

Computational Mathematics Final Term Project

1. “8OX” data set

(a) covariance matrix

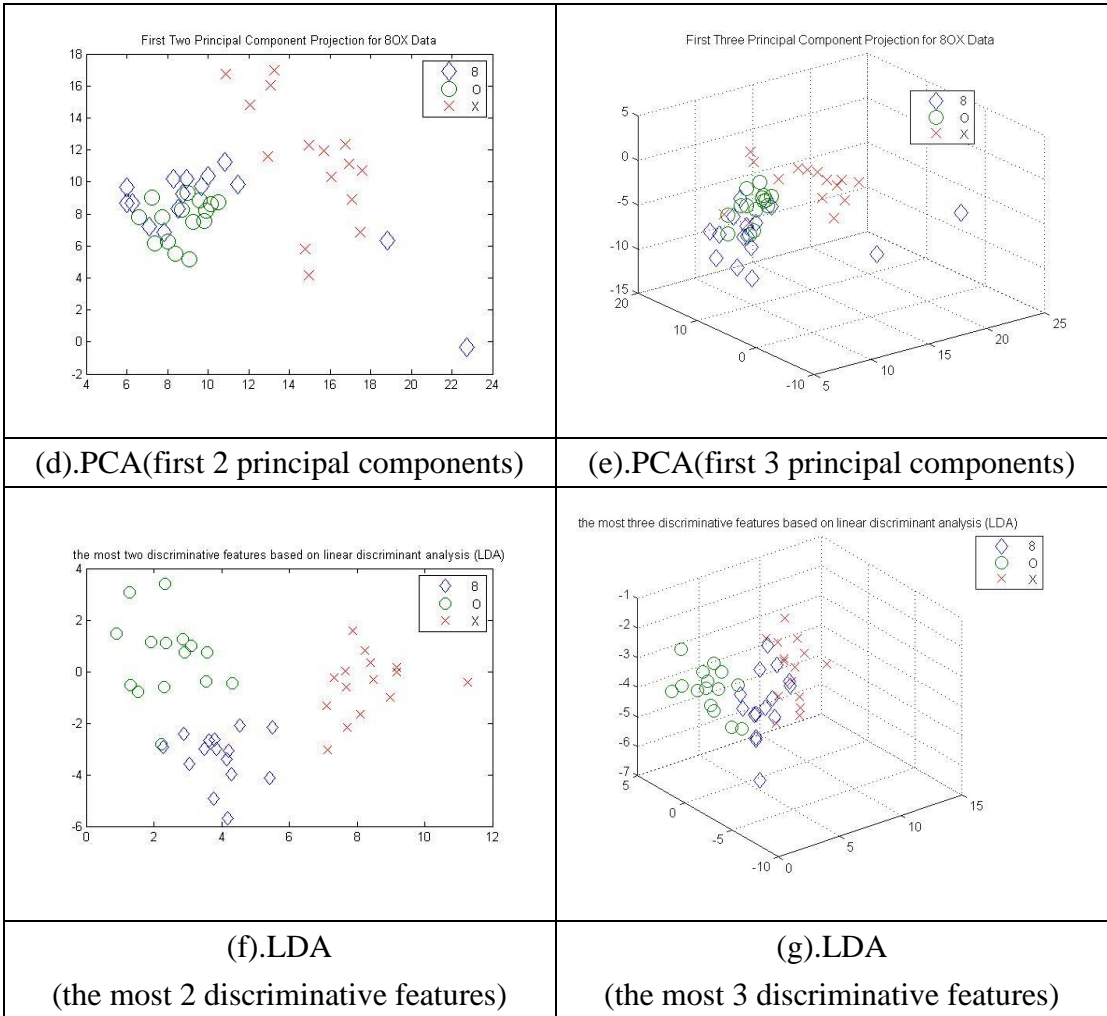
	1	2	3	4	5	6	7	8
1	4.3818	-0.3136	-1.3288	-0.2227	0.6439	-0.2909	0.1500	0.4924
2	-0.3136	4.5182	0.1167	-0.4136	-0.1288	2.4045	0.3045	-0.3939
3	-1.3288	0.1167	2.3010	0.5106	0.3737	0.9348	1.7439	0.0202
4	-0.2227	-0.4136	0.5106	3.3818	1.3333	-0.1636	1.9409	-0.8333
5	0.6439	-0.1288	0.3737	1.3333	4.1010	3.0758	1.9848	1.8384
6	-0.2909	2.4045	0.9348	-0.1636	3.0758	6.0182	1.4636	2.0606
7	0.1500	0.3045	1.7439	1.9409	1.9848	1.4636	8.3000	1.5606
8	0.4924	-0.3939	0.0202	-0.8333	1.8384	2.0606	1.5606	14.3131

(b). Eigenvalues (in descending order)

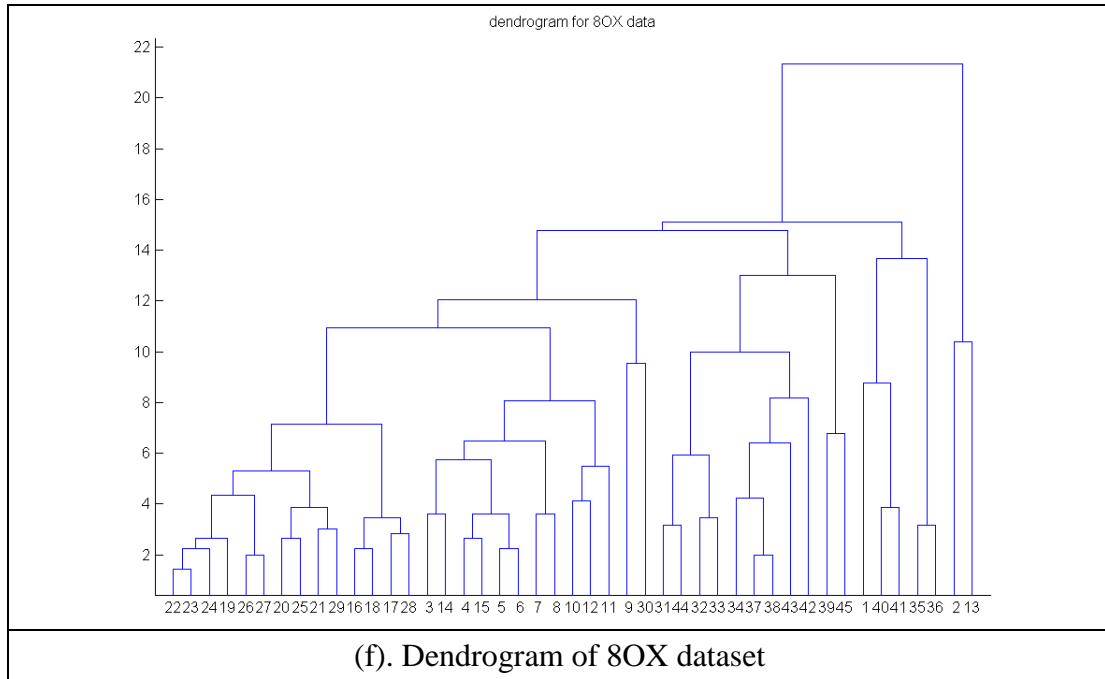
16.2029 10.3753 7.2457 5.1487 4.0436 2.4197 1.2271 0.6521

(c). percentage of lambda (%)

34.2446 56.1727 71.4865 82.3682 90.9143 96.0283 98.6218 100.0000



Group 6		
ID	Name	分工
102062514	朱財德	25%
102062537	郭炳成	25%
102062548	詹育陞	25%
102062617	廖楚喬	25%



2. G19 data set

(a) covariance matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	6.2120e+05	2.6341e+05	3.5781e+05	3.3973e+05	4.6119e+05	4.8266e+05	1.6170e+05	3.1456e+05	3.2049e+05	3.0975e+05	2.2581e+05	2.4298e+05	2.5494e+05	1.7197e+05	2.9248e+05	8.3527e+04	2.1085e+05	1.1759e+05	2.0153e+05
2	2.6341e+05	6.9097e+05	3.8529e+05	4.5745e+05	4.4719e+05	3.3370e+05	2.9004e+05	2.9677e+05	3.0341e+05	2.0982e+05	2.7283e+05	3.0337e+05	2.7642e+05	2.5976e+05	1.8946e+05	1.9339e+05	1.7465e+05	1.3704e+05	2.3138e+05
3	3.5781e+05	3.8529e+05	7.4904e+05	4.6521e+05	6.6166e+05	5.9837e+05	1.9221e+05	5.6934e+05	4.6229e+05	2.3675e+05	3.5235e+05	1.5885e+05	5.0749e+05	2.6279e+05	3.2383e+05	2.6434e+05	2.6766e+05	1.9363e+05	3.4368e+05
4	3.3973e+05	4.5745e+05	4.6521e+05	8.6659e+05	6.9184e+05	5.2972e+05	2.4814e+05	3.2795e+05	3.9234e+05	2.8654e+05	3.9274e+05	2.6309e+05	5.7747e+05	3.8024e+05	5.3654e+05	4.1263e+05	5.1070e+05	2.9044e+05	4.4859e+05
5	4.6119e+05	4.4719e+05	6.6166e+05	6.9184e+05	1.1811e+06	7.5404e+05	2.6503e+05	6.8887e+05	4.5982e+05	3.7296e+05	3.2795e+05	3.4714e+05	2.9215e+05	5.7995e+05	4.0056e+05	5.0923e+05	3.1963e+05	4.8521e+05	2.7836e+05
6	4.8266e+05	3.3370e+05	5.9837e+05	5.2972e+05	7.5404e+05	9.7477e+05	2.6563e+05	5.8800e+05	4.8307e+05	3.1217e+05	4.3228e+05	2.3465e+05	4.0551e+05	3.0627e+05	3.8450e+05	2.7781e+05	3.2016e+05	2.6702e+05	4.2451e+05
7	1.6170e+05	2.9004e+05	1.9221e+05	2.4814e+05	3.6503e+05	2.6563e+05	4.4574e+05	2.5940e+05	2.0821e+05	1.8266e+05	2.2919e+05	1.9968e+05	1.8948e+05	1.4044e+05	1.8424e+05	2.2063e+05	2.4266e+05	1.8142e+05	1.8514e+05
8	3.1456e+05	2.9677e+05	5.6934e+05	3.2795e+05	6.8887e+05	5.8800e+05	2.5940e+05	9.7234e+05	4.8203e+05	2.7295e+05	2.1181e+05	2.2848e+05	4.2457e+05	2.0331e+05	6.5556e+04	1.6862e+05	9.8753e+04	2.0081e+05	1.7240e+05
9	3.2049e+05	3.0341e+05	4.6229e+05	3.9224e+05	4.5982e+05	4.8307e+05	2.0821e+05	4.8203e+05	6.2989e+05	2.5522e+05	4.2437e+05	3.7449e+05	4.8674e+05	3.1923e+05	3.0415e+05	3.0221e+05	3.9074e+05	3.6993e+05	4.5181e+05
10	3.0975e+05	2.0982e+05	2.3675e+05	2.8654e+05	3.7296e+05	3.1217e+05	1.8266e+05	2.7295e+05	2.5522e+05	4.5464e+05	2.9368e+05	2.6258e+05	3.1042e+05	1.9812e+05	3.4351e+05	1.5796e+05	3.4082e+05	5.8398e+04	2.6941e+05
11	2.2581e+05	2.7283e+05	3.5235e+05	3.9274e+05	3.4714e+05	4.3228e+05	2.2919e+05	2.1181e+05	4.2437e+05	2.9368e+05	8.3334e+05	4.8342e+05	5.8725e+05	3.7194e+05	4.7953e+05	4.0547e+05	5.2304e+05	3.1967e+05	5.7048e+05
12	2.4298e+05	3.0337e+05	1.5885e+05	2.6309e+05	2.9215e+05	2.3465e+05	1.9968e+05	2.2848e+05	3.7449e+05	2.6258e+05	4.8342e+05	7.7441e+05	3.1158e+05	4.0731e+05	2.9146e+05	2.3024e+05	4.1473e+05	3.6932e+05	4.0514e+05
13	2.5494e+05	2.7642e+05	5.0749e+05	5.7747e+05	5.7995e+05	4.0551e+05	1.8948e+05	4.2457e+05	4.8674e+05	3.1042e+05	5.8725e+05	3.1158e+05	8.5447e+05	4.2334e+05	6.1166e+05	3.7934e+05	5.9341e+05	2.7568e+05	5.2479e+05
14	1.7197e+05	2.5976e+05	2.6279e+05	3.8024e+05	4.0056e+05	3.0627e+05	1.4044e+05	2.0331e+05	3.1923e+05	1.9812e+05	3.7194e+05	4.0731e+05	4.2334e+05	5.7140e+05	4.9576e+05	3.1464e+05	5.3731e+05	2.3791e+05	4.1336e+05
15	2.9248e+05	1.8946e+05	3.2383e+05	5.3654e+05	5.0922e+05	3.8450e+05	1.8424e+05	6.5556e+04	3.0415e+05	3.4351e+05	4.7953e+05	2.9146e+05	6.1166e+05	4.9576e+05	1.0293e+06	3.3474e+05	8.8658e+05	2.4974e+05	5.6724e+05
16	8.3527e+04	1.9339e+05	2.6434e+05	4.1263e+05	3.1960e+05	2.7781e+05	2.2063e+05	1.6862e+05	3.0221e+05	1.5796e+05	4.0547e+05	2.3024e+05	3.7934e+05	3.1464e+05	3.3474e+05	7.8588e+05	3.8678e+05	4.3618e+05	4.9028e+05
17	2.1085e+05	1.7465e+05	2.6766e+05	5.1070e+05	4.8521e+05	3.2016e+05	2.4266e+05	9.8753e+04	3.9074e+05	3.4082e+05	5.2304e+05	4.1473e+05	5.9341e+05	5.3731e+05	8.8658e+05	3.8678e+05	1.0880e+06	4.1663e+05	6.6949e+05
18	1.1759e+05	1.3704e+05	1.9363e+05	2.9044e+05	2.7836e+05	2.6702e+05	1.8142e+05	2.0081e+05	3.6993e+05	8.5389e+04	3.1967e+05	3.6932e+05	2.7568e+05	2.3791e+05	2.4974e+05	4.3618e+05	4.1663e+05	9.1906e+05	5.4948e+05
19	2.0153e+05	2.3138e+05	3.4368e+05	4.4859e+05	4.5300e+05	4.2451e+05	1.8514e+05	1.7240e+05	4.5181e+05	2.6941e+05	5.7048e+05	4.0514e+05	5.2479e+05	4.1336e+05	5.6724e+05	4.9028e+05	6.6949e+05	5.4948e+05	8.3332e+05

(b). Eigenvalues (in descending order)

1.0e+06 *

Columns 1 through 9

7.3758 1.9340 1.0810 0.7697 0.6523 0.6037 0.5174 0.4004 0.3362

Columns 10 through 18

0.3141 0.2742 0.2266 0.2002 0.1601 0.1224 0.0985 0.0860 0.0744

Column 19

0.0485

(c). percentage of lambda (%)

Columns 1 through 9

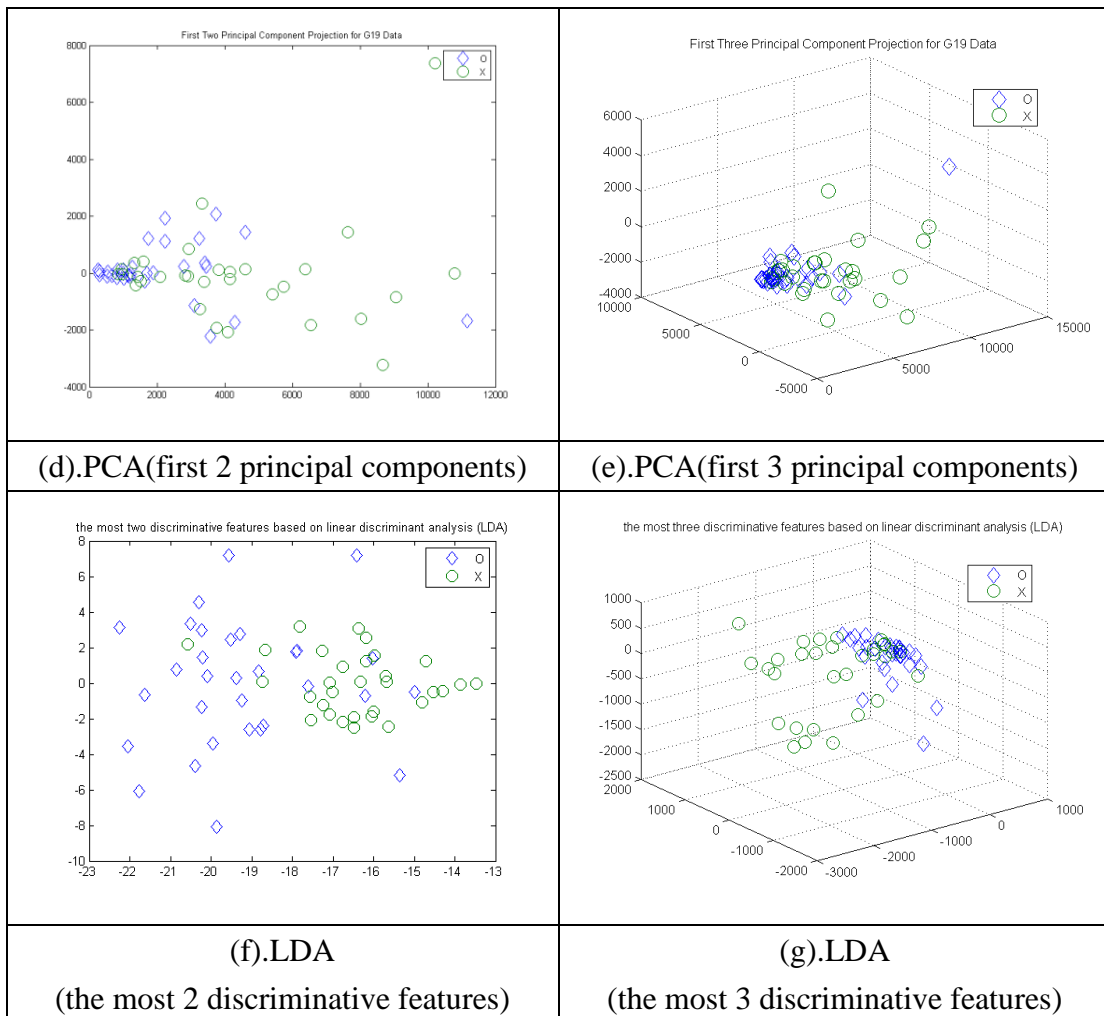
48.2850 60.9461 68.0228 73.0615 77.3317 81.2836 84.6705 87.2915 89.4925

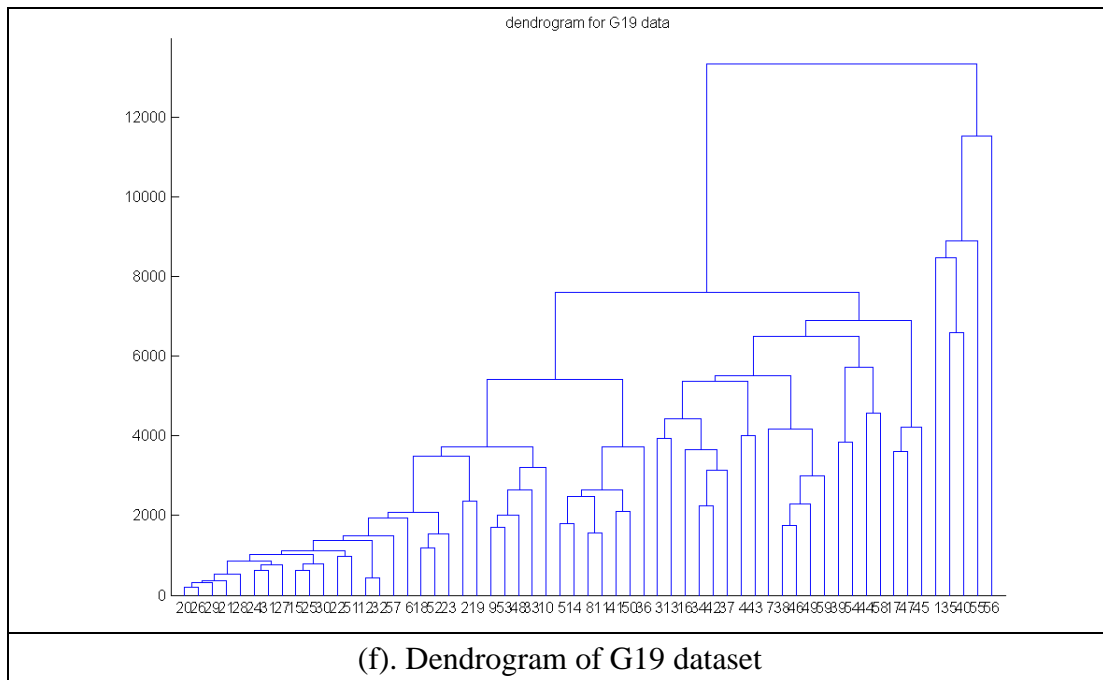
Columns 10 through 18

91.5486 93.3435 94.8270 96.1374 97.1856 97.9871 98.6322 99.1954 99.6826

Column 19

100.0000





3. For the data set “**IMOX**.txt” introduced in class, there are $n = 192$ patterns from $k = 4$ categories, each pattern consists of $d = 8$ features. Repeat the same processes as required in problem (1).

(a). covariance matrix

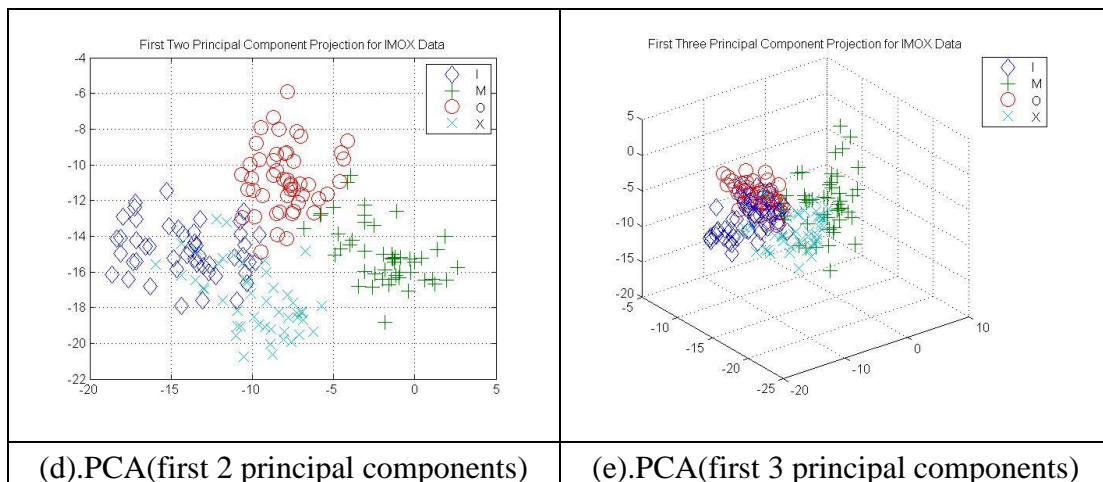
4.6383	2.2703	1.0168	0.4144	2.6840	1.2355	-2.3158	-1.1831
2.2703	6.7974	2.2615	0.2639	3.0453	4.5951	-2.8176	-3.2862
1.0168	2.2615	6.2276	0.7743	1.7625	3.3733	-1.6464	-1.9649
0.4144	0.2639	0.7743	5.0942	0.1577	-0.4461	-0.1765	0.5351
2.6840	3.0453	1.7625	0.1577	5.8861	5.8582	-2.2033	-1.9838
1.2355	4.5951	3.3733	-0.4461	5.8582	9.3521	-2.8159	-2.9070
-2.3158	-2.8176	-1.6464	-0.1765	-2.2033	-2.8159	9.5083	3.9049
-1.1831	-3.2862	-1.9649	0.5351	-1.9838	-2.9070	3.9049	9.5824

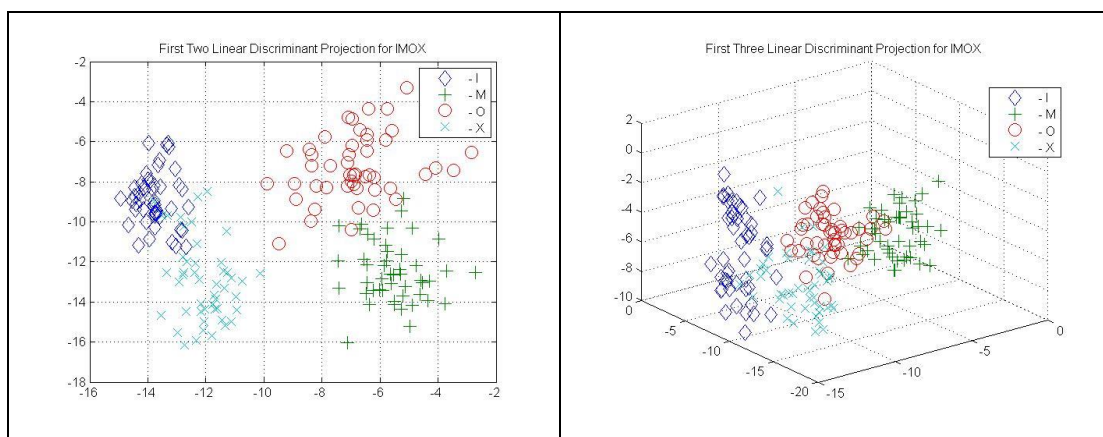
(b). Eigenvalues (in descending order)

24.2673	8.7729	6.4188	5.5945	4.5224	3.6371	3.2476	0.6258
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(c). percentage of lambda (%)

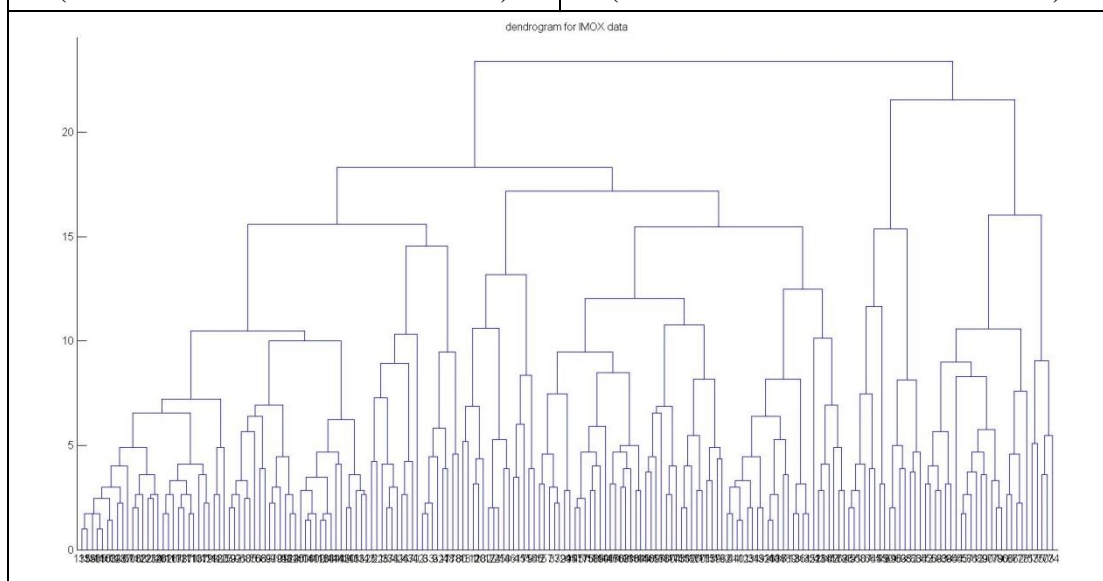
42.5097	57.8775	69.1216	78.9216	86.8436	93.2148	98.9037	100.0000
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(f).LDA
(the most 2 discriminative features)

(g).LDA
(the most 3 discriminative features)



(f). Dendrogram of IMOX dataset

4. Iris data set

(a) covariance matrix

4x4 double

	1	2	3	4
1	0.6857	-0.0424	1.2743	0.5163
2	-0.0424	0.1900	-0.3297	-0.1216
3	1.2743	-0.3297	3.1163	1.2956
4	0.5163	-0.1216	1.2956	0.5810

(b). Eigenvalues (in descending order)

4.2282 0.2427 0.0782 0.0238

(c). percentage of lambda (%)

92.4619 97.7685 99.4788 100.0000

