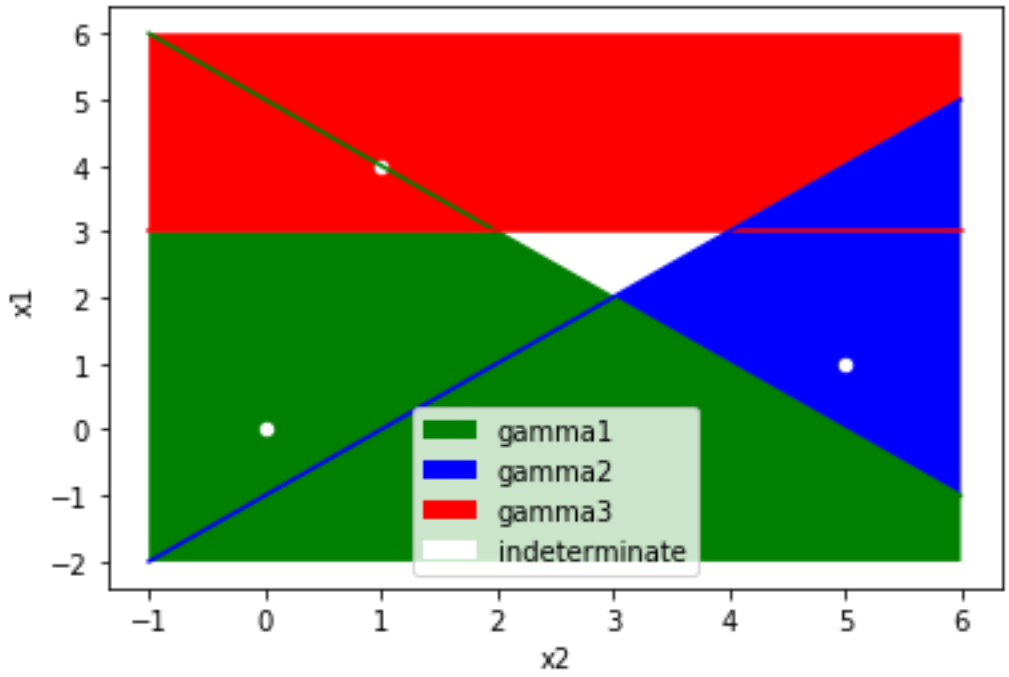
1



According to the diagram, (4,1) is decided as Γ_3, (1, 5) is decided as Γ_2 and (0,0) is decided as Γ_1. There is an indeterminate region in white. A point in it is (2.5, 3), call it point A. $g_{12}(A) = -0.5$, means A belongs to Γ_2 $g_{13}(A) = 0.5$, means A belongs to Γ_1 $g_{23}(A) = -0.5$, means A belongs to Γ_3, so A lies in indeterminate region.

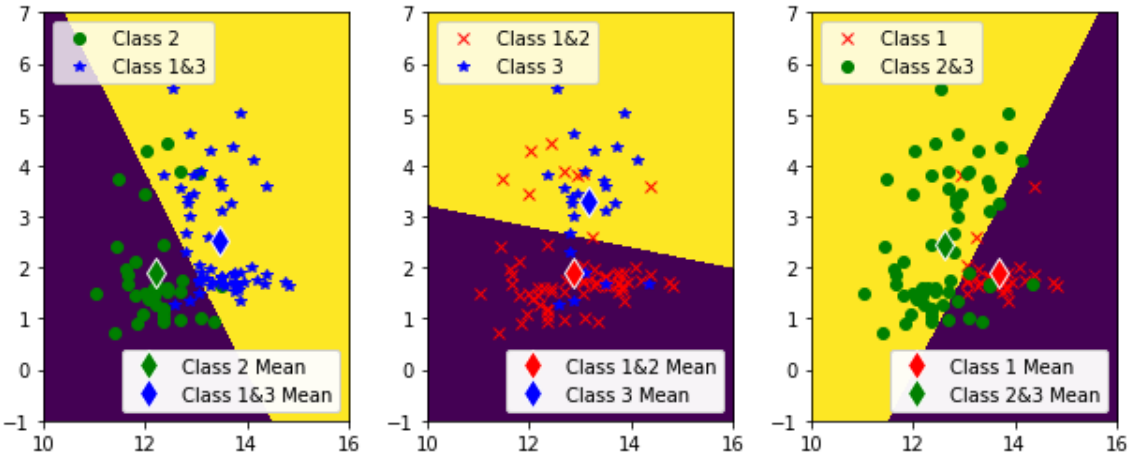
2

(a)

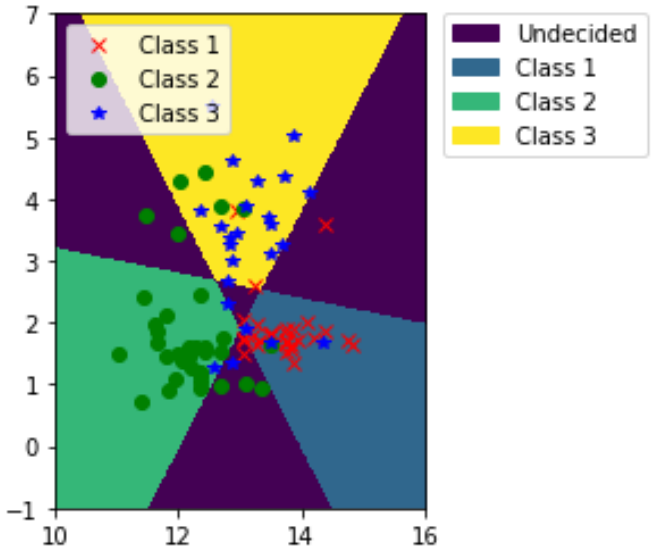
Error rate on training set is 25.842696629213485

Error rate on test set is 29.213483146067414

(b)



(c)



3

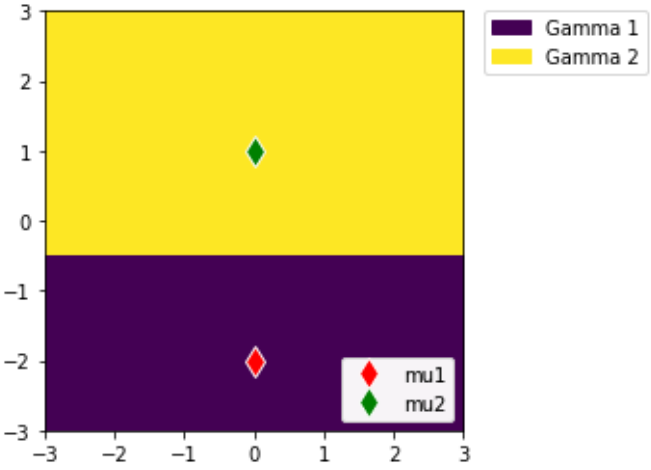
(a)

For the principle of the classifier is based on the distance between points on plane and the mean vector, so the MVM function could be decided as negative distance. This is not a linear classifier.

$$g_1(\underline{x}) = -\left\|\underline{x} - \underline{\mu_1}\right\|^2$$

$$g_2(\underline{x}) = -\left\|\underline{x} - \underline{\mu_2}\right\|^2$$

(b)



(c) This is not a linear classifier.

$$g_1(\underline{x}) = -\left\|\underline{x} - \underline{\mu_1}\right\|^2$$

$$g_2(\underline{x}) = -\left\|\underline{x} - \underline{\mu_2}\right\|^2$$

$$g_3(\underline{x}) = -\left\|\underline{x} - \underline{\mu_3}\right\|^2$$

(d)