**COMP7703 – Demo 1 (Practical 4)**

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**3.**

Chosen

1. Non-blurring on dataset:

True

a) :

Took 12 iterations for the algorithm to converge and it was able to find the cluster centres with some error:

b) :

Took 4 iterations for the algorithm to converge and it was able to find the cluster centres successfully:

c) :

Took 4 iterations for the algorithm to converge and it was able to find the cluster centres with some error:

1. Non-blurring on dataset :

True

a) :

Took 15 iterations for the algorithm to converge and it was able to find the cluster centres with some error:

b) :

Took 8 iterations for the algorithm to converge and it was able to find the cluster centres for successfully, with some error:

c) :

Took 10 iterations for the algorithm to converge and it was able to find the cluster centres with some error:

**Observations:**

* Sometimes when testing the script, the estimated cluster centre for will deviate towards the true cluster centre for with . Since the -ball is bigger with a bigger i.e. radius, this could be due to points surrounding being included:
  + In the randomised initial cluster for .
  + Or as it is converging to .
* This problem is very common in general if we don’t initialise each cluster centre as randomly chosen points within each dataset compared to randomly initialising over the whole dataset .
  + Need a method to stop nearby initialised cluster centres from converging to the same centre.
* Another key observation to note is that regardless of the value of used in the algorithm, there is a higher error in estimating the -axis part of cluster centre for (the estimated mean is further away from the true mean) compared to for . This is because is randomly generated with higher variance in the first column as opposed to so it is more difficult for the algorithm to correctly locate the true centre.
* The key difference between the -means and (non-blurring) mean shift algorithms is that in -means, there is no -ball with fixed radius around each of the cluster centres which decide which points are included and thus used to shift the mean. In -means, points are assigned “ownership” based on which initialised cluster centre they are closest to and then the centres shift based on the mean of all the points that have the same ownership.