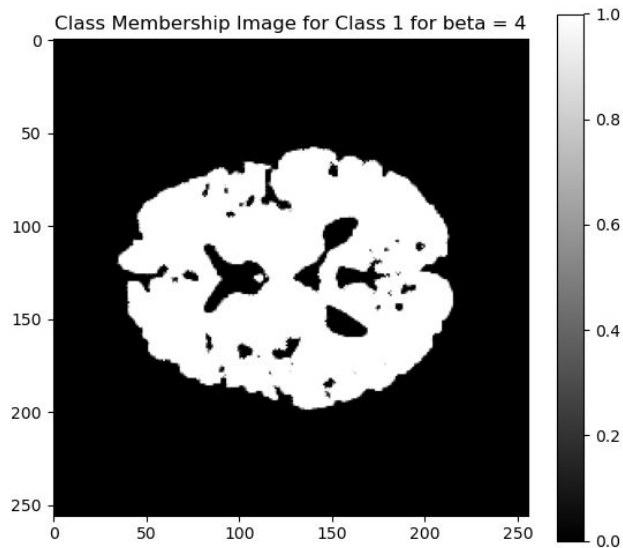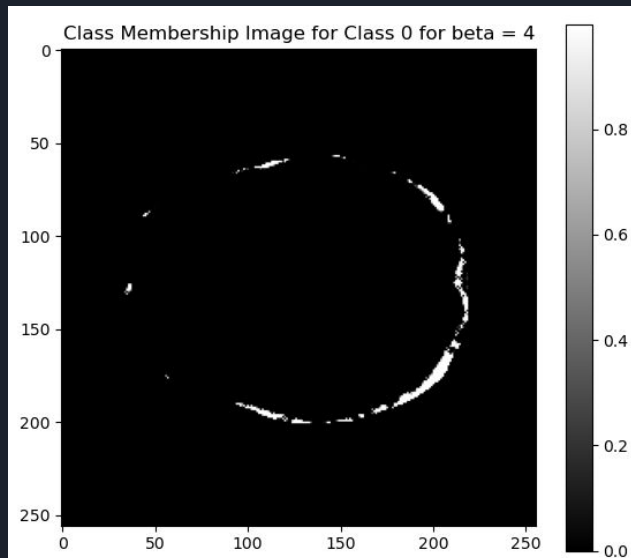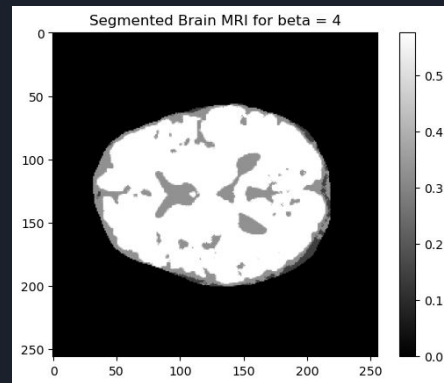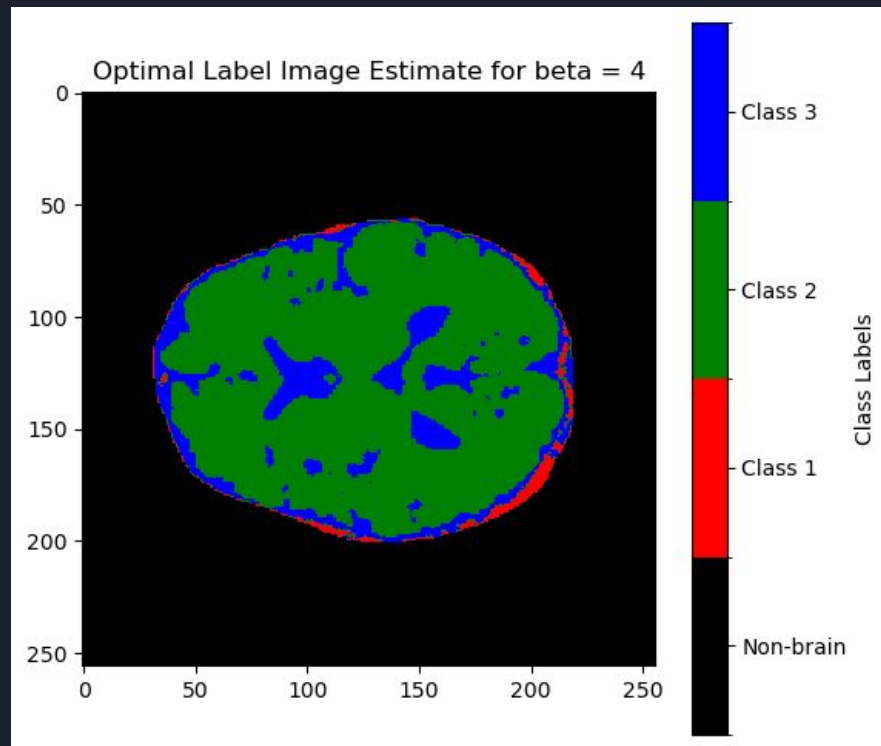
Initializations used

- For no. of clusters = 3
- The initial estimation of the centroids is done with **kmeans**. The initial values are:
  - ```
    Mean: [0.04827107, 0.57584521, 0.31780393]
    ```
  - ```
    Covariance: [0.00095086, 0.0043139 , 0.00499235]
    ```
- K-means groups similar pixels together based on pixel intensity, providing a good starting estimate for labels and faster convergence
- The means and covariance returned by the k-means algorithm are a good estimate of the Gaussian since the initial estimate is a good approximation and for this approximation, the means and covariances returned are exactly the parameters used in the Gaussian
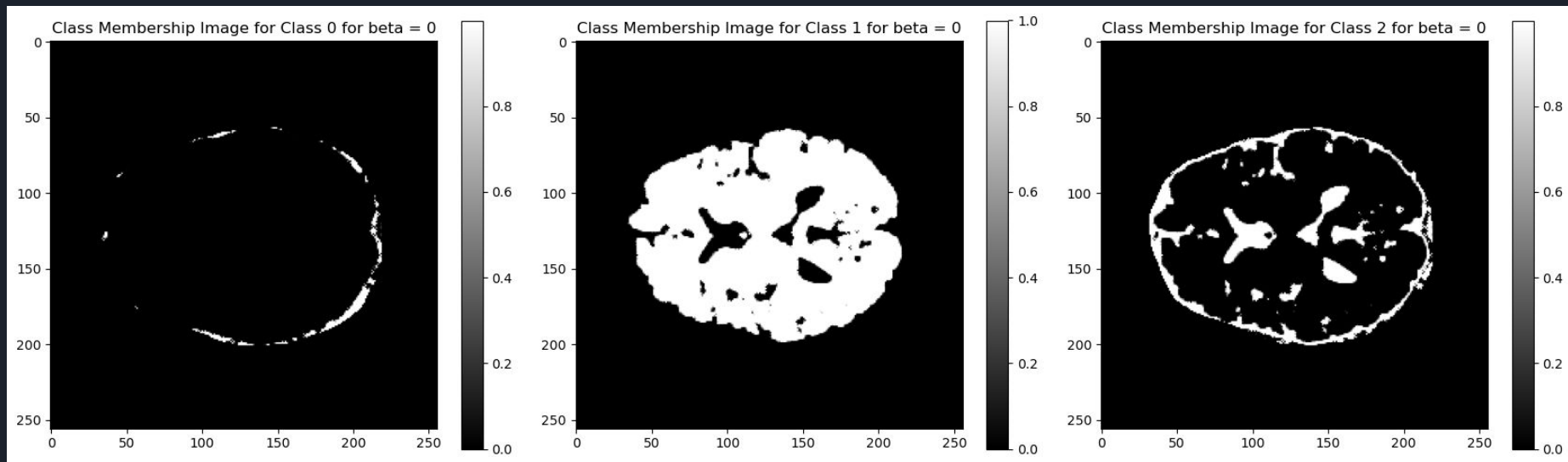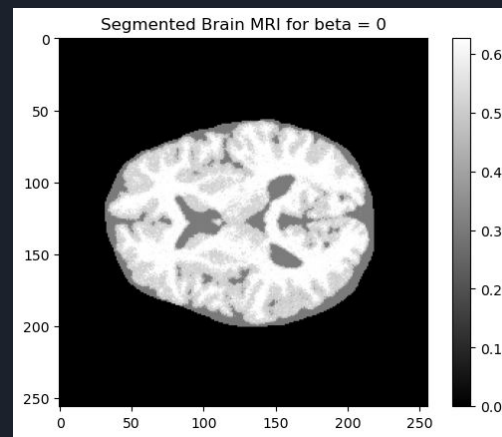
The Results

Segmented Brain MRI for beta = 4

Class Membership Image for Class 0 for beta = 4

Class Membership Image for Class 1 for beta = 4

Class Membership Image for Class 2 for beta = 4

The Results

Optimal Label Image Estimate for beta = 4

The Results

The Results