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Theoretical Exercise 1

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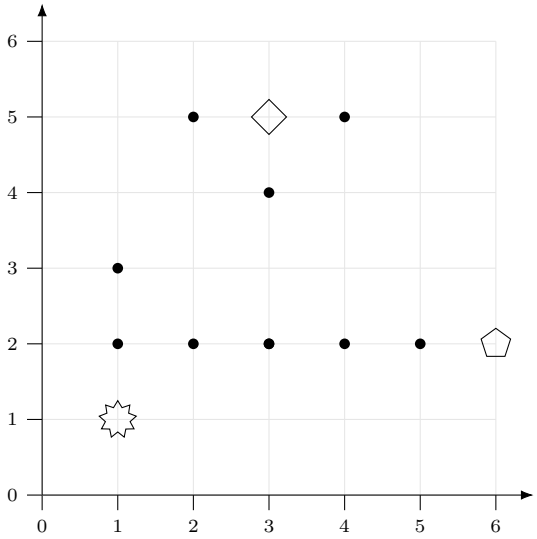
Exercise 1 Clustering

(a) K-Means

Draw the underlying Voronoi Diagram to compute the assignment of each point to the corresponding cluster centers. Compute the new cluster centers after the assignment.



(b) K-Means

Assume you could pick the perfect positions for 3 K-Means cluster centers. Draw a dataset (consisting of 3 clusters) where K-Means would not recover the ground truth clusters.

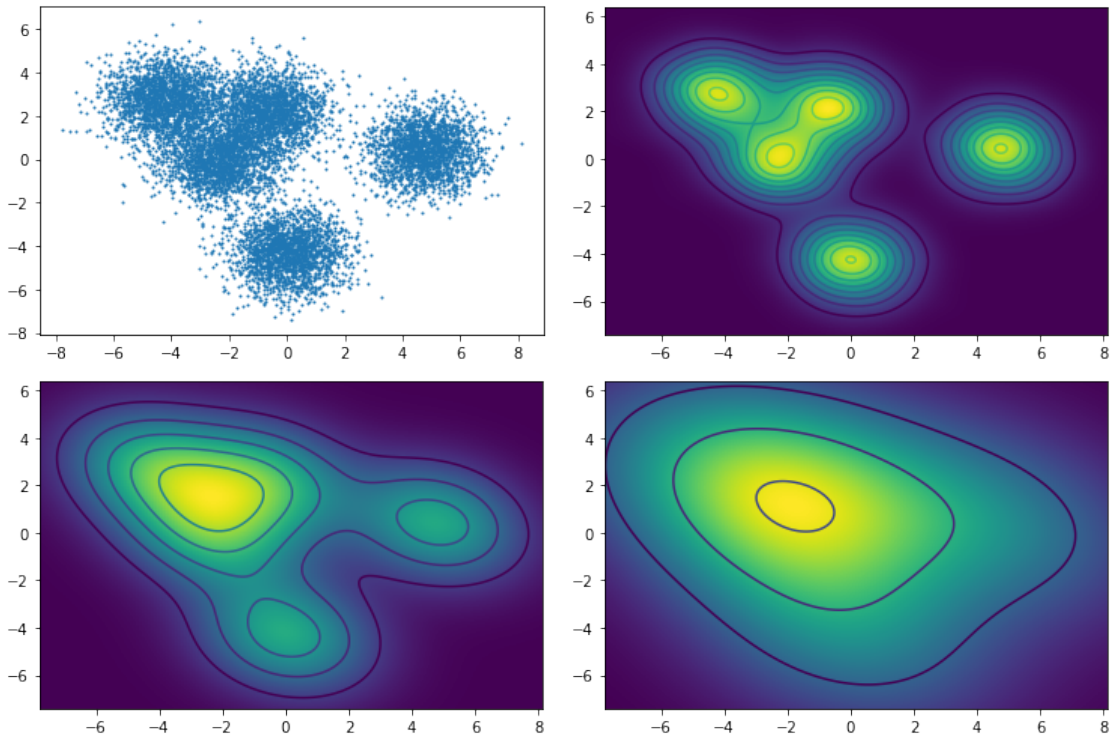
(c) Clustering Methods

Categorize the different clustering methods according to the shapes can model.

method	shape
K-Means	
GMM	
Mean Shift	
Hierarchical Clustering	

(d) Mean Shift Clustering

Given are the following sampling and density plots:



For each density plot draw in the cluster boundaries you would obtain with mean shift clustering. Which parameter of the algorithm needs to be varied, to obtain these different results?

(e) DBSCAN

Classify each point according to the DBSCAN clustering method. The radius ϵ is visualized in blue. The minimum number of neighbours is 3.