The EM Algorithm for Gaussian Mixtures

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The results can be seen it is more close to result ouput:

Output exceeds the size limit. Open the full output data in a text editor

```
-5511.87498360487
-5498.306935928102
-5455.74784212288
-5375.483908598774
-5310.840676275509
-5286.2216812084225
-5270.077585663935
-5251.487624636218
-5226.928844997889
-5194.439056945813
-5153.385163621092
-5109.226649306809
-5079.388420905838
-5063.684368980265
-5051.114820716361
-5037.916767483619
-5024.207323619705
-5011.649284517466
-5001.673256718064
-4994.0050832697825
-4987.422057702094
-4981.199838329424
-4975.354445559357
-4970.326452730407
-4966.428141124837
```

-4922.145626498078 -4922.142020376738 -4922.1407748633565 -4922.

alfa = [0.4945118662773324, 0.2429842868119087, 0.09951139636488887, 0.1629924505458696]

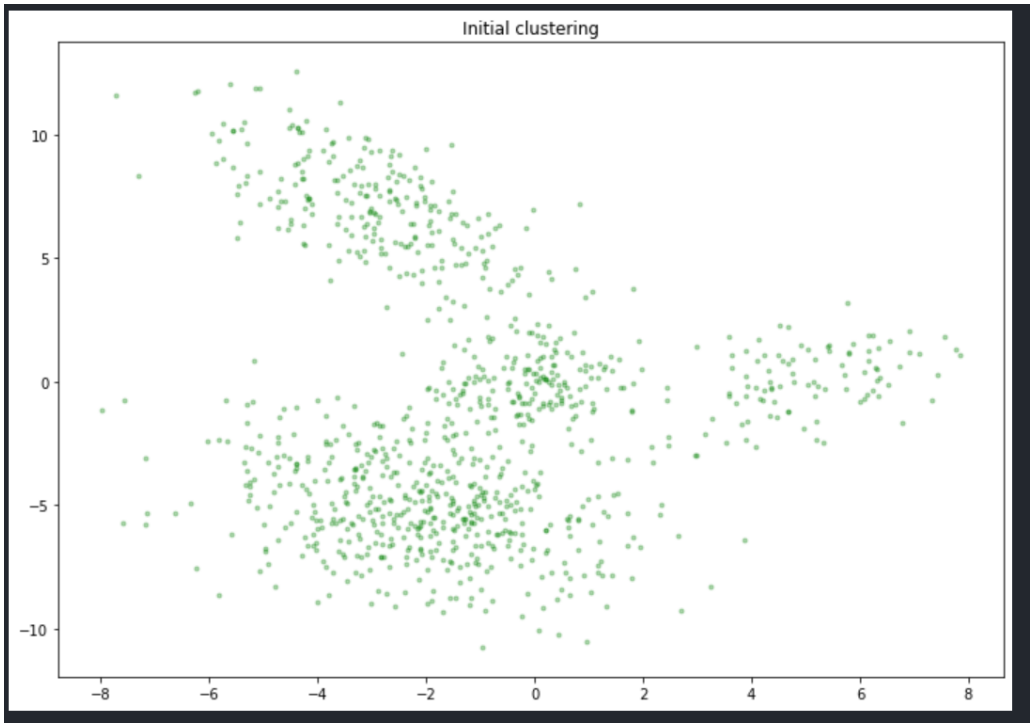
miu = [array([[-2.10287941], [-5.12502179]]), array([[-2.85808818], [6.93409823]]), array([[4.93394078], [-0.02849207]]), array([[-0.09921931], [-0.0631105]])]

sigma = [array([[3.68834053, -1.10756663], [-1.10756663, 4.05869873]]), array([[2.68203208, -2.43776195], [-2.43776195, 4.84580121]]), array([[1.82845863, 0.86043548], [0.86043548, 1.89102849]]), array([[0.87377065, 0.10154453], [0.10154453, 1.12173264]])]

I considered an epsilon of 0.001 for convergence, although for 0.1 and 0.00001 I observed the same output. For the implementation, at first I generated the random weights such that the sum of a sample's weight's equals 1 and then computed the M step.

Afterwards, until convergence, I computed the E step (the weights) and the M step (alfa, miu, sigma). In the end, I assigned each point to a cluster based on the biggest probability that it had.

Initial Clustering:



Final Clustering: