
```

load ../data/assignmentSegmentBrainGmmEmMrf.mat;

img = imageData;
mask = imageMask;
numClasses = 3;

initialLabels = findInitialization(img, mask, numClasses);
labels = initialLabels;

mu = zeros(1, numClasses);
sig = zeros(1, numClasses);

for label = 1:numClasses
    locationsWithLabel = (labels == label);
    [mu_, sig_] = getMuAndSig(img, locationsWithLabel);
    mu(label) = mu_;
    sig(label) = sig_;
end

initialMu = mu;
initialSig = sig;

beta = 100.0;
[optimalLabels, optimalMemberships] = EM(img, mask, labels,
    numClasses, mu, sig, beta);
fprintf('With beta: %f\n', beta);
fprintf('Initial mu: %f, %f, %f\n', initialMu(1), initialMu(2),
    initialMu(3));
fprintf('Initial sig: %f, %f, %f\n', initialSig(1), initialSig(2),
    initialSig(3));
fprintf('Final mu: %f, %f, %f\n', mu(1), mu(2), mu(3));

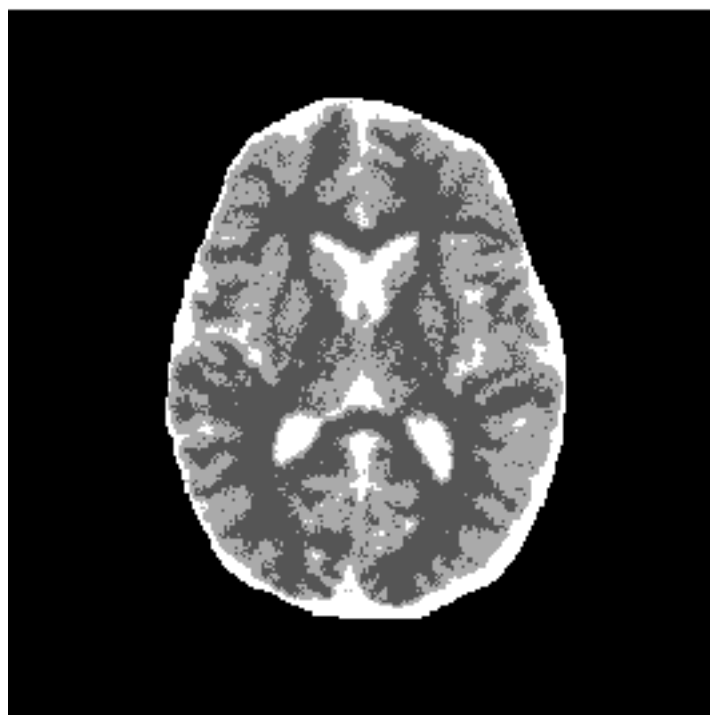
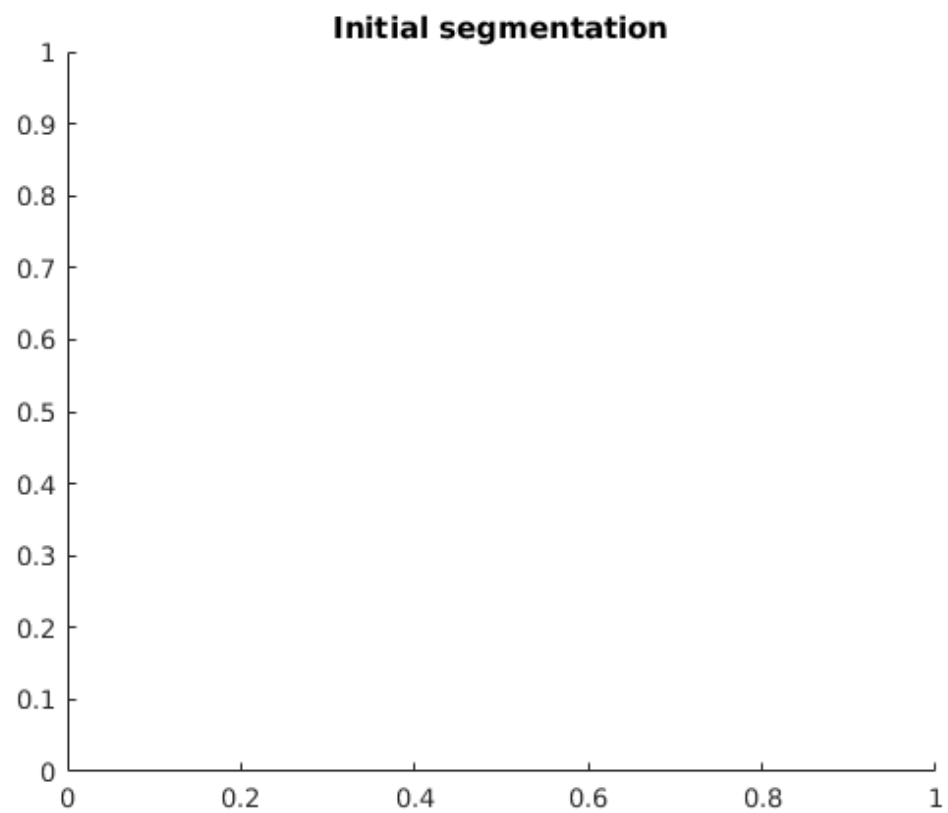
figure, imshow(initialLabels, []), title('Initial segmentation');
figure, imshow(img, []), title('Corrupted image provided');
figure, imshow(optimalMemberships(:, :, 1), []), title(strcat('Label
1 for beta = ', num2str(beta)));
figure, imshow(optimalMemberships(:, :, 2), []), title(strcat('Label
2 for beta = ', num2str(beta)));
figure, imshow(optimalMemberships(:, :, 3), []), title(strcat('Label
3 for beta = ', num2str(beta)));
figure, imshow(optimalLabels, []), title(strcat('Optimal labels for
beta = ', num2str(beta)));

beta = 0.0;
[optimalLabels, optimalMemberships] = EM(img, mask, labels,
    numClasses, mu, sig, beta);
figure, imshow(initialLabels, []), title('Initial segmentation');
fprintf('With beta: %f\n', beta);
fprintf('Final mu: %f, %f, %f\n', mu(1), mu(2), mu(3));

```

```
figure, imshow(optimalMemberships(:, :, 1), []), title(strcat('Label  
1 for beta = ', num2str(beta)));  
figure, imshow(optimalMemberships(:, :, 2), []), title(strcat('Label  
2 for beta = ', num2str(beta)));  
figure, imshow(optimalMemberships(:, :, 3), []), title(strcat('Label  
3 for beta = ', num2str(beta)));  
figure, imshow(optimalLabels, []), title(strcat('Optimal labels for  
beta = ', num2str(beta)));
```

```
Change in log posterior: 898818.316955 to 16894091.611872  
Change in log posterior: 879439.838396 to 17217239.746909  
Change in log posterior: 860449.059966 to 17252083.772761  
Change in log posterior: 856136.350393 to 17247584.856440  
Change in log posterior: 853923.511987 to 17244629.527795  
Change in log posterior: 853732.625368 to 17243638.201849  
Change in log posterior: 853735.492974 to 17242981.431019  
Change in log posterior: 853331.685364 to 17242864.953246  
Change in log posterior: 853335.337995 to 17243006.225078  
Change in log posterior: 853335.521229 to 17243008.806910  
With beta: 100.000000  
Initial mu: 0.628828, 0.505404, 0.270111  
Initial sig: 1.567921, 1.290239, 1.144988  
Final mu: 0.628828, 0.505404, 0.270111  
Change in log posterior: 15.412783 to 891.611872  
Change in log posterior: 10336.788087 to 31932.277495  
Change in log posterior: 10111.174097 to 31978.701603  
Change in log posterior: 9646.850874 to 32153.445155  
Change in log posterior: 8854.663683 to 32843.667379  
Change in log posterior: 7771.676025 to 35394.078132  
Change in log posterior: 6808.596195 to 43221.709616  
Change in log posterior: 6438.375185 to 61004.505843  
Change in log posterior: 6622.965013 to 88256.976985  
Change in log posterior: 6936.517890 to 114370.507175  
With beta: 0.000000  
Final mu: 0.628828, 0.505404, 0.270111
```



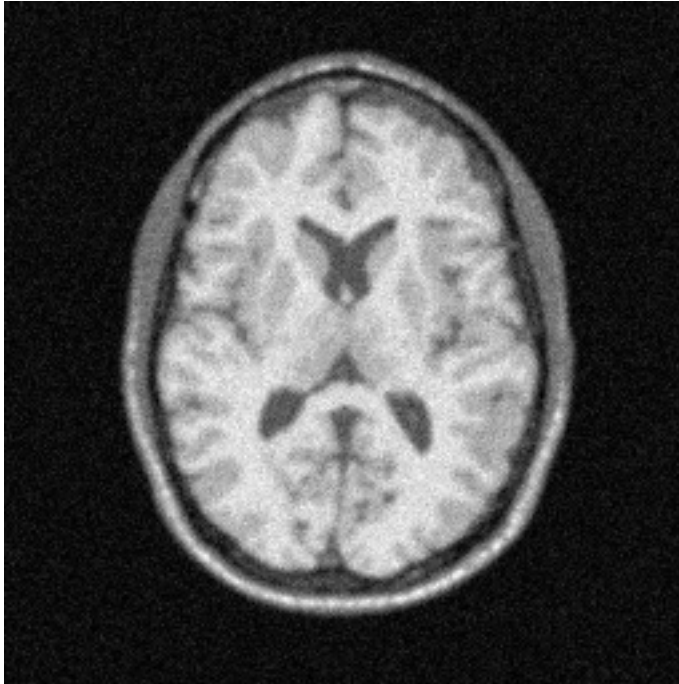
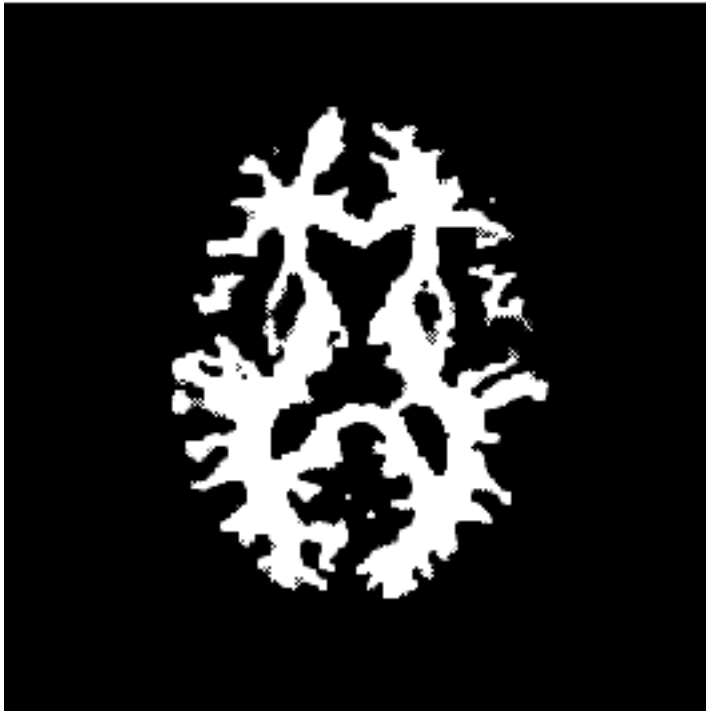
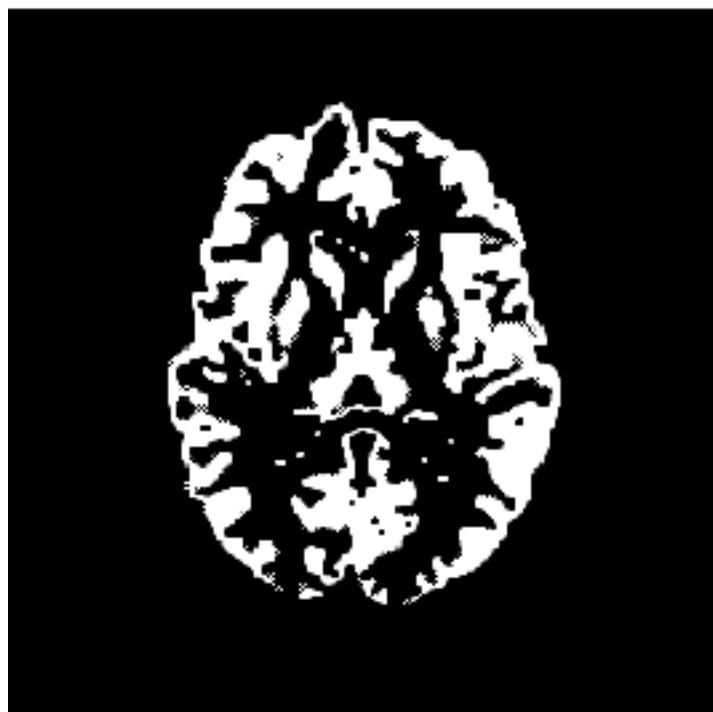


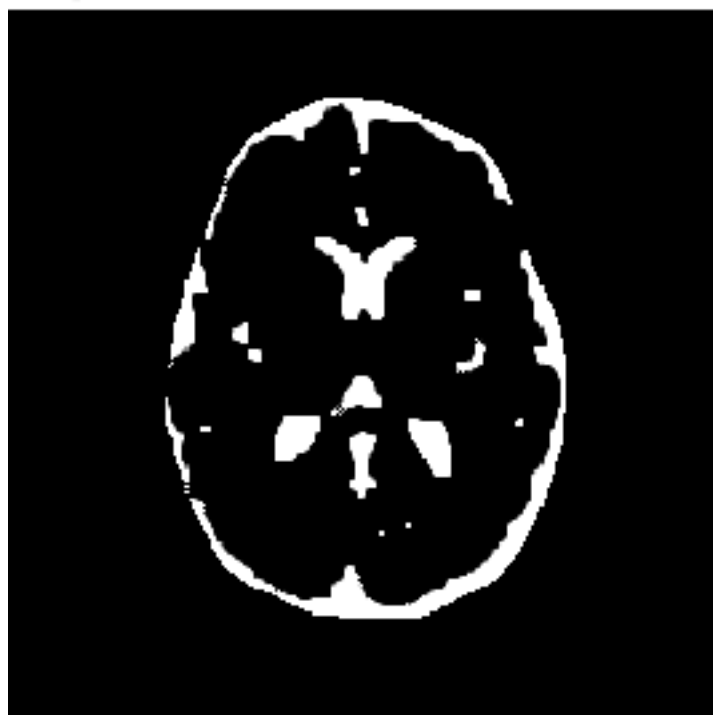
Figure 2: T1-weighted MRI scan

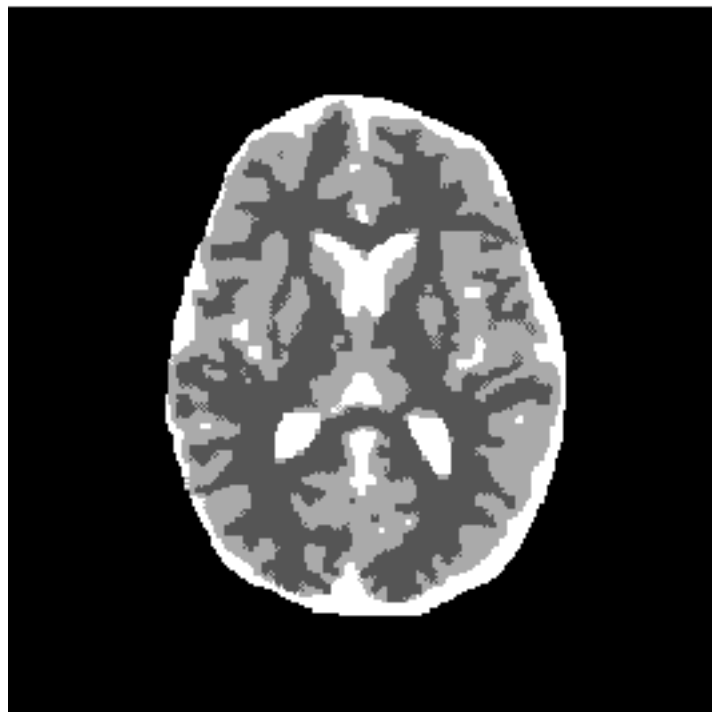


Labels for beta = 200



Optimal labels for beta = 200





initial segmentation

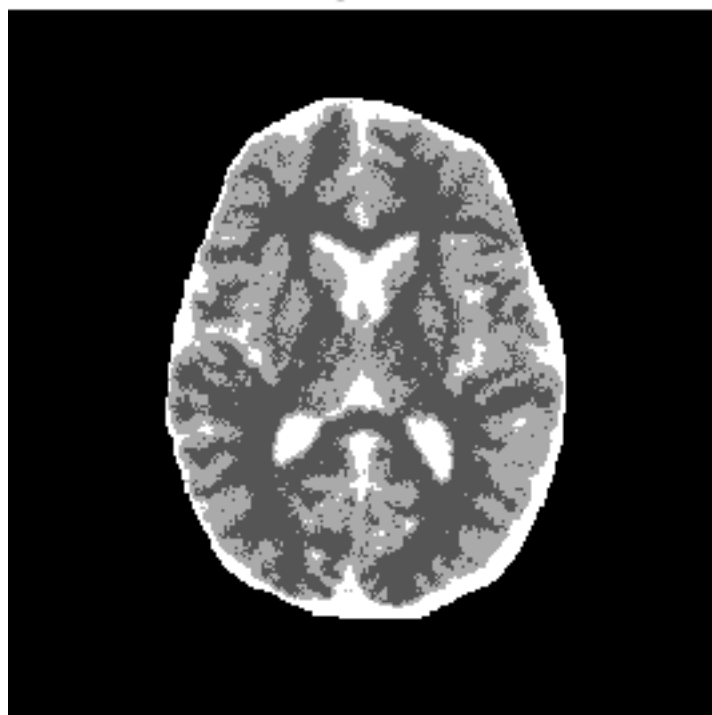
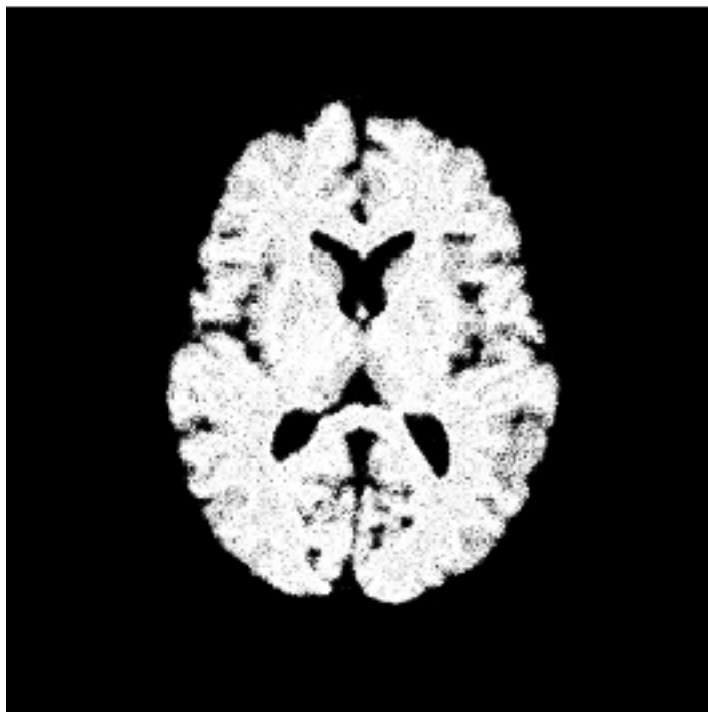
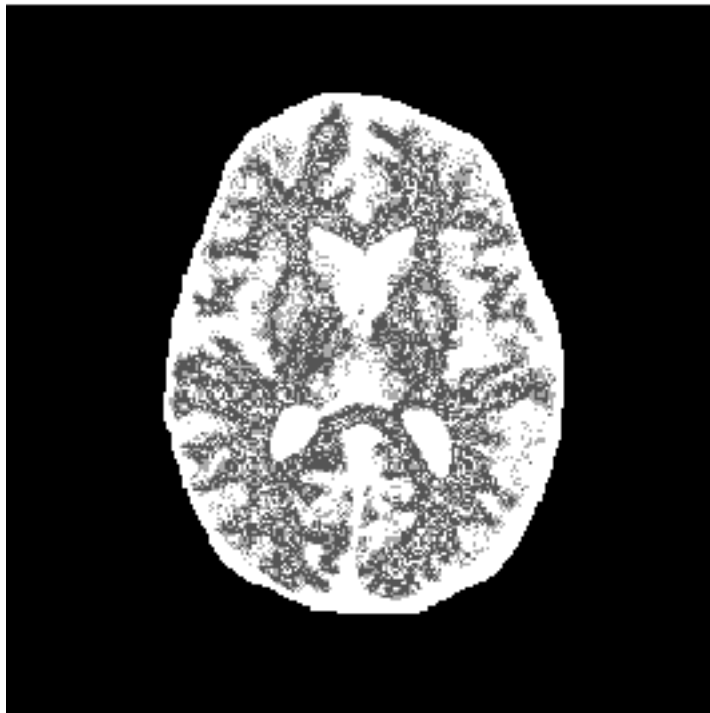


Figure 2 for NCM - 0



Figure 3 for NCM - 0





Optimal labels for beta = 0



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