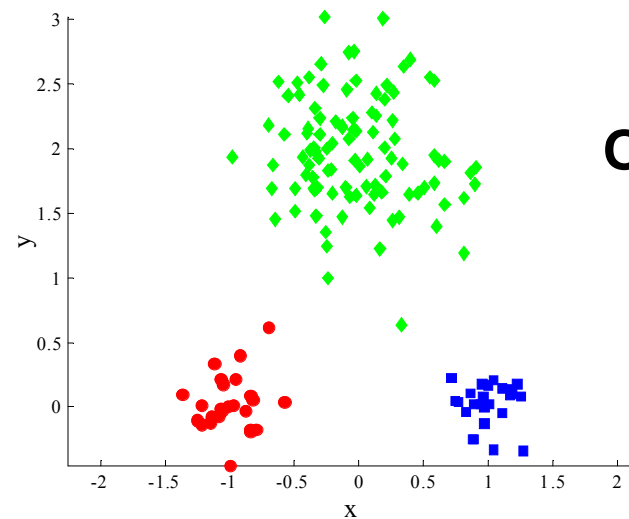
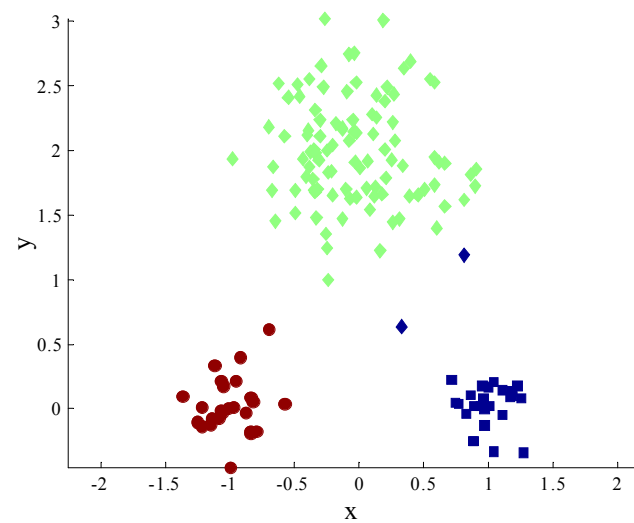


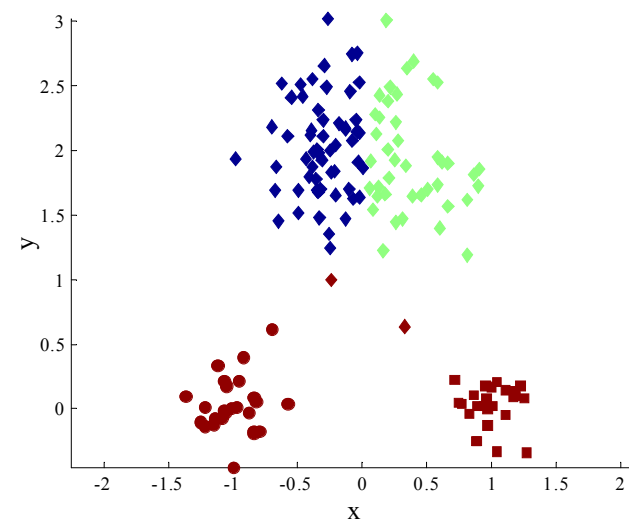
Two different K-means Clustering



Original Points

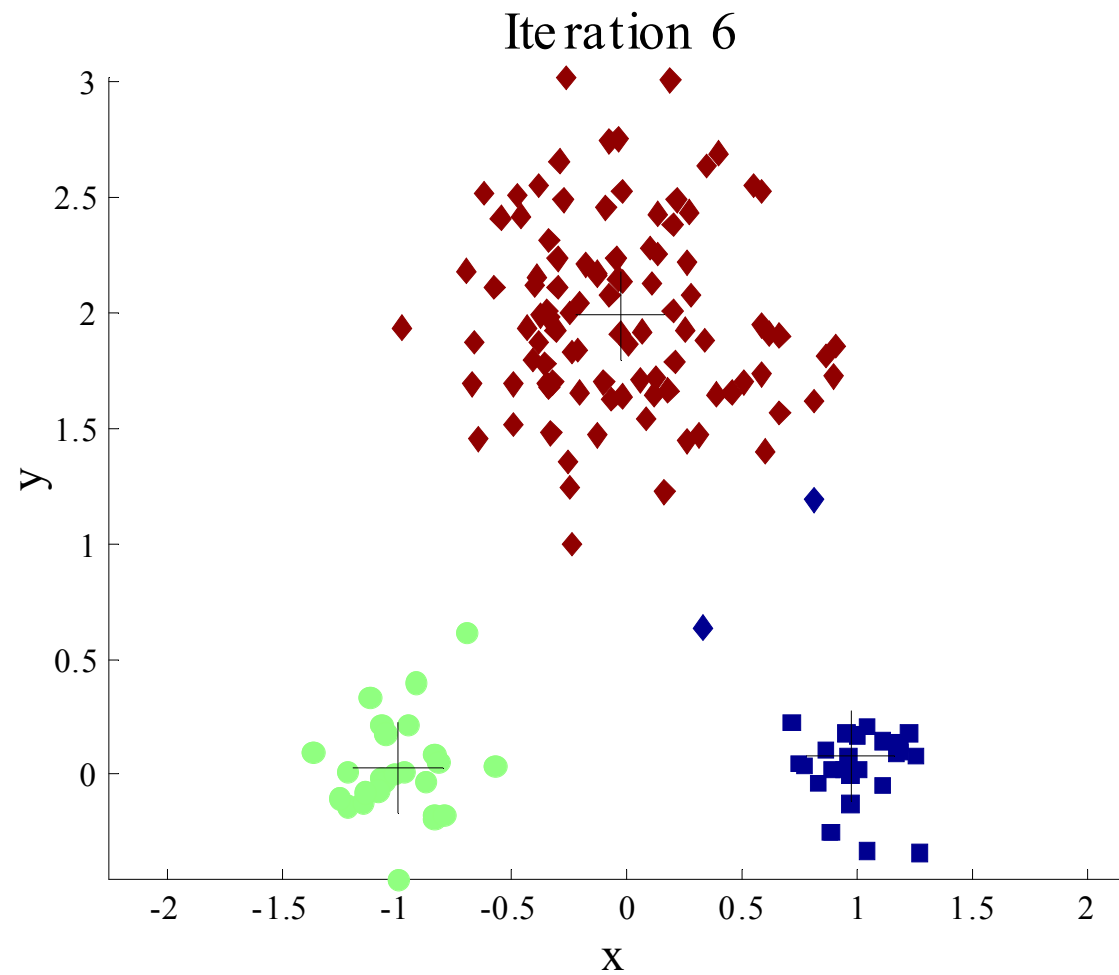


Optimal Clustering

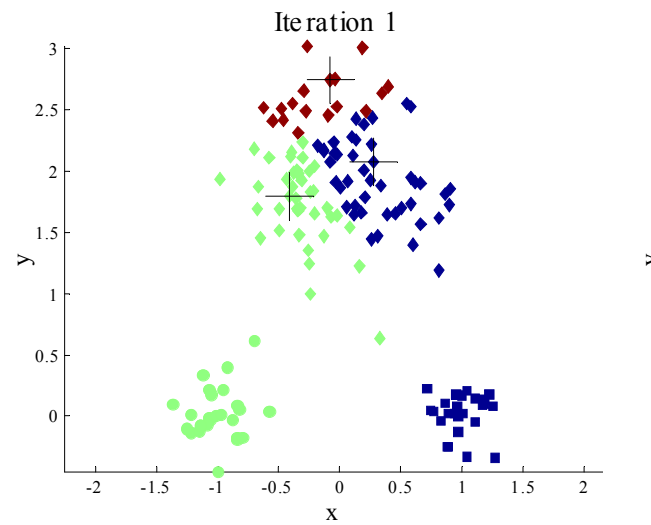


Sub-optimal Clustering

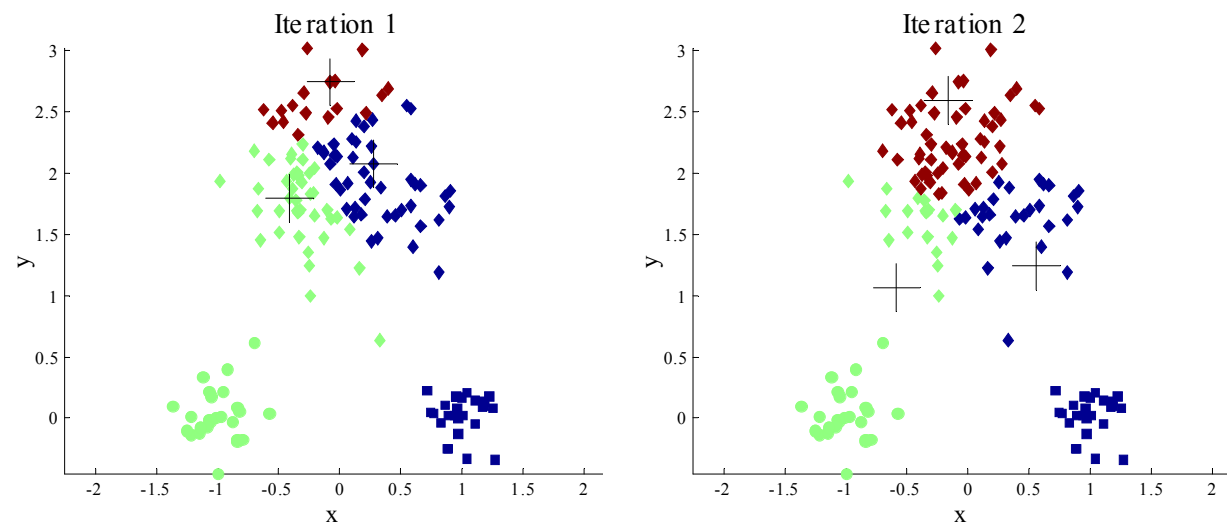
Choosing Initial Centroids is important



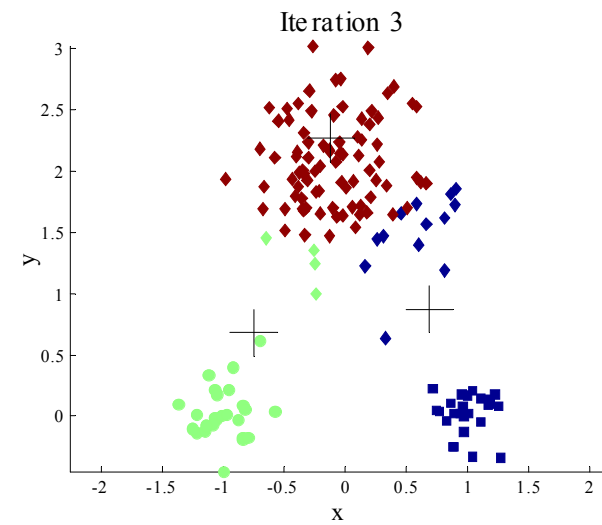
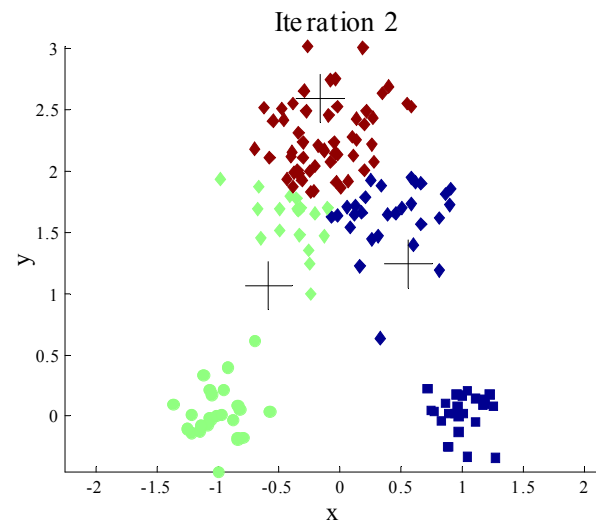
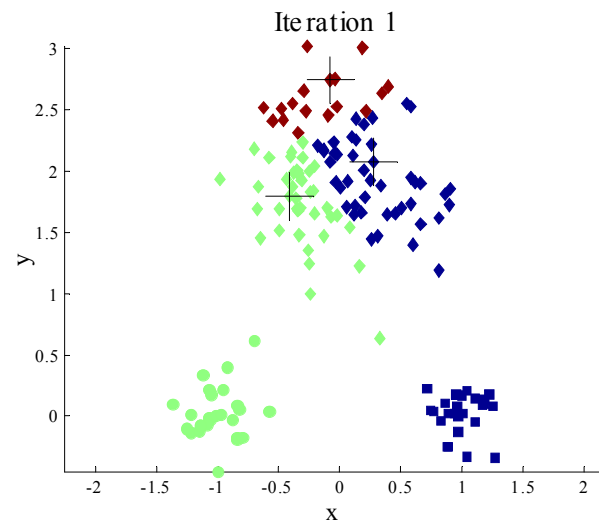
Choosing Initial Centroids is important



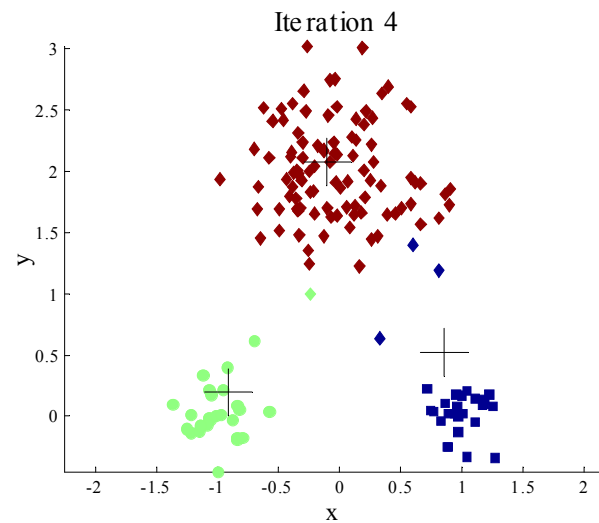
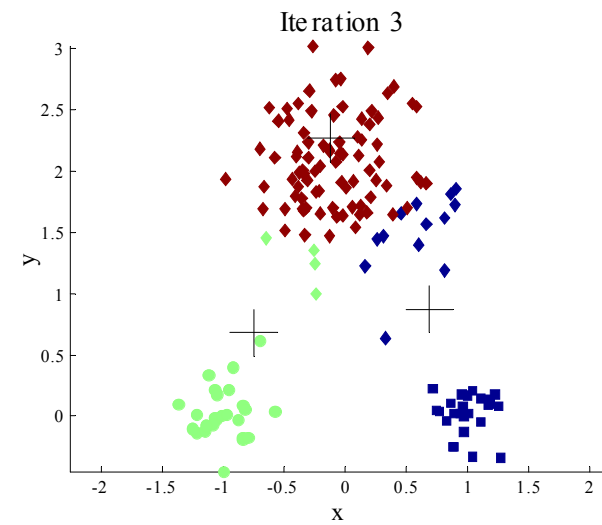
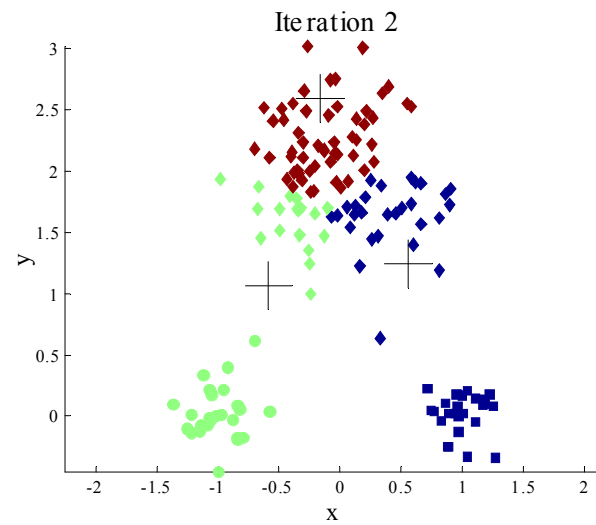
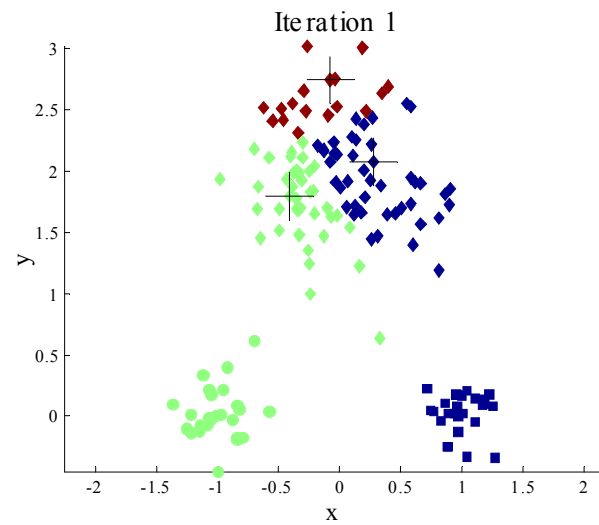
Choosing Initial Centroids is important



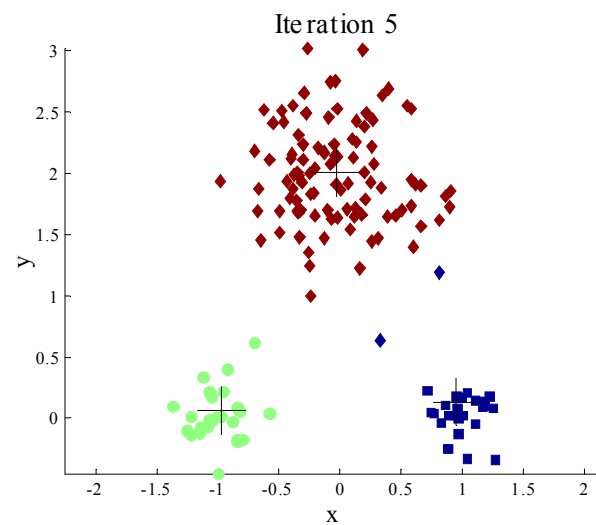
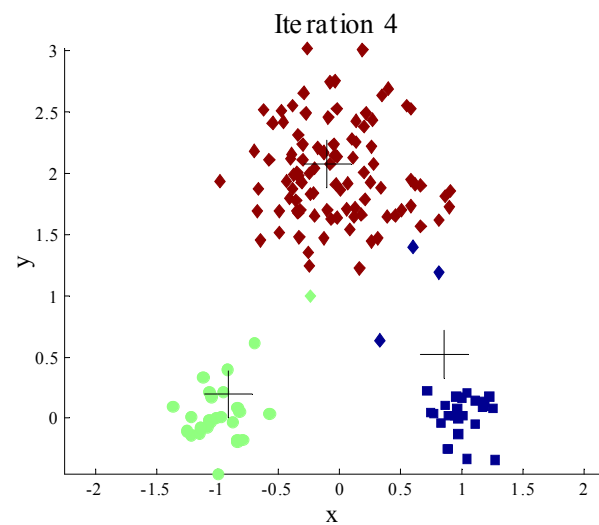
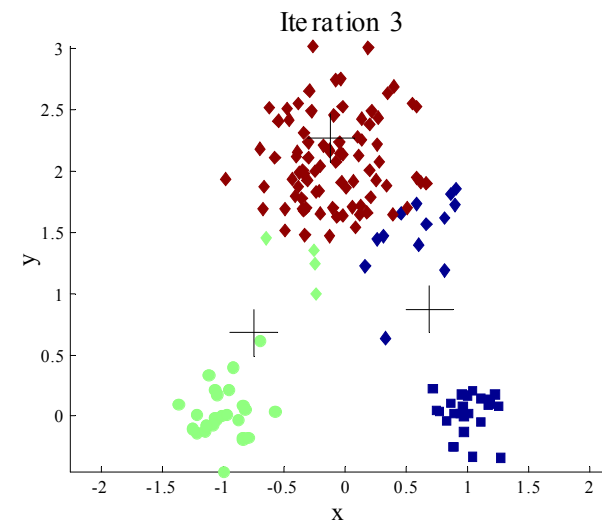
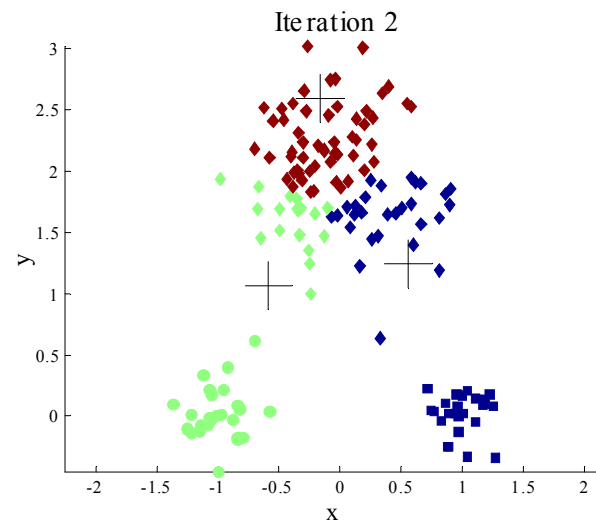
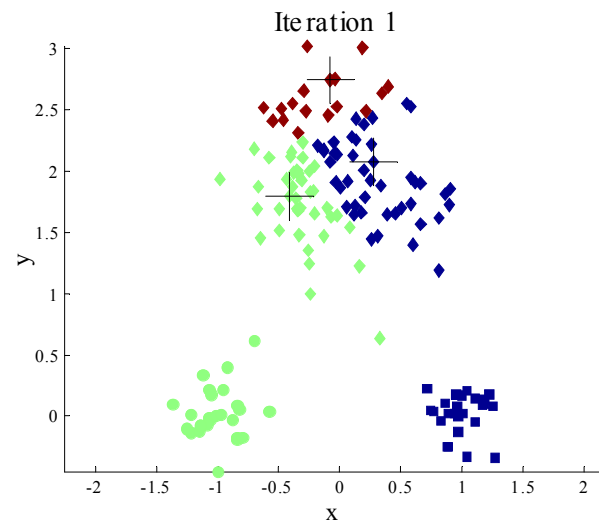
Choosing Initial Centroids is important



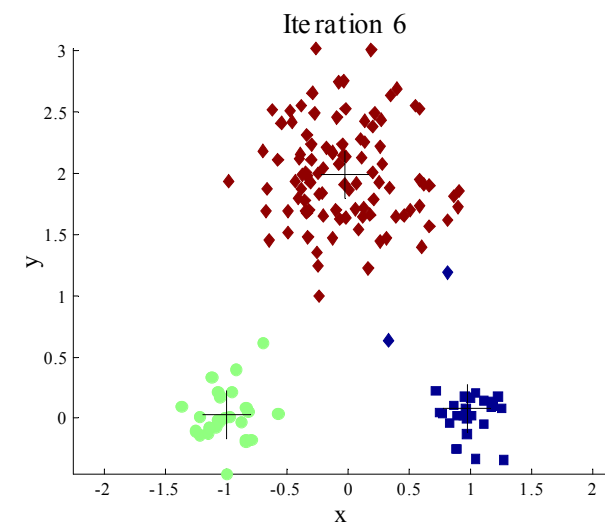
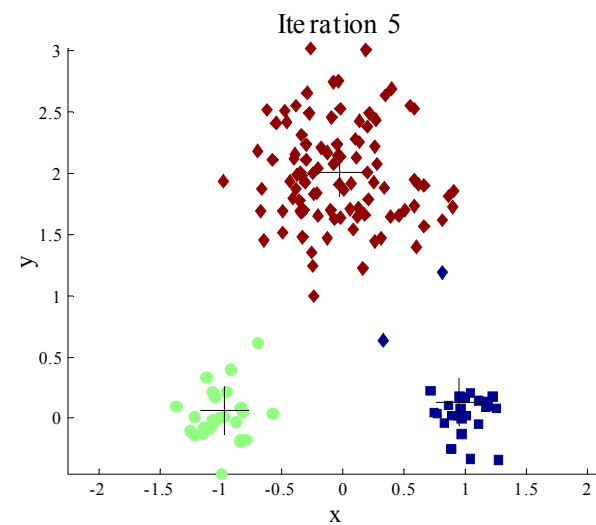
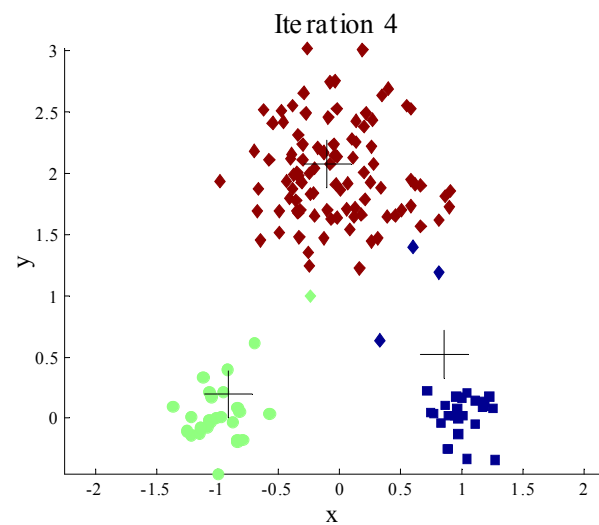
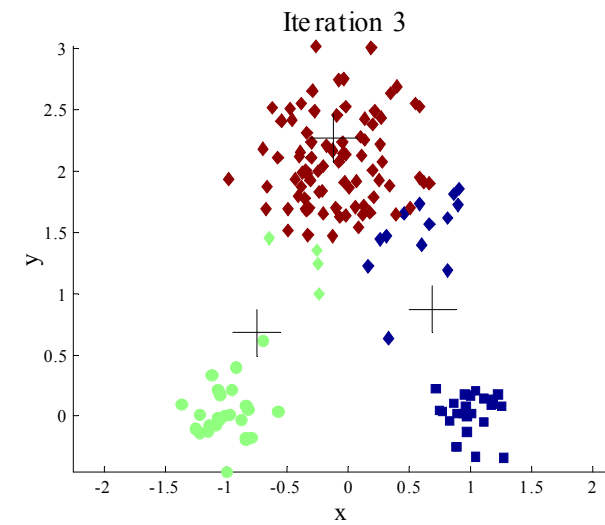
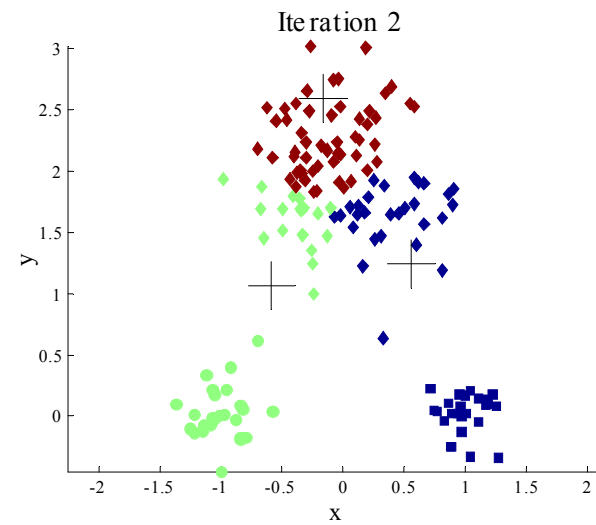
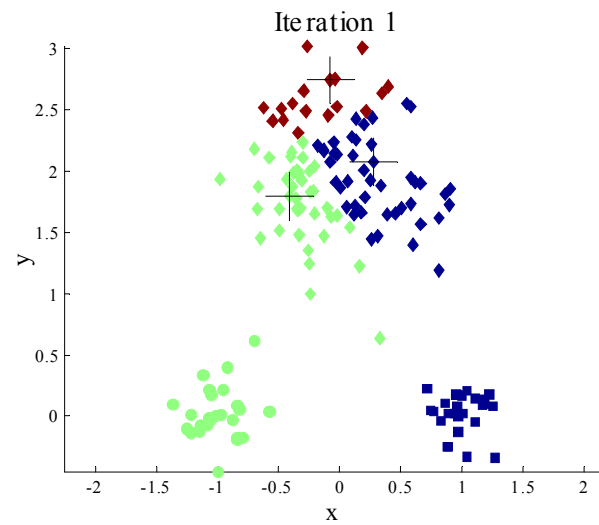
Choosing Initial Centroids is important



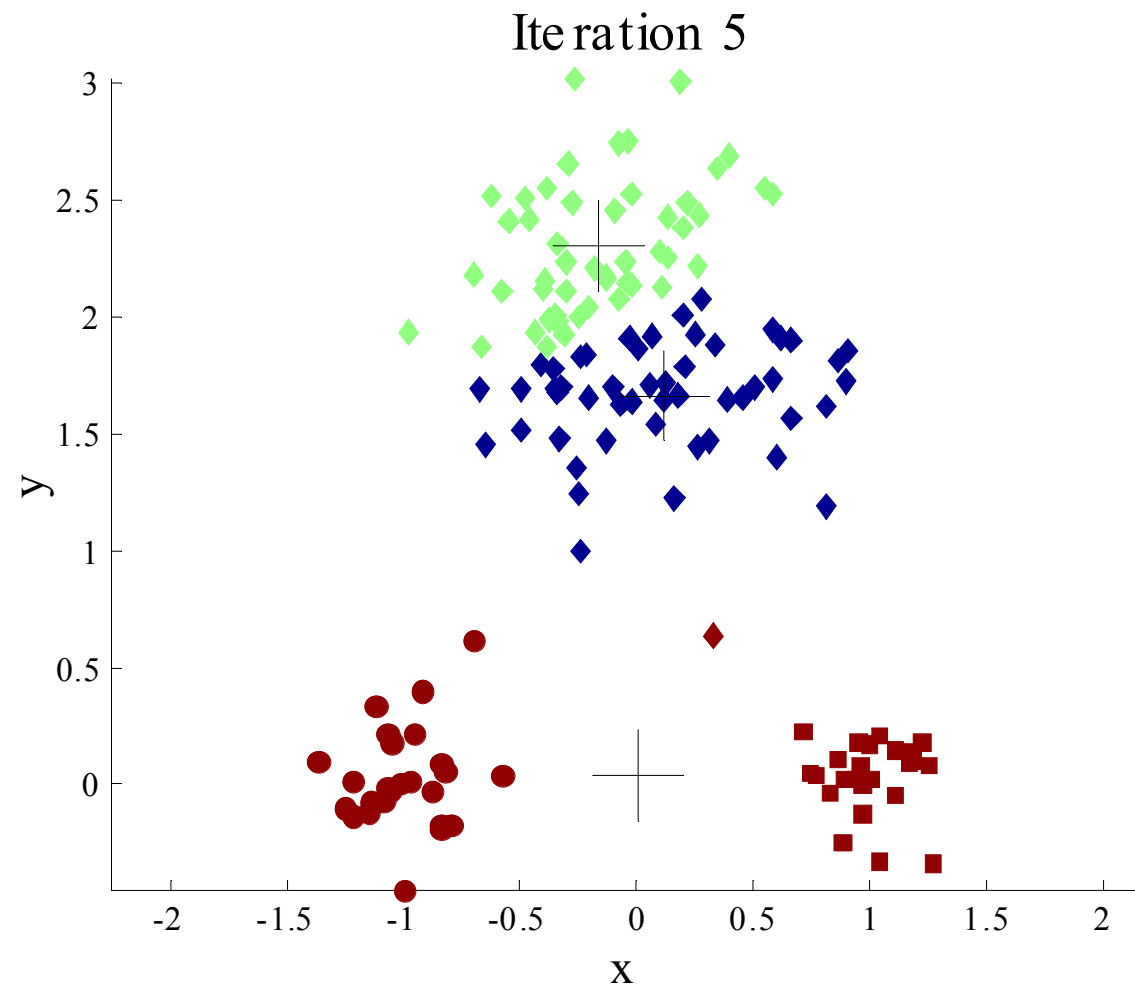
Choosing Initial Centroids is important



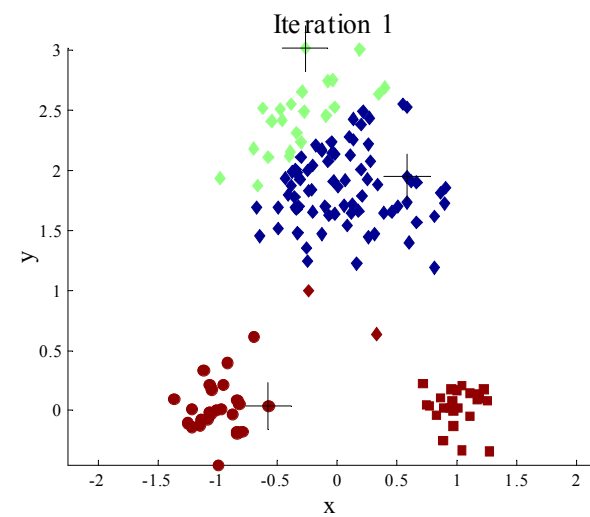
Choosing Initial Centroids is important



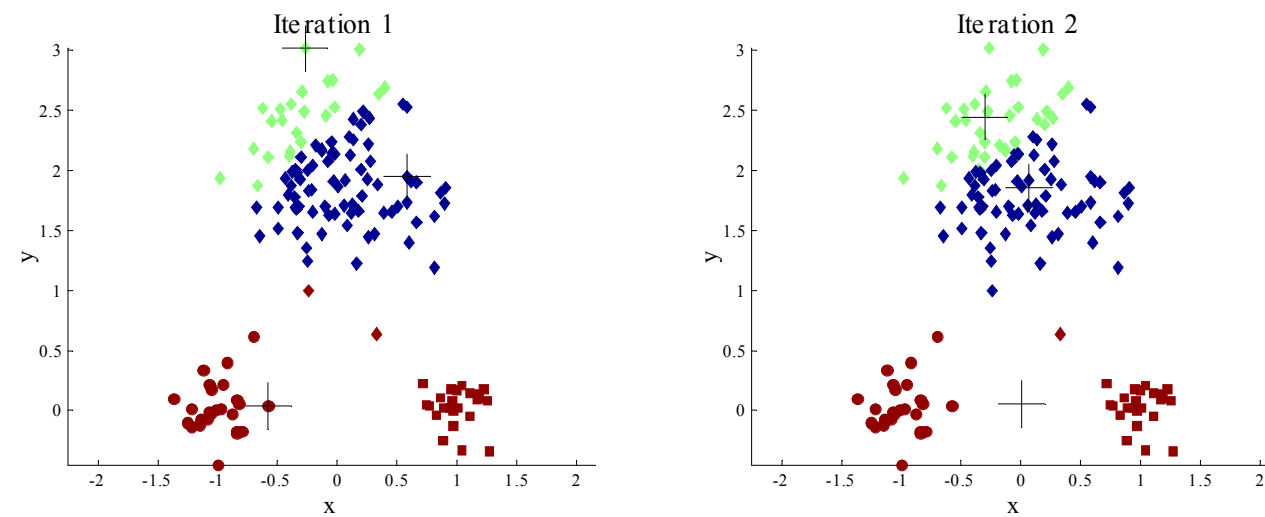
Choosing Initial Centroids is important



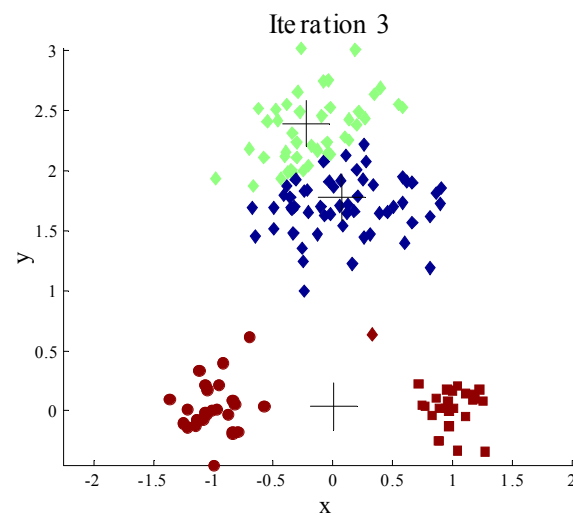
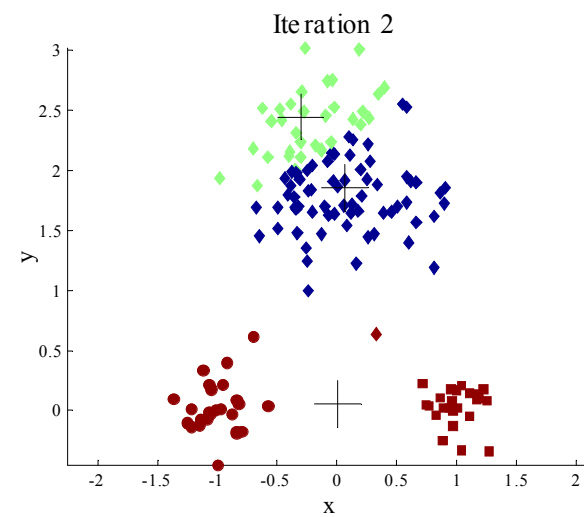
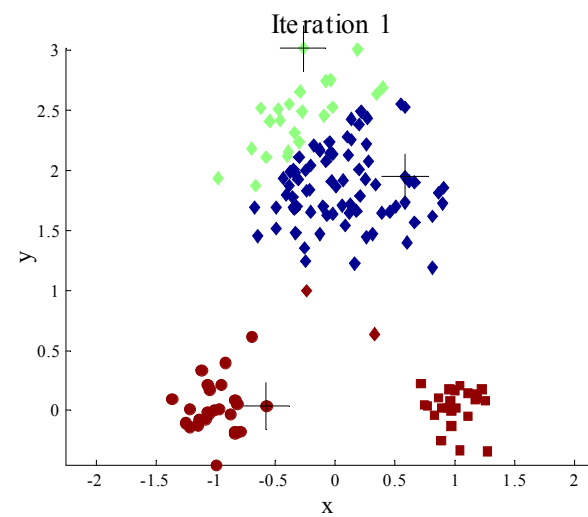
Choosing Initial Centroids is important



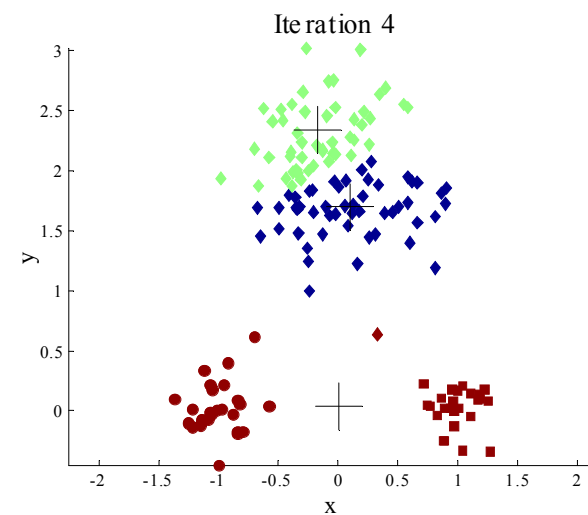
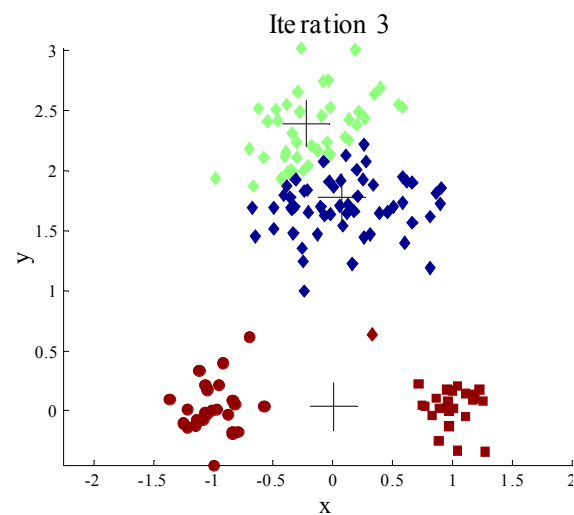
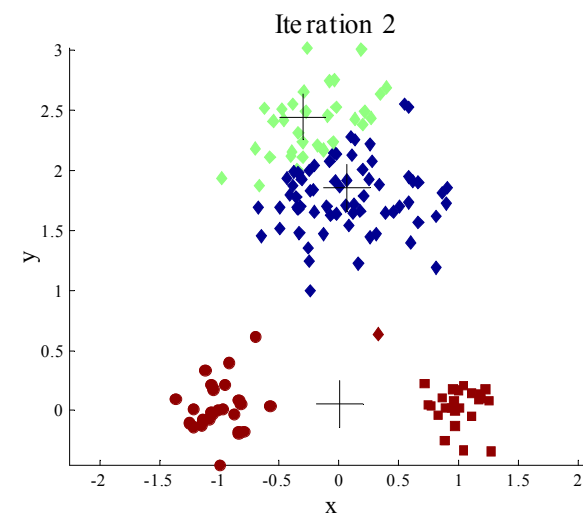
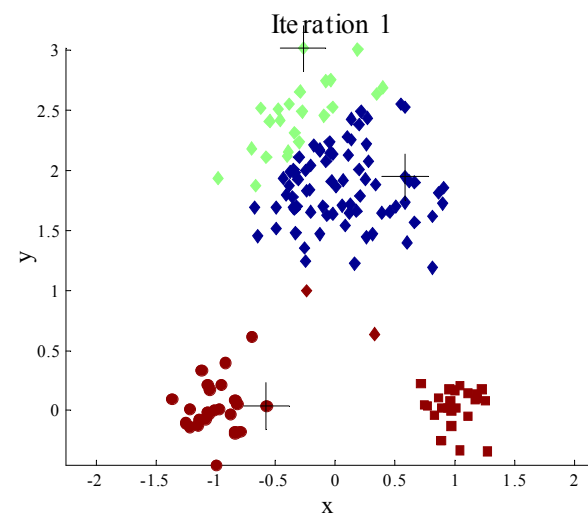
Choosing Initial Centroids is important



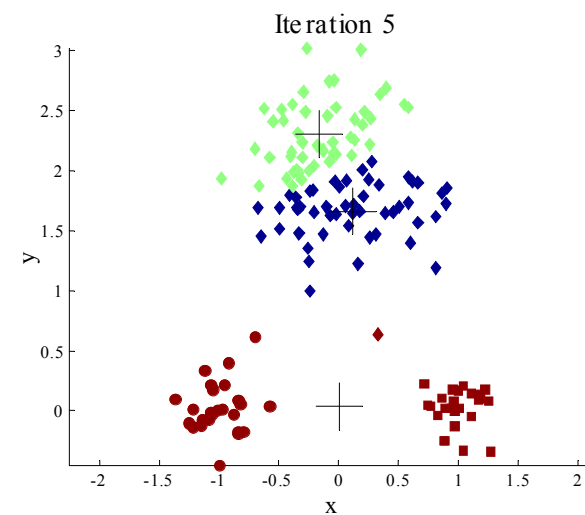
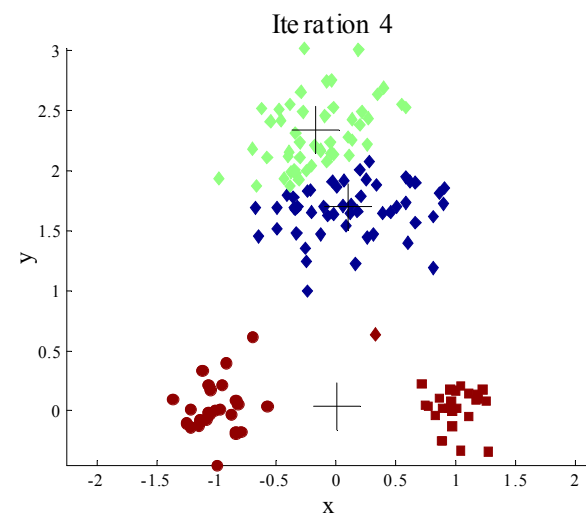
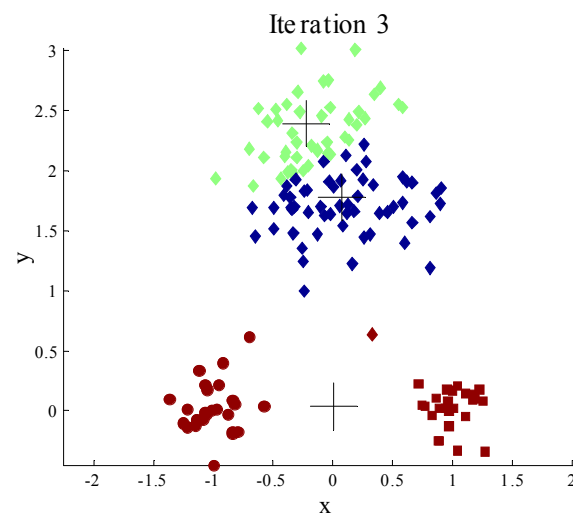
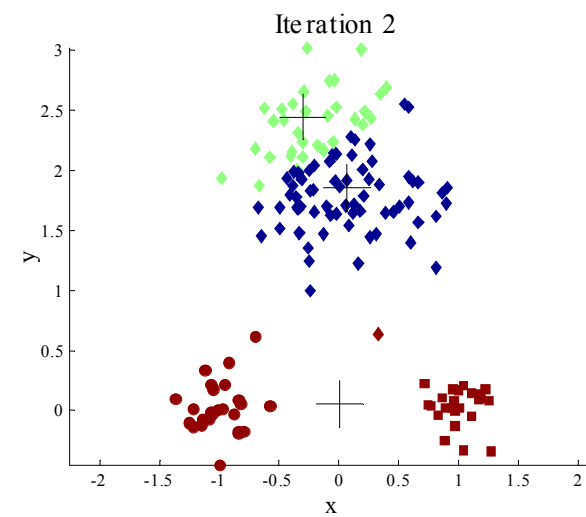
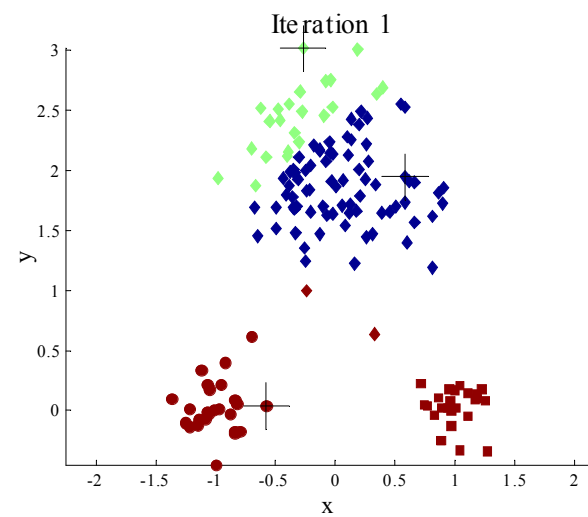
Choosing Initial Centroids is important



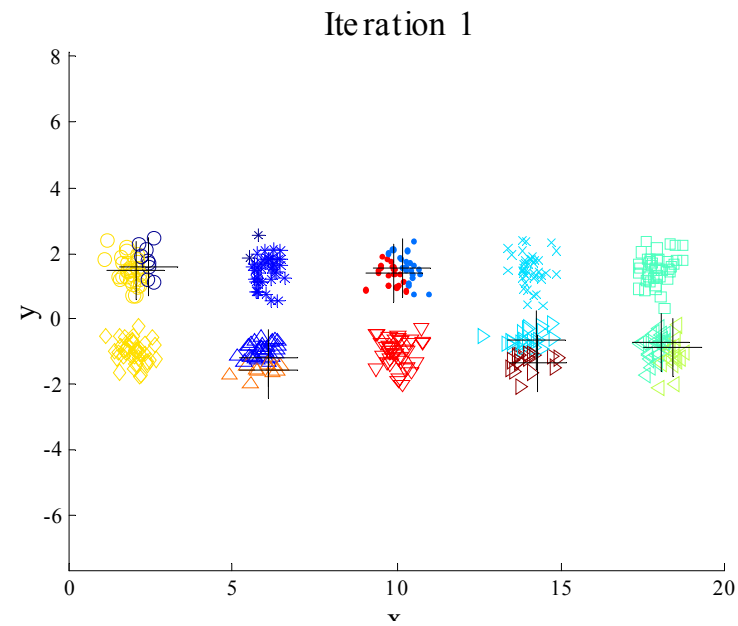
Choosing Initial Centroids is important



Choosing Initial Centroids is important

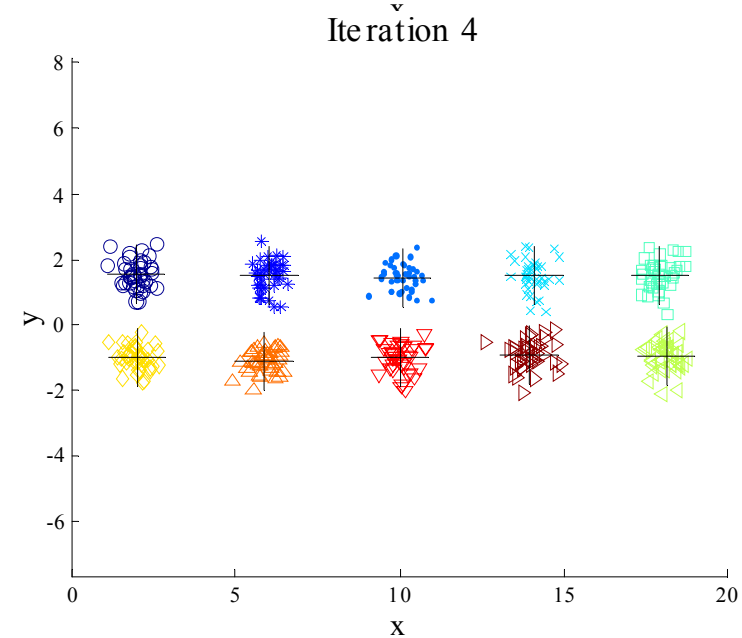
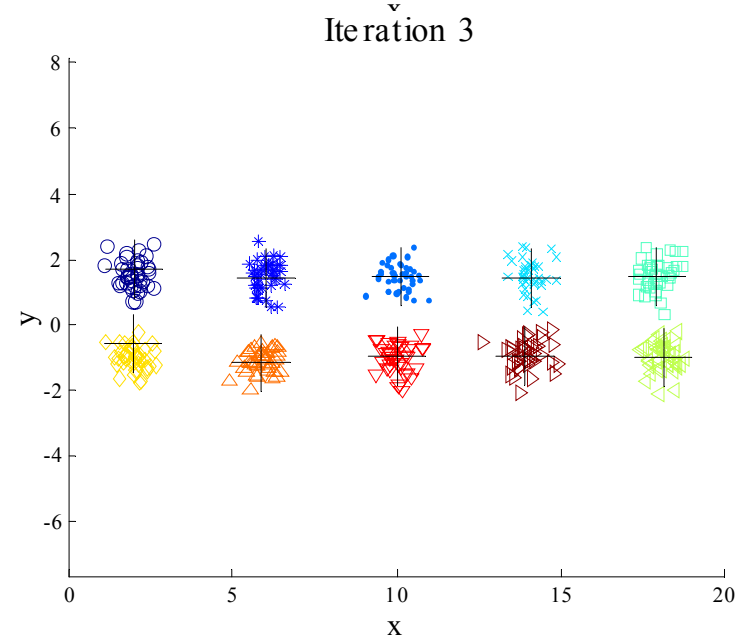
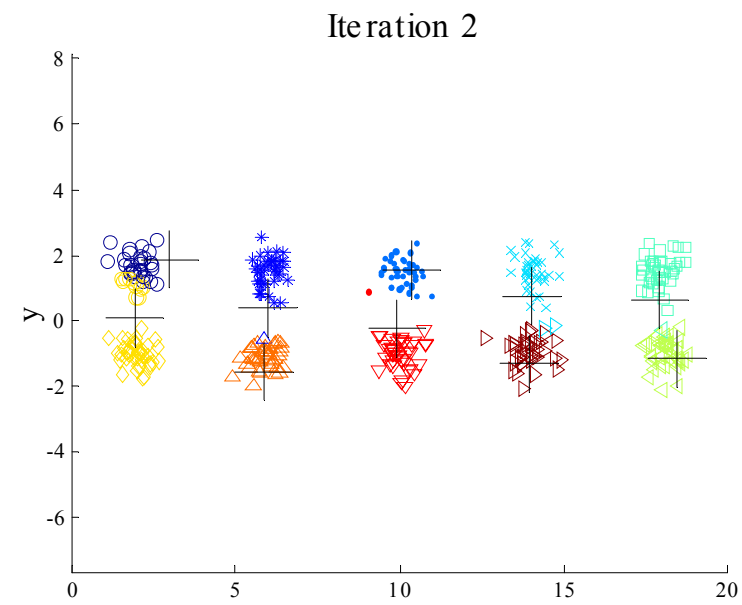
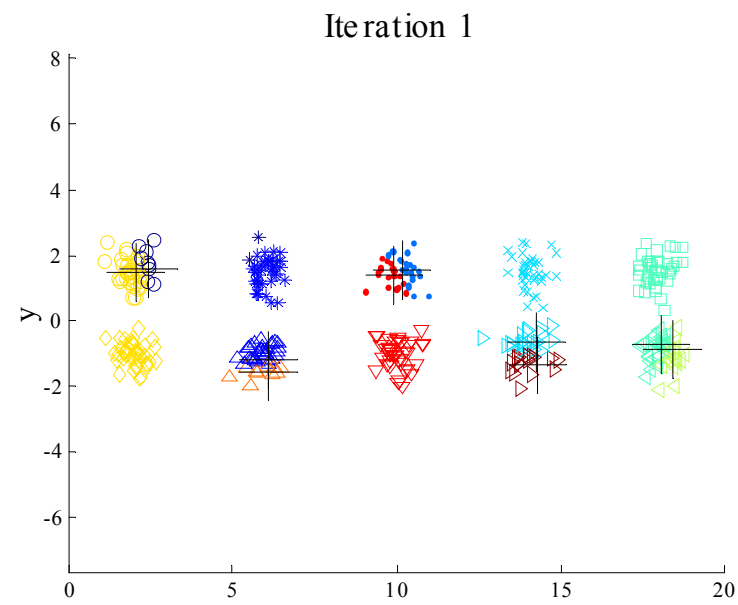


Example I: 10 Clusters



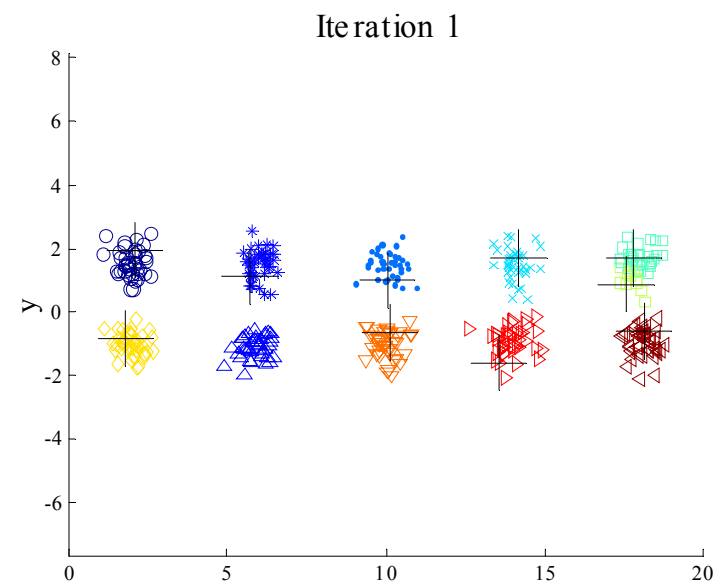
Starting with two initial centroids in one cluster of each pair of clusters

Example I: 10 Clusters



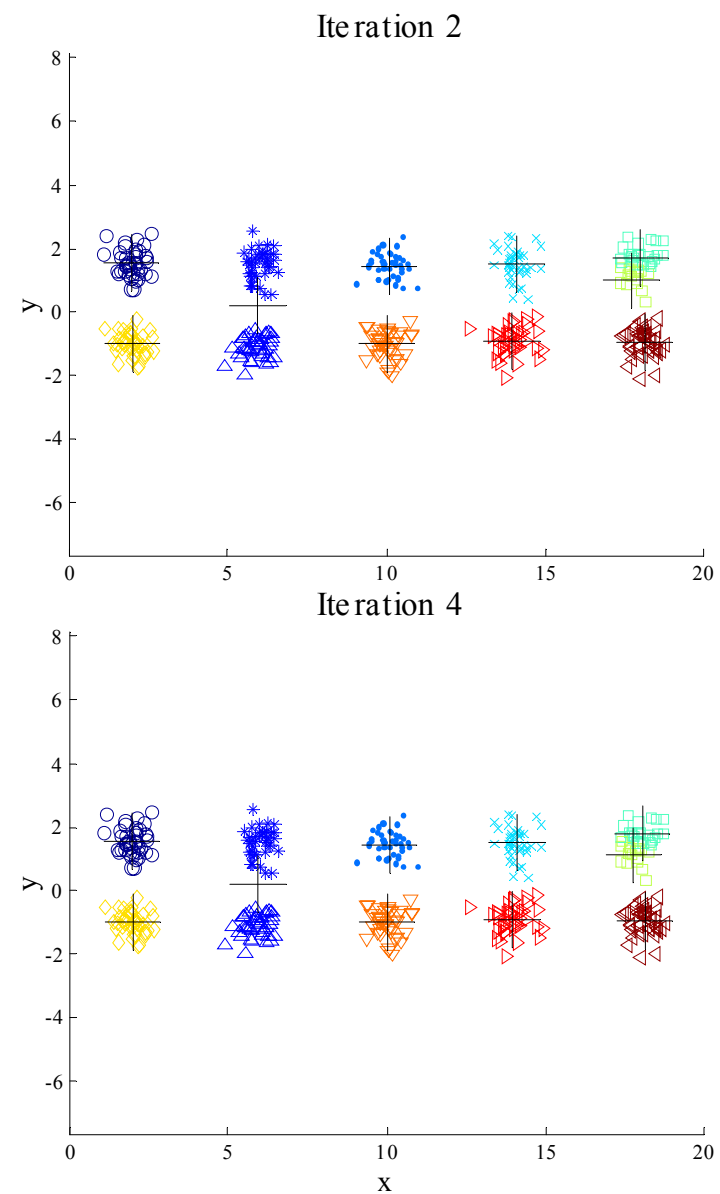
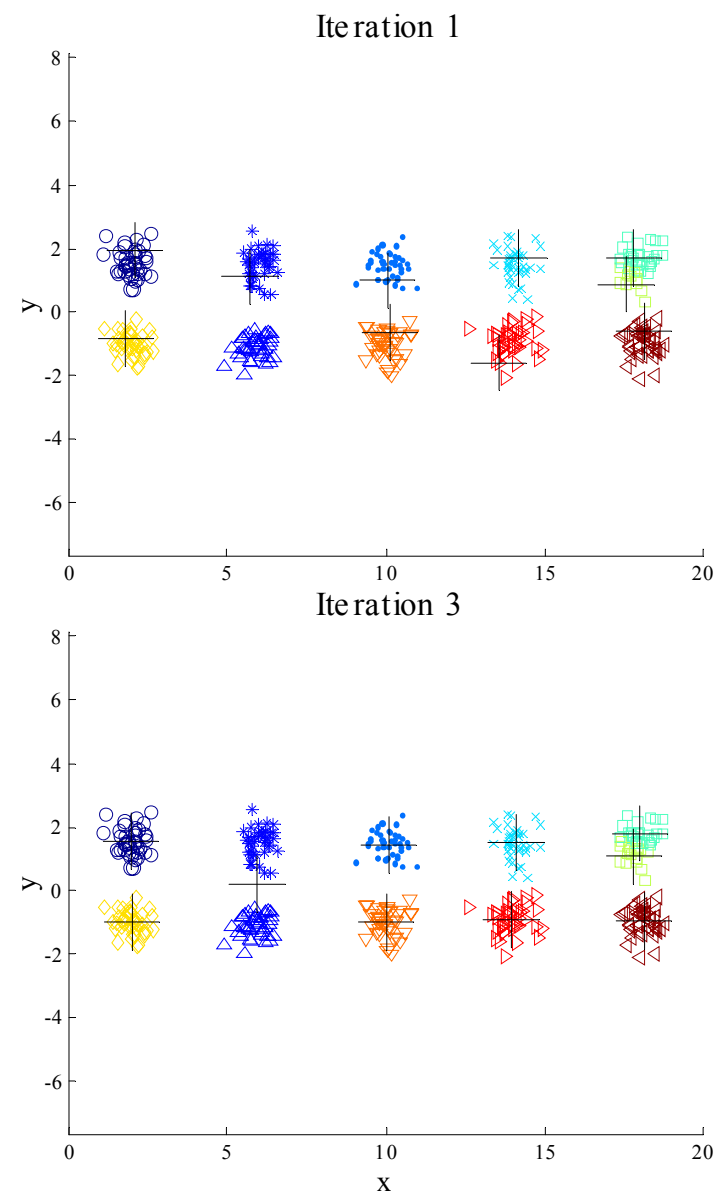
Starting with two initial centroids in one cluster of each pair of clusters

Example II: 10 Clusters



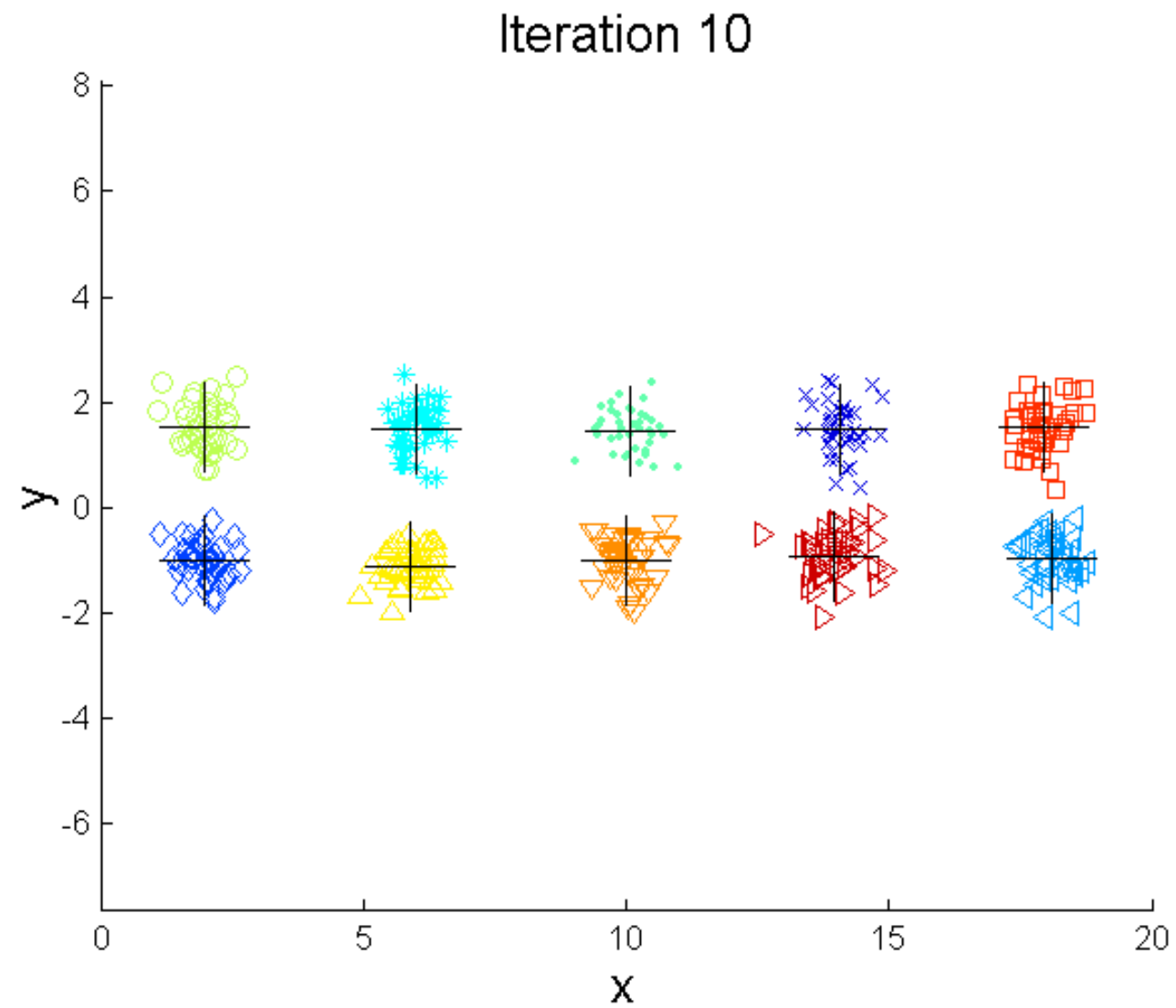
Starting with some pairs of clusters having three initial centroids, while other have only one.

Example II: 10 Clusters

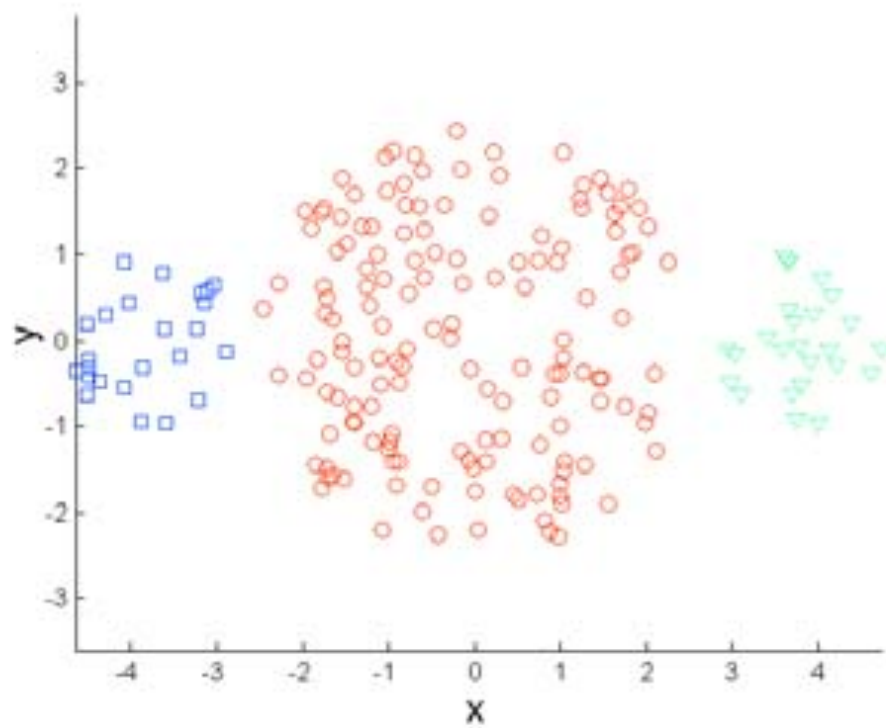


Starting with some pairs of clusters having three initial centroids, while other have only one.

Example: Bisecting K-means



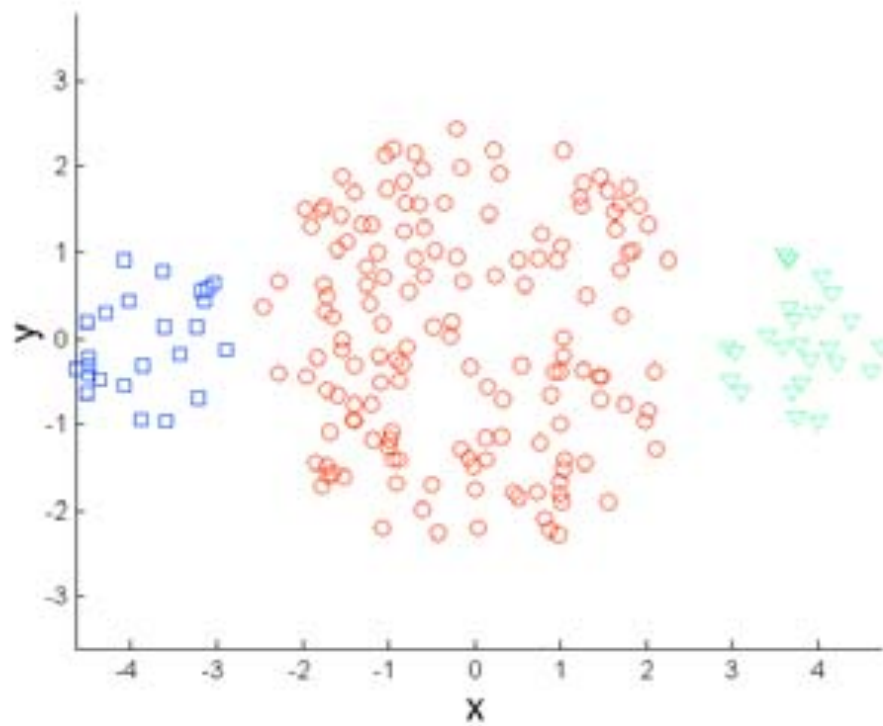
Limitations of K-means: Differing Sizes



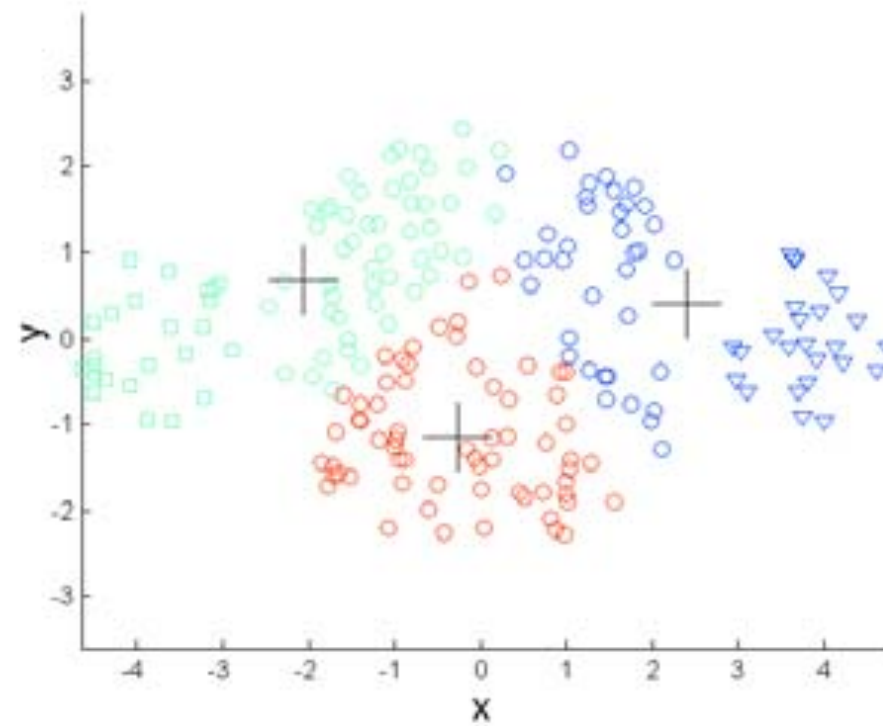
Original Points

K-means (3 Clusters)

Limitations of K-means: Differing Sizes

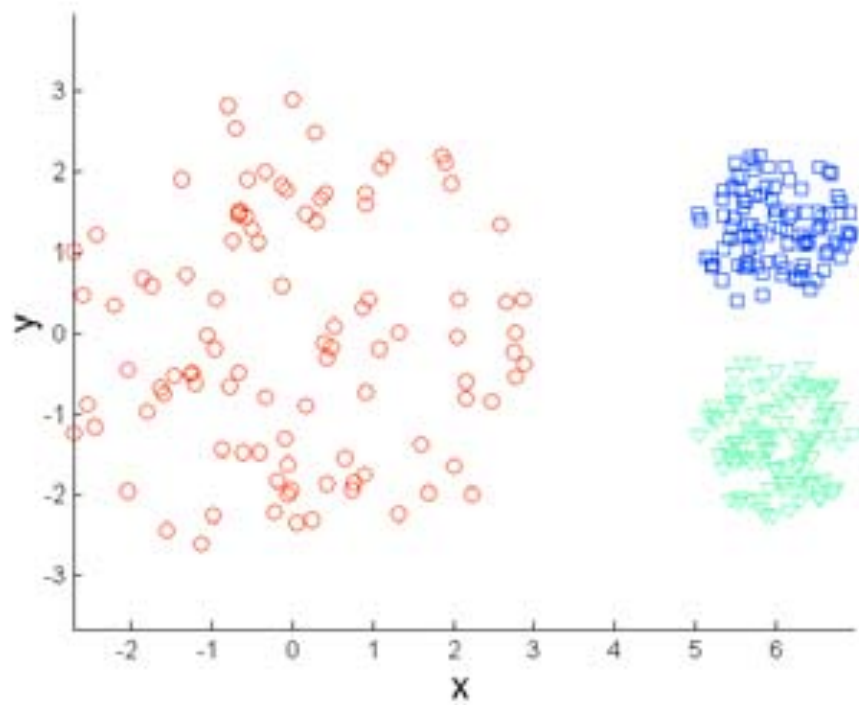


Original Points



K-means (3 Clusters)

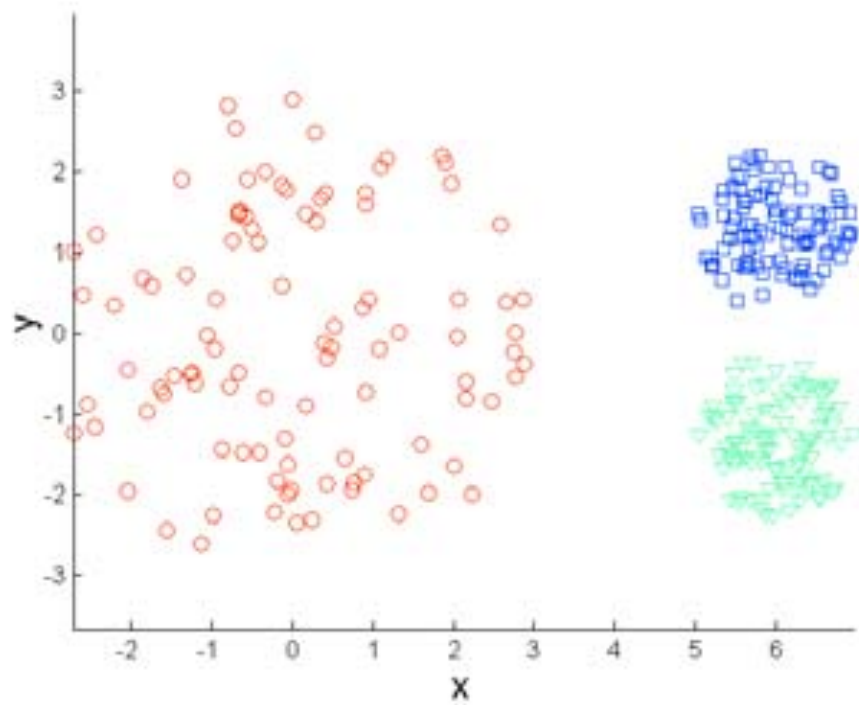
Limitations of K-means: Differing Density



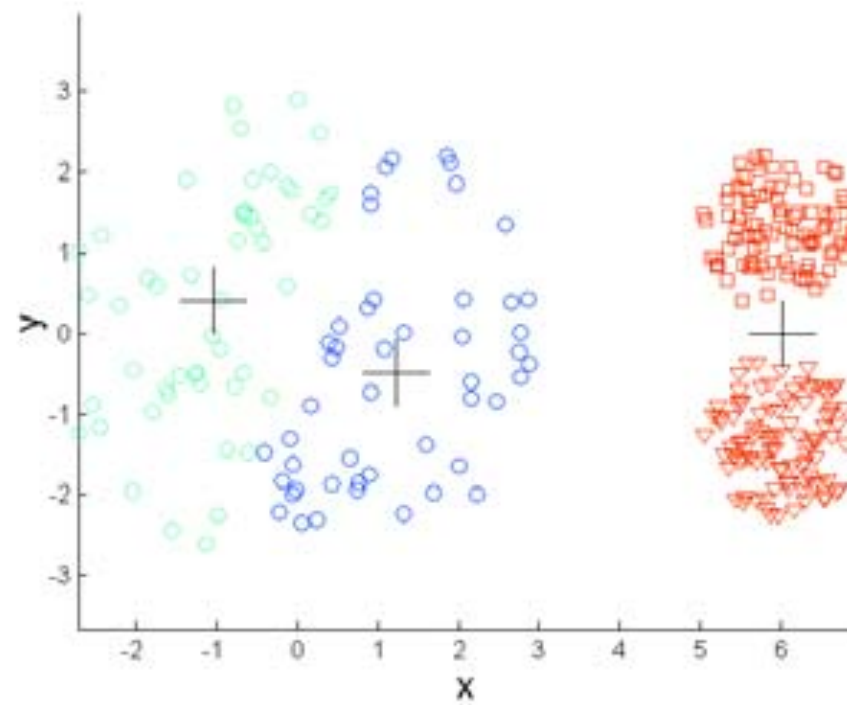
Original Points

K-means (3 Clusters)

Limitations of K-means: Differing Density

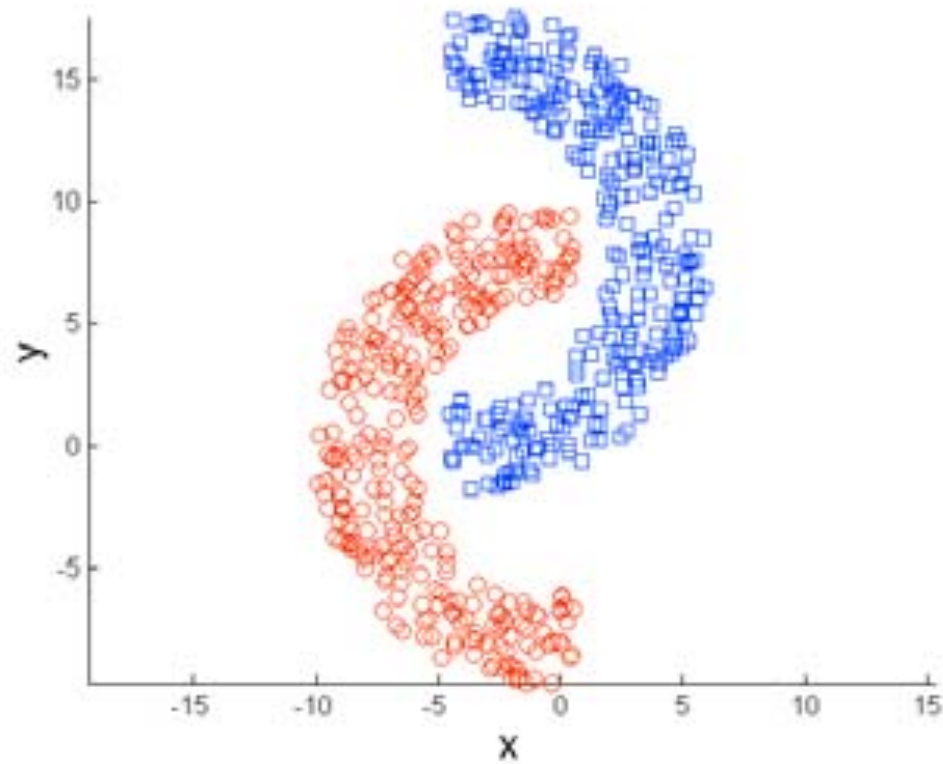


Original Points



K-means (3 Clusters)

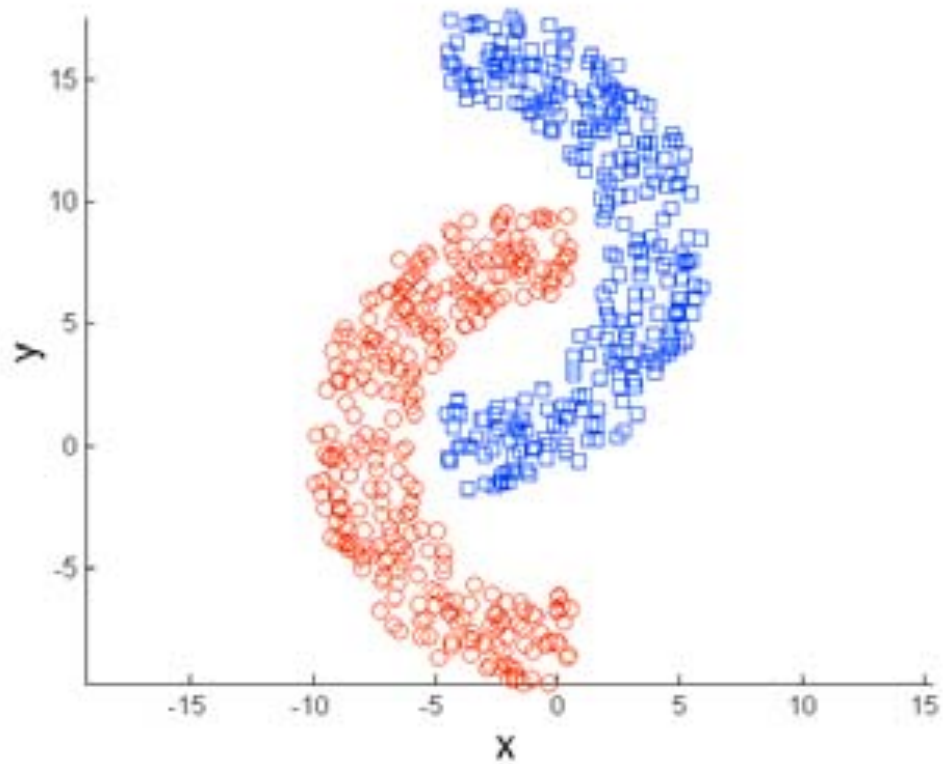
Limitations of K-means: Non-globular Shapes



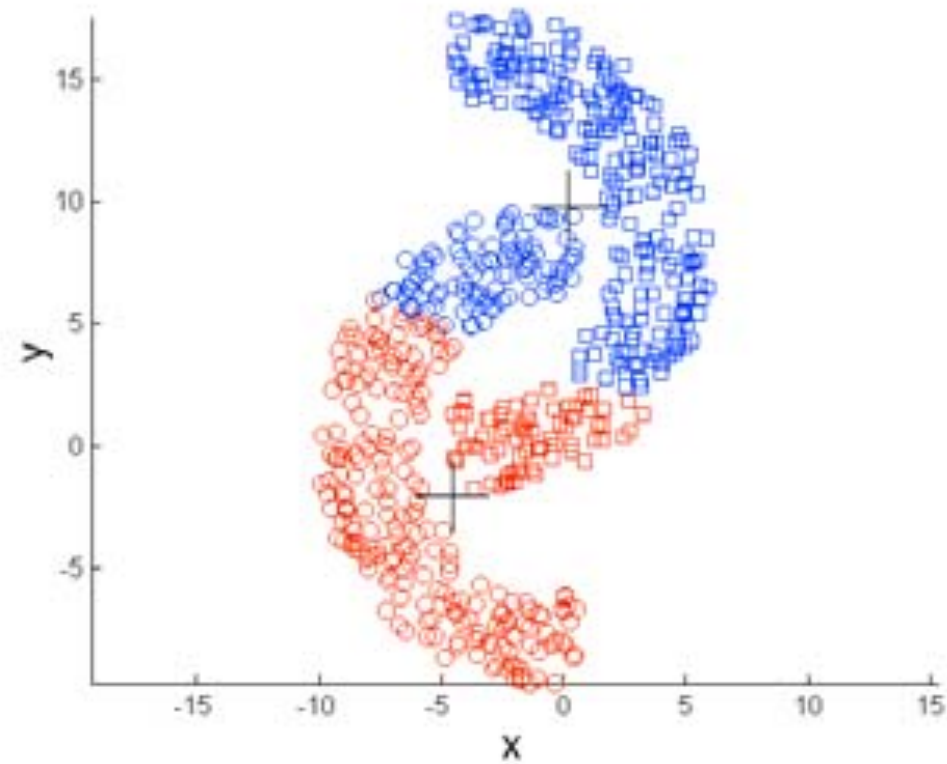
Original Points

K-means (2 Clusters)

Limitations of K-means: Non-globular Shapes

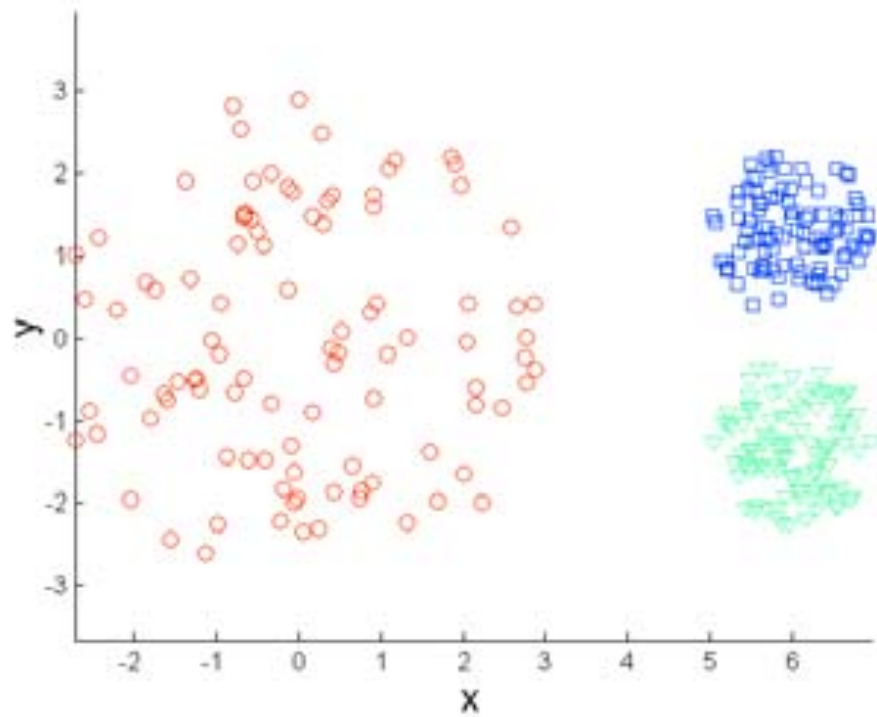


Original Points

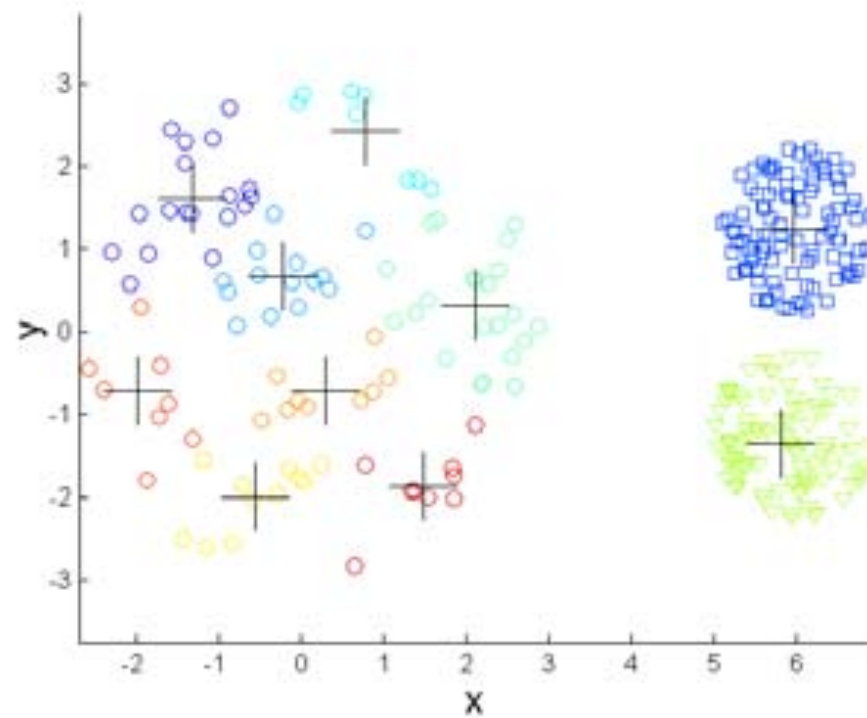


K-means (2 Clusters)

Overcoming K-means Limitations?

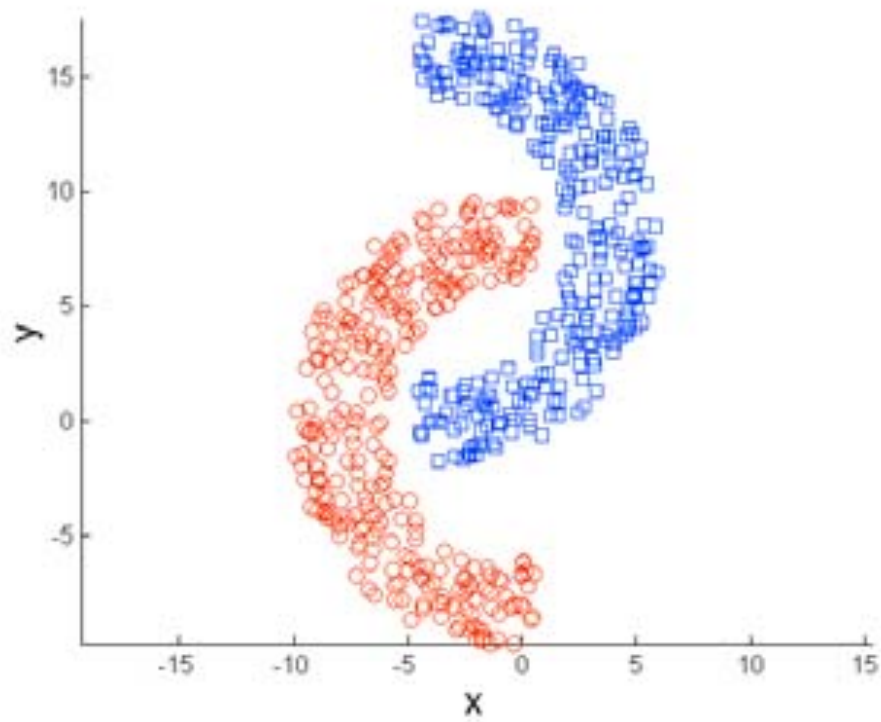


Original Points

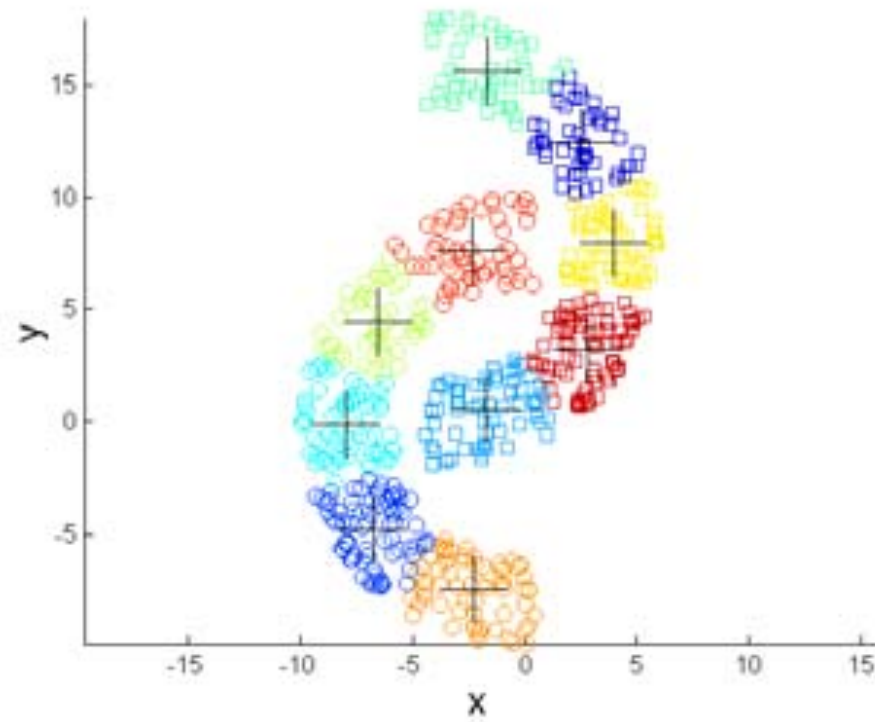


K-means Clusters

Overcoming K-means Limitations?



Original Points



K-means Clusters