Homework1

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1.

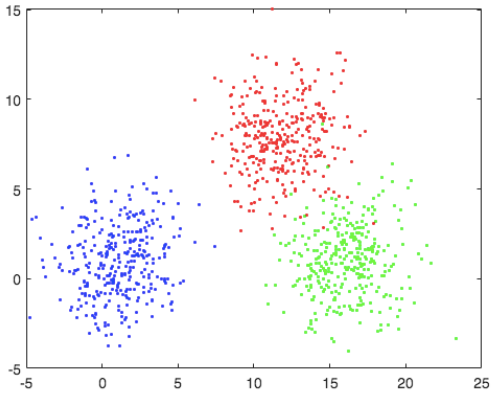
(a.) • : generated dataset

randn('seed',0); Prior(C1)== Prior(C2)== Prior(C3)==1/3

C1：藍色(m1=[1;1] S1=[4 0;0 4])

C2：紅色(m2=[12;8] S2=[4 0;0 4])

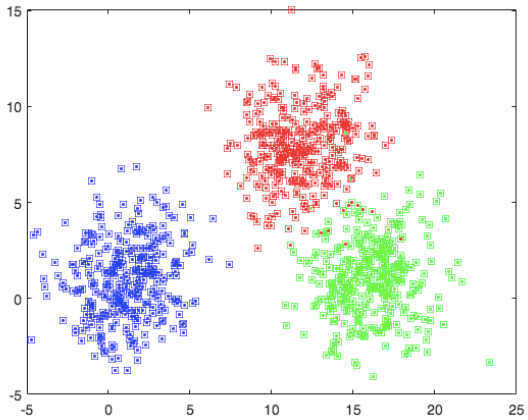
C3：綠色(m3=[16;1] S3=[4 0;0 4])



(b.)

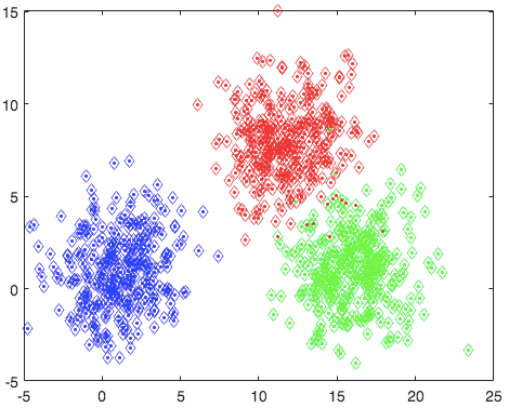
• : generated dataset ☐: Bayesian classifier predict

Bayesian classifier:



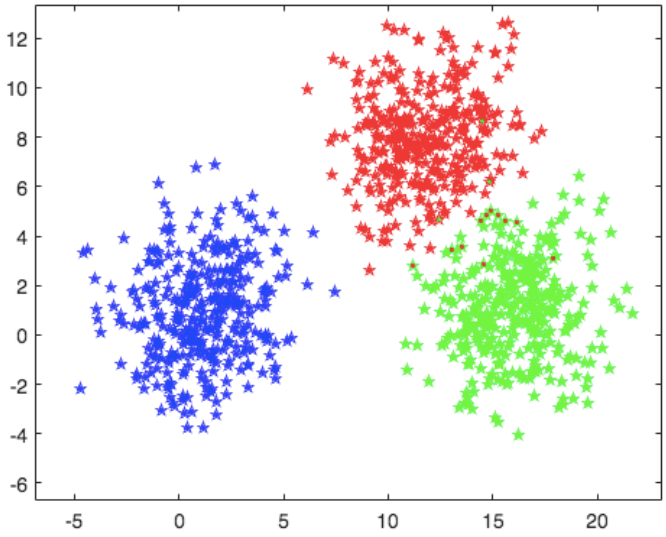
• : generated dataset ♦: Mahalanobis classifier predict

Mahalanobis classifier



• : generated dataset ★: Euclidean classifier predict

Euclidean classifier



(c.)

Classifier	Bayesian	Mahalanobis	Euclidean
Error	**0.014**	**0.014**	**0.014**

2.

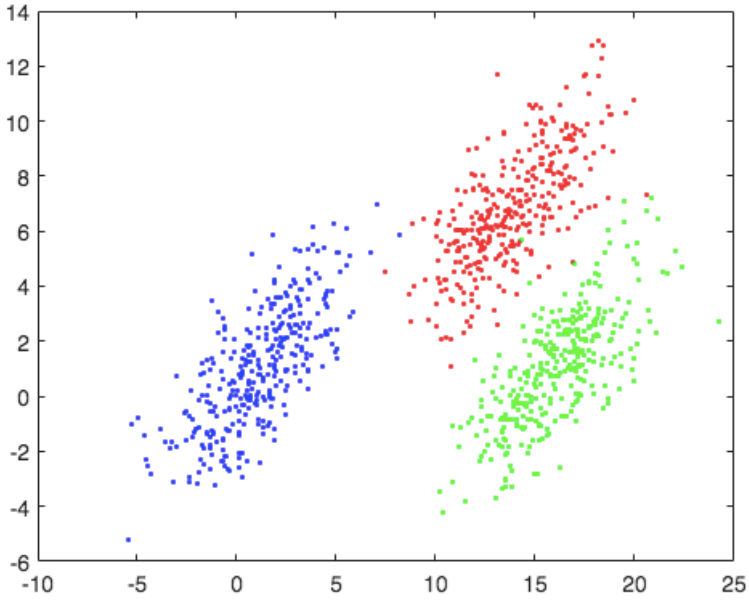
(a.) • : generated dataset

randn('seed',0); Prior(C1)== Prior(C2)== Prior(C3)==1/3

C1：藍色(m1=[1;1] S1=[5 3;3 4])

C2：紅色(m2=[14;7] S2=[5 3;3 4])

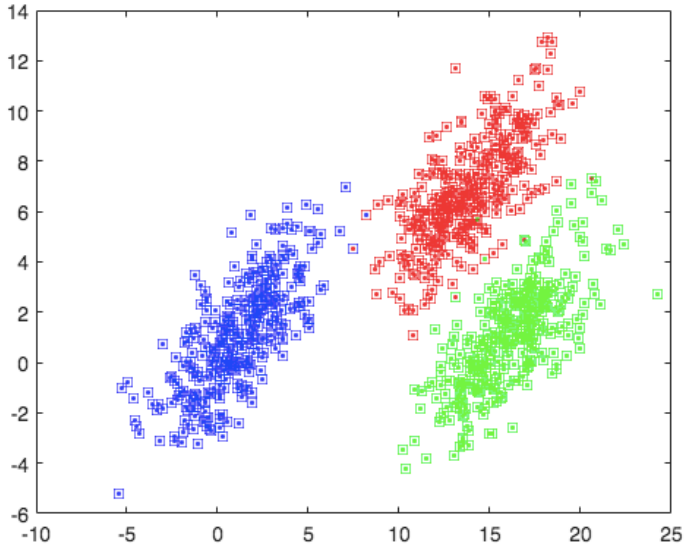
C3：綠色(m3=[16;1] S3=[5 3;3 4])



(b.)

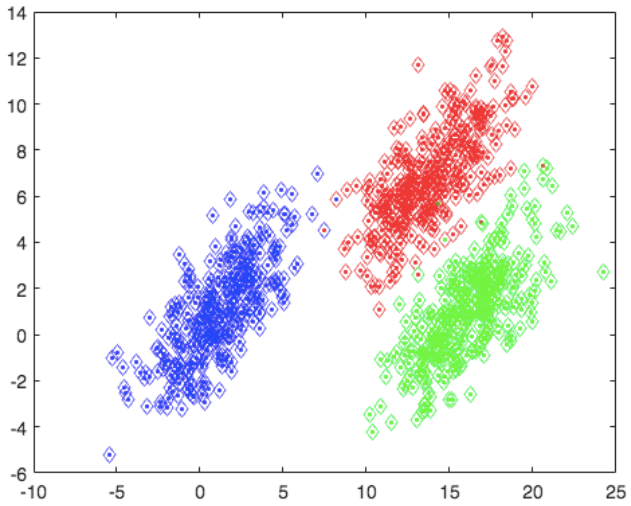
• : generated dataset ☐: Bayesian classifier predict

Bayesian classifier:



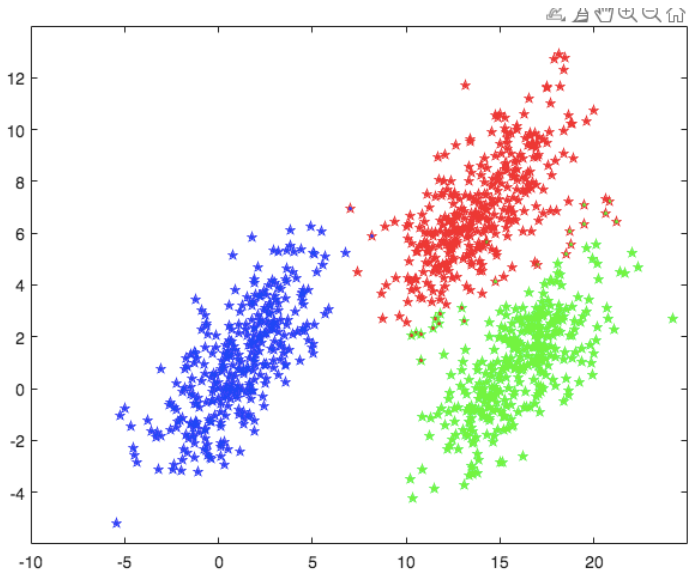
• : generated dataset ♦: Mahalanobis classifier predict

Mahalanobis classifier



• : generated dataset ★: Euclidean classifier predict

Euclidean classifier



(c.)

Classifier	Bayesian	Mahalanobis	Euclidean
Error	**0.007**	**0.007**	**0.02**

3.

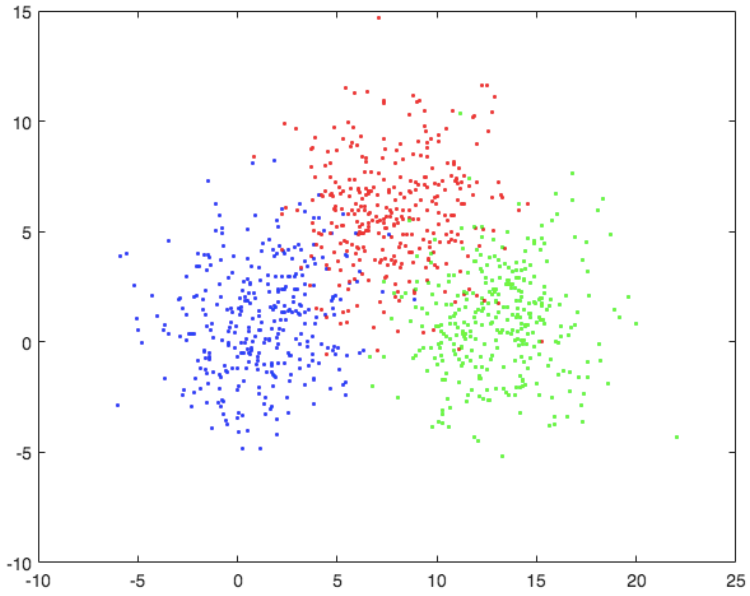
(a.) • : generated dataset

randn('seed',0); Prior(C1)== Prior(C2)== Prior(C3)==1/3

C1：藍色(`m1=[1;1] S1=[6 0;0 6]`)

C2：紅色(`m2=[8;6] S2=[6 0;0 6]`)

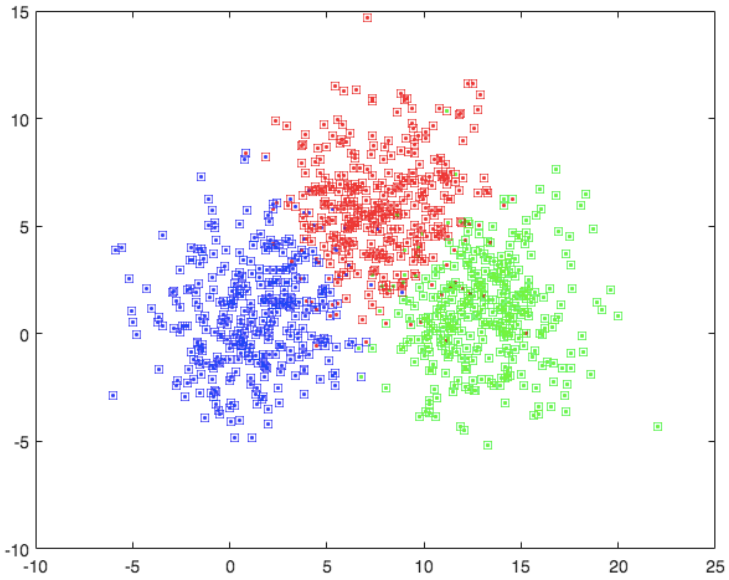
C3：綠色(`m3=[13;1] S3=[6 0;0 6]`)



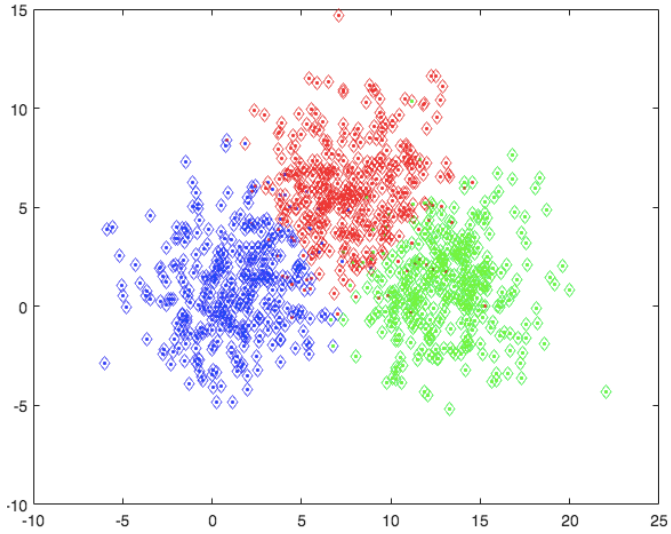
(b.)

• : generated dataset ☐: Bayesian classifier predict

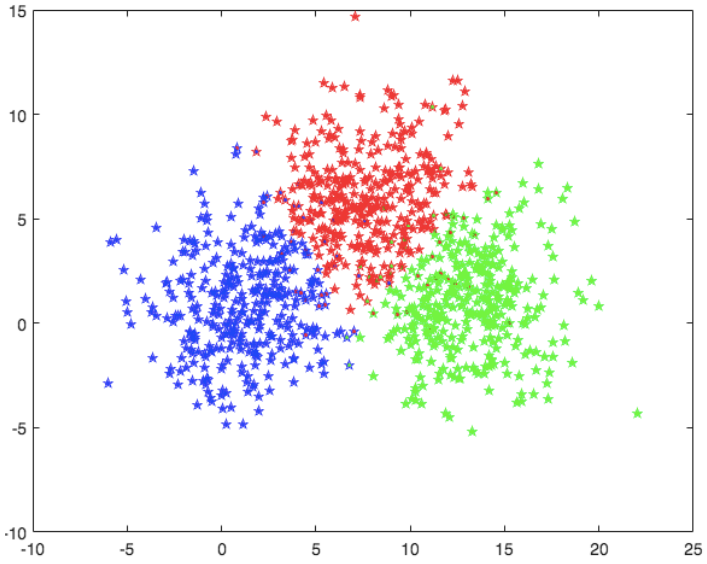
Bayesian classifier:



• : generated dataset ♦: Mahalanobis classifier predict Mahalanobis classifier



• : generated dataset ✶: Euclidean classifier predict Euclidean classifier



(c.)

Classifier	Bayesian	Mahalanobis	Euclidean
Error	**0.077**	**0.077**	**0.077**

4.

(a.)

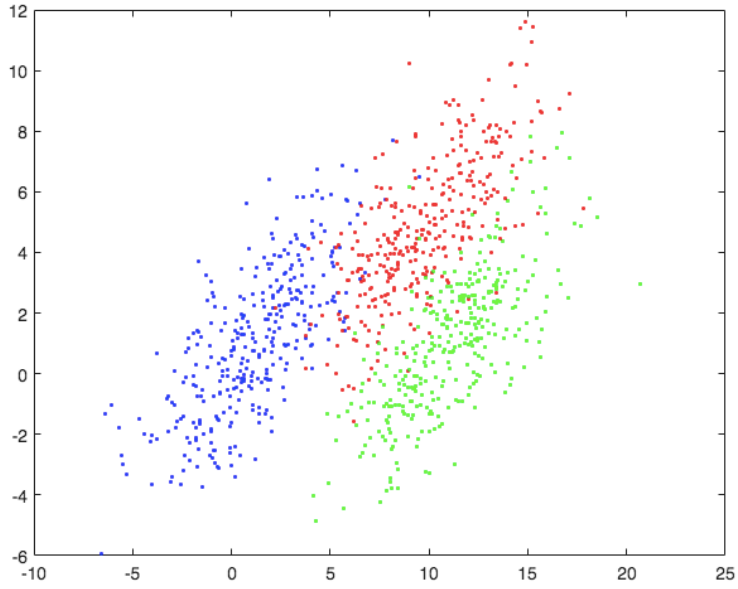
• : generated dataset

randn('seed',0);　　Prior(C1)== Prior(C2)== Prior(C3)==1/3

C1：藍色(m1=[1;1] S1=[7 4;4 5])

C2：紅色(m2=[10;5] S2=[7 4;4 5])

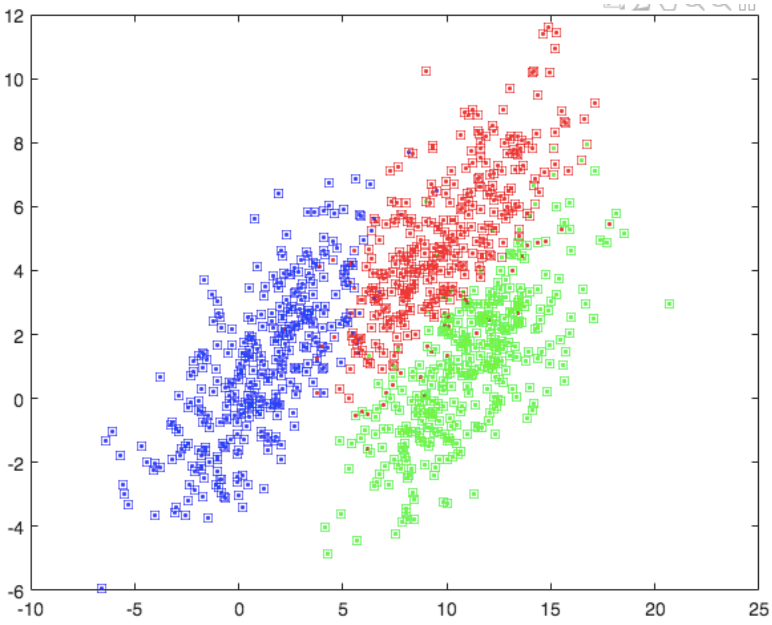
C3：綠色(m3=[11;1] S3=[7 4;4 5])



(b.)

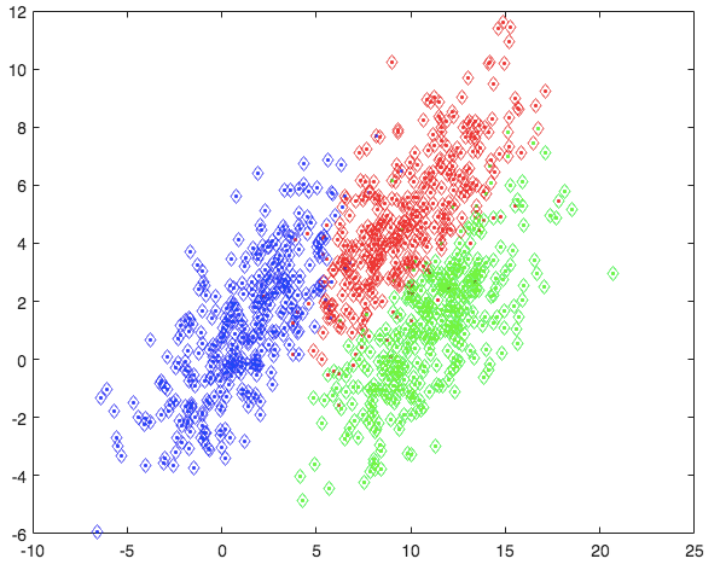
• : generated dataset　　☐: Bayesian classifier predict

Bayesian classifier:



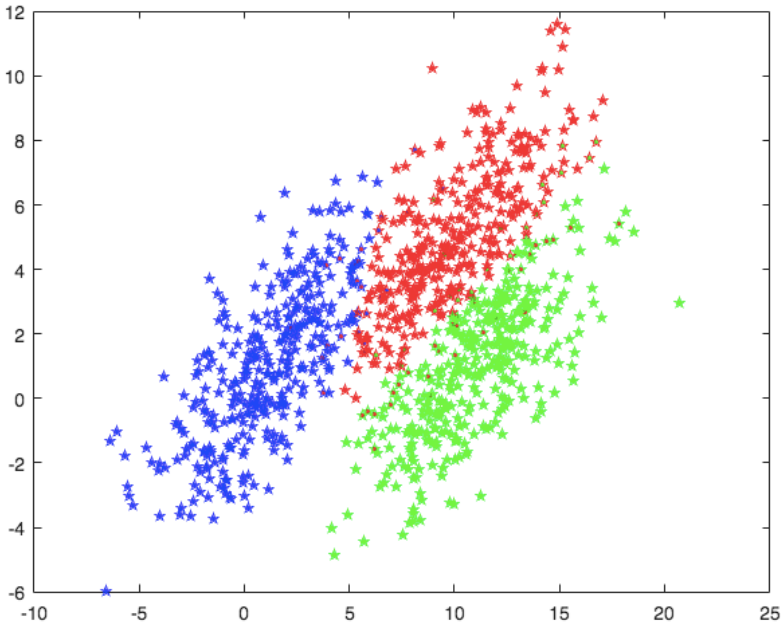
• : generated dataset ♦: Mahalanobis classifier predict

Mahalanobis classifier:



• : generated dataset ✶: Euclidean classifier predict

Euclidean classifier



(c.)

Classifier	Bayesian	Mahalanobis	Euclidean
Error	**0.075**	**0.075**	**0.123**

5.

(a.)

• : generated dataset

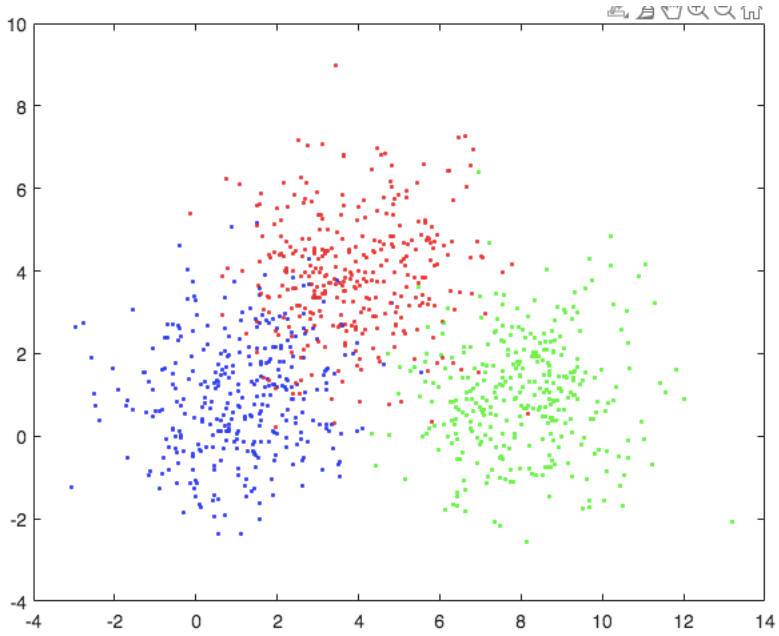
randn('seed',0);

C1：藍色(m1=[1;1] S1=[2 0;0 2])

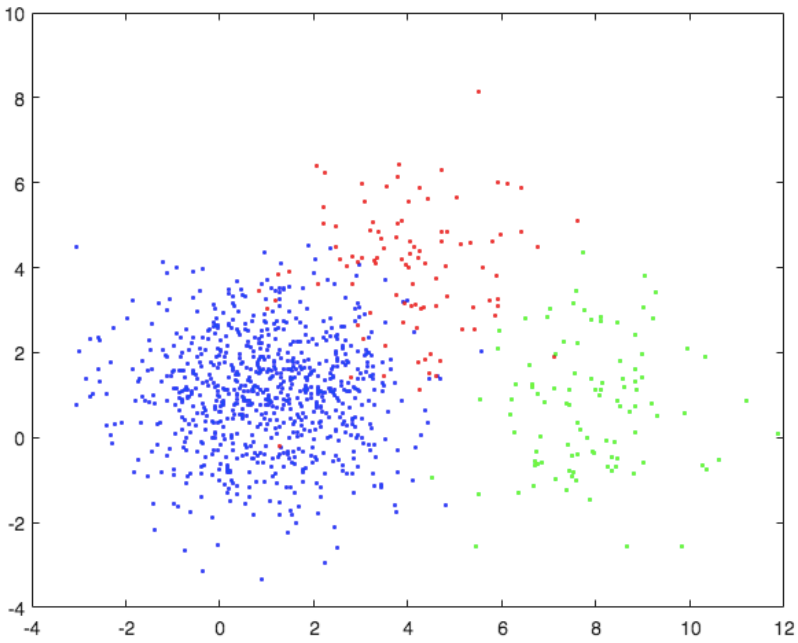
C2：紅色(m2=[4;4] S2=[2 0;0 2])

C3：綠色(m3=[8;1] S3=[2 0;0 2])

Prior(C1)== Prior(C2)== Prior(C3)==1/3



Prior(C1)=0.8 Prior(C2)=0.1 Prior(C3)=0.1

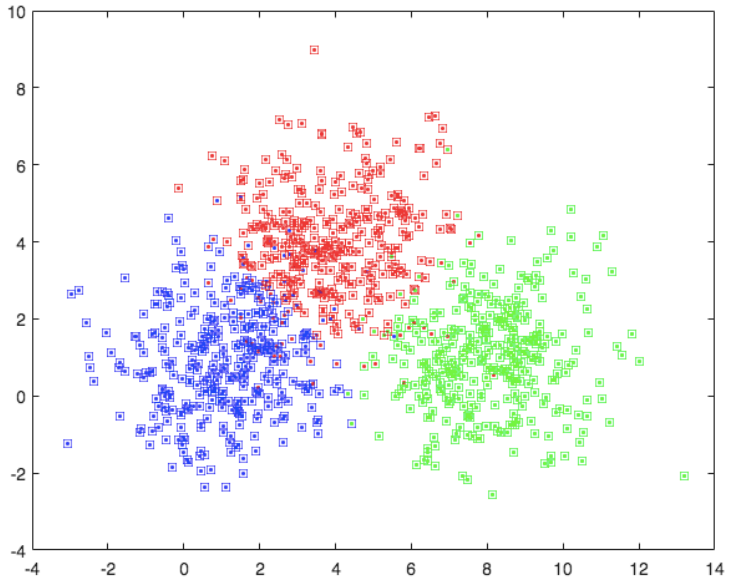


(b.)

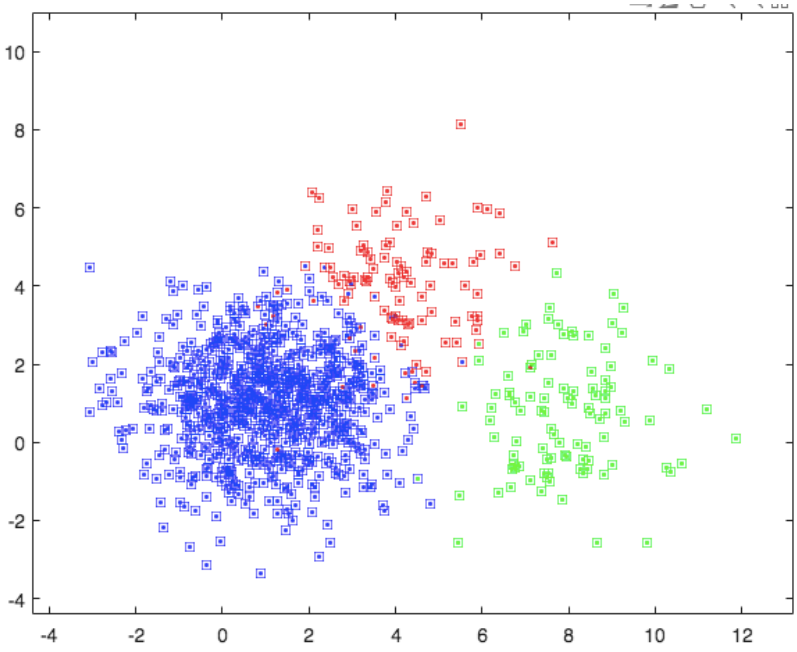
• : generated dataset ☐: Bayesian classifier predict

Bayesian classifier:

Prior(C1)== Prior(C2)== Prior(C3)==1/3



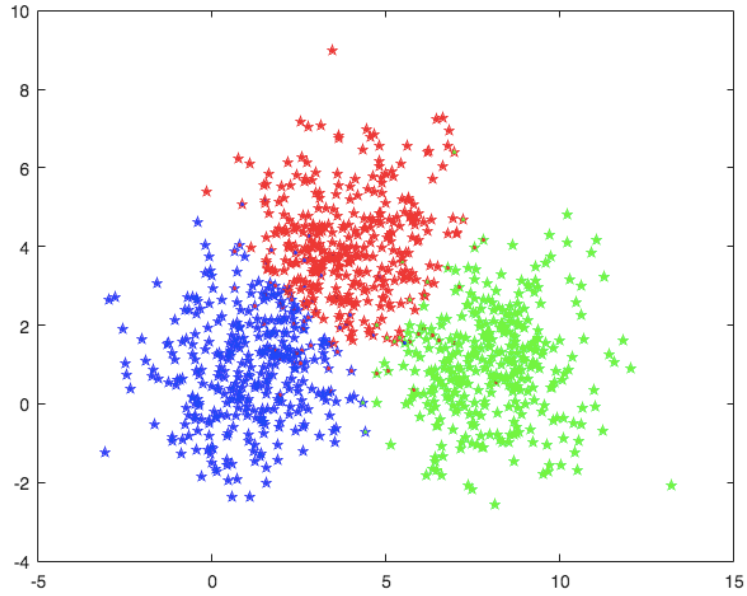
Prior(C1)=0.8 Prior(C2)=0.1 Prior(C3)=0.1



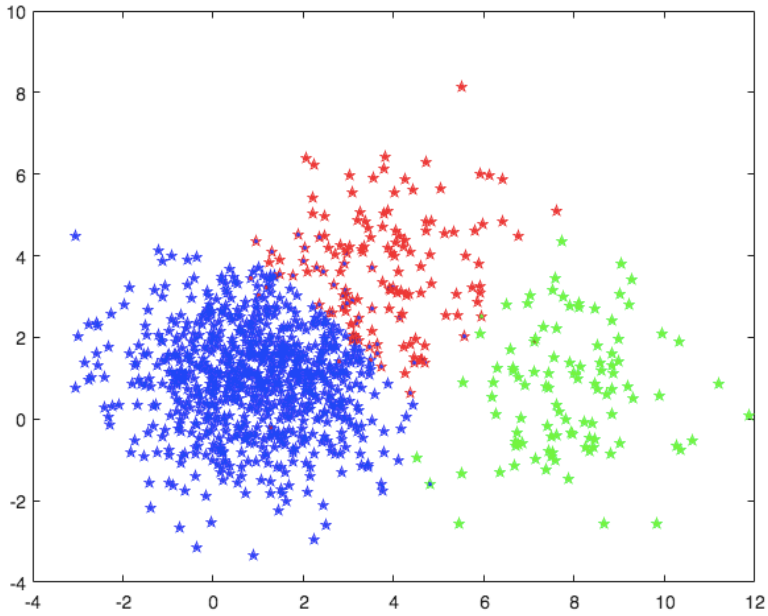
• : generated dataset ✶: Euclidean classifier predict

Euclidean classifier

Prior(C1)== Prior(C2)== Prior(C3)==1/3



Prior(C1)=0.8 Prior(C2)=0.1 Prior(C3)=0.1



(c.)

Prior(C1)== Prior(C2)== Prior(C3)==1/3

Classifier	Bayesian	Euclidean
Error	**0.084**	**0.084**

Prior(C1)=0.8 Prior(C2)=0.1 Prior(C3)=0.1

Classifier	Bayesian	Euclidean
Error	**0.03**	**0.052**

6. (使用不同 random seed 生產 X3 及 Z dataset)

• : generated dataset(X3)

randn('seed',0);

C1：藍色(m1=[1;1] S1=[6 0;0 6])

C2：紅色(m2=[8;6] S2=[6 0;0 6])

C3：綠色(m3=[13;1] S3=[6 0;0 6])

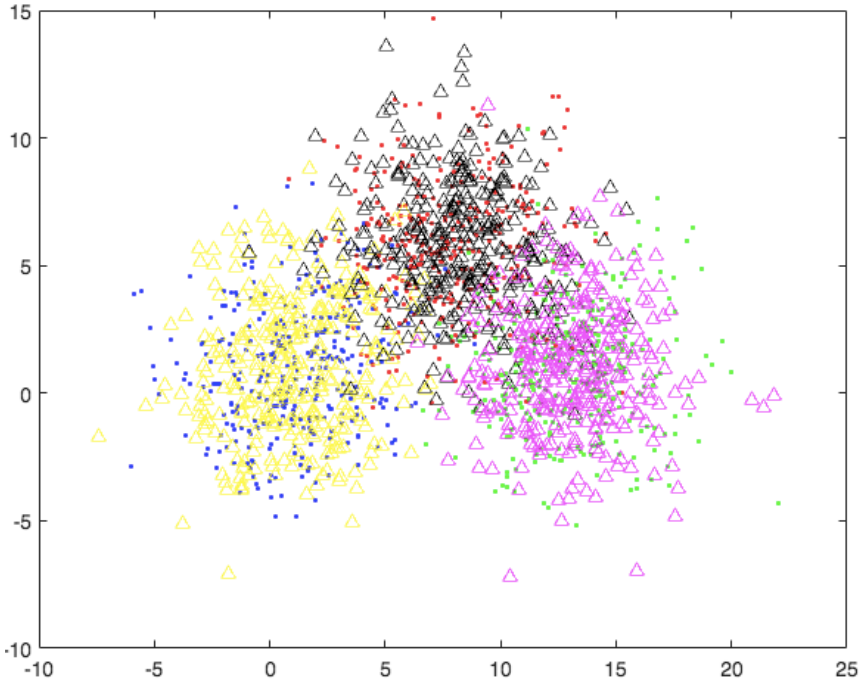
training data(Z)

randn('seed',100);

C1：黃色(m1=[1;1] S1=[6 0;0 6])

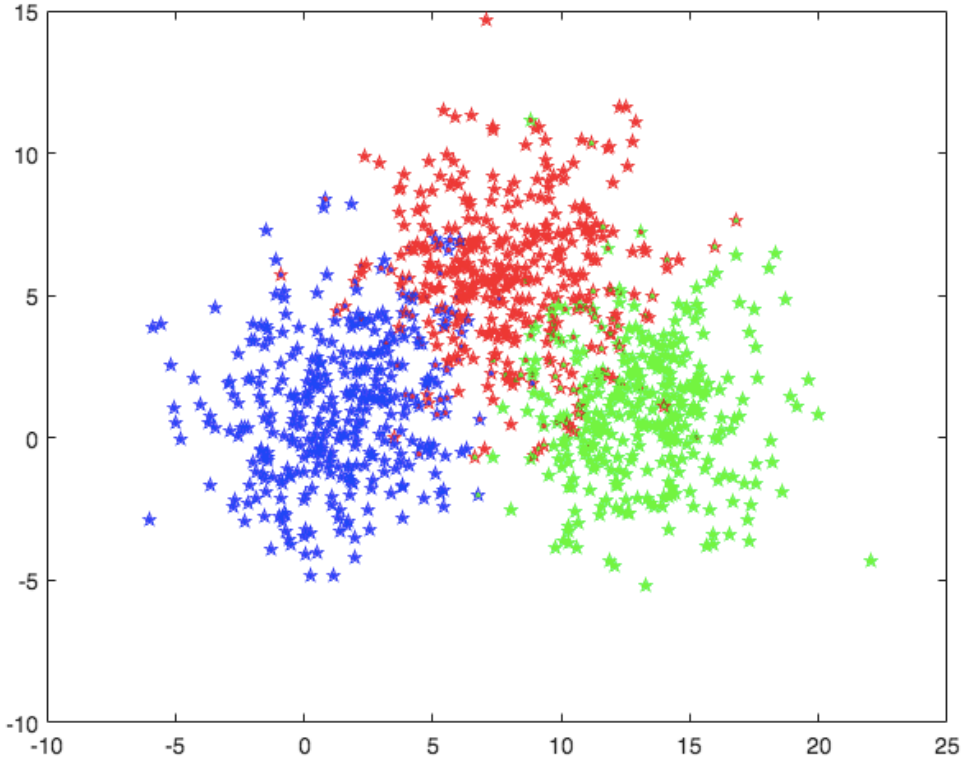
C2：黑色(m2=[8;6] S2=[6 0;0 6])

C3：紫色(m3=[13;1] S3=[6 0;0 6])

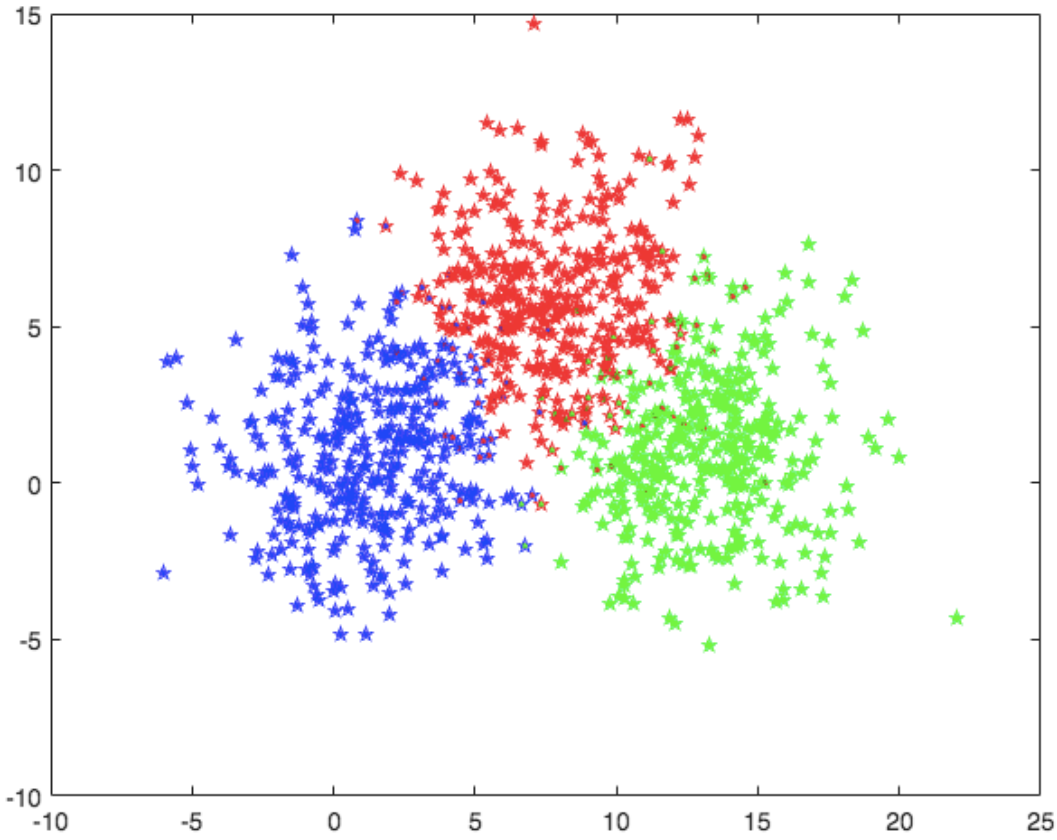


(a.) • : generated dataset ★: KNN classifier predict

K=1



K=11



KNN-Classifier	K=1	K=11
Error	**0.121**	**0.095**