We use computer simulations to compare the performance of the classifiers. We generate $\boldsymbol{x}_{ij}-\boldsymbol{\mu}_i,\ j=1,2,\ldots,(i=1,2)$ independently from a pseudorandom p-variate t-distribution, $t_p(\mathbf{0},\boldsymbol{\Sigma}_i,\nu)$ with mean zero, covariance matrix $\boldsymbol{\Sigma}_i$ and degrees of freedom ν.

We set $\boldsymbol{\mu}_2=\mathbf{0}$, $\boldsymbol{\Sigma}_1=c_1\boldsymbol{B}(0.3^{|i-j|^{1/3}})\boldsymbol{B}$ and $\boldsymbol{\Sigma}_2=c_2\boldsymbol{B}(0.3^{|i-j|^{1/3}})\boldsymbol{B}$, where $\boldsymbol{B}=\mathrm{diag}\left[\{0.5+1\ /\ (p+1)\}^{1/2},\ldots,\{0.5+p\ /\ (p+1)\}^{1/2}\right]$. We consider two cases for (a) : $\boldsymbol{\mu}_1=(1,\ldots,1,0,\ldots,0)^T$ whose first $\lceil p^{2/3}\rceil$ elements are 1, and (b) : $\boldsymbol{\mu}_1=(0,\ldots,0,1,\ldots,1)^T$ whose last $\lceil p^{2/3}\rceil$ elements are 1.

We consider three cases :

(1) $p=2^s,\ s=5,\ldots,10,\ (n_1,n_2)=(10,20),\ (c_1,c_2)=(1,2)$ and $\nu=25$ for (a) and (b)

(2) $p=2^s,\ s=5,\ldots,10,\ (n_1,n_2)=(10,20),\ (c_1,c_2)=(0.8,1.2)$ and $\nu=25$ for (b)

(3) $p=500,\ (n_1,n_2)=(10,20),\ (c_1,c_2)=(0.8,1.2)$ and $\nu=10(10)60$ for (b)

Let $\boldsymbol{x}_0$ be an observation vector and we estimate $\boldsymbol{\mu}_i$ and $\boldsymbol{\Sigma}_i$ by $\overline{\boldsymbol{x}}_{in_i}=\sum_{j=1}^{n_i}\boldsymbol{x}_{ij}\ /\ n_i$ and $\boldsymbol{S}_{in_i}=\sum_{j=1}^{n_i}(\boldsymbol{x}_{ij}-\overline{\boldsymbol{x}}_{in_i})(\boldsymbol{x}_{ij}-\overline{\boldsymbol{x}}_{in_i})^T\ /\ (n_i-1)$ for $i=1,2$

Now we compare the follow classifiers:

one classifiers an individual into π_1 if

DBDA : $\left(\mathbf{x}_0-\frac{\overline{\mathbf{x}}_{1n_1}+\overline{\mathbf{x}}_{2n_2}}{2}\right)^T(\overline{\mathbf{x}}_{2n_2}-\overline{\mathbf{x}}_{1n_1})-\frac{\mathrm{tr}\left(\mathbf{S}_{1n_1}\right)}{2n_1}+\frac{\mathrm{tr}\left(\mathbf{S}_{2n_2}\right)}{2n_2}<0$

GQDA : $\frac{p||\mathbf{x}_0-\overline{\mathbf{x}}_{1n_1}||^2}{\mathrm{tr}\left(\mathbf{S}_{1n_1}\right)}-\frac{p||\mathbf{x}_0-\overline{\mathbf{x}}_{2n_2}||^2}{\mathrm{tr}\left(\mathbf{S}_{2n_2}\right)}-p\log\left\{\frac{\mathrm{tr}\left(\mathbf{S}_{2n_2}\right)}{\mathrm{tr}\left(\mathbf{S}_{2n_2}\right)}\right\}-\frac{p}{n_1}+\frac{p}{n_2}<0$

DLDA : $\{\mathbf{x}_0-(\overline{\mathbf{x}}_{1n_1}+\overline{\mathbf{x}}_{2n_2})\ /\ 2\}^T\mathbf{S}_d^{-1}(\overline{\mathbf{x}}_{2n_2}-\overline{\mathbf{x}}_{1n_1})<0$, where $\mathbf{S}_d=\mathrm{diag}(s_{1n},\ldots,s_{pn})$, $s_{in}=\sum_{i=1}^{2}\sum_{l=1}^{n_i}(x_{ijl}-\overline{x}_{ijn_i})^2\ /\ (n_1+n_2-2)$

DQDA : $(\mathbf{x}_0-\overline{\mathbf{x}}_{1n_1})^T\mathbf{S}_{d(1)}^{-1}(\mathbf{x}_0-\overline{\mathbf{x}}_{1n_1})-(\mathbf{x}_0-\overline{\mathbf{x}}_{2n_2})^T\mathbf{S}_{d(2)}^{-1}(\mathbf{x}_0-\overline{\mathbf{x}}_{2n_2})-\log\left\{\frac{\det\left(\mathbf{S}_{d(2)}\right)}{\det\left(\mathbf{S}_{d(1)}\right)}\right\}<0$, where $\mathbf{S}_{d(i)}=\mathrm{diag}(s_{(i)1n_i},\ldots,s_{(i)pn_i})$ and $s_{(i)jn_i}=\sum_{l=1}^{n_i}(x_{ijl}-\overline{x}_{ijn_i})^2\ /\ (n_i-1)$

HM-LSVM : The hard-margin linear support vector machine