The profile2 data

March 8, 2011

The data:

```
bellydancer 7 10 6 5
bellydancer 8 9 5 7
bellydancer 5 10 5 8
bellydancer 6 10 6 8
bellydancer 7 8 7 9
politician  4 4 4 4
politician 6 4 5 3
politician 5 5 5 6
politician 6 6 6 7
politician 4 5 6 5
admin 3 1 1 2
admin 5 3 1 5
admin 4 2 2 5
admin 7 1 2 4
admin 6 3 3 3
```

The SAS code and output:

```
options linesize=80;

data profile;
  infile "profile.dat";
  input group $ read dance tv ski;

proc discrim can list out=fred;
  class group;

proc print;

proc gplot;
  plot Can1*Can2=group;

run;
```

The DISCRIM Procedure

Total Sample Size	15	DF Total	14
Variables	4	DF Within Classes	12
Classes	3	DF Between Classes	2

Number of Observations Read	15
Number of Observations Used	15

Class Level Information

group	Variable Name	Frequency	Weight	Proportion	Prior Probability
admin	admin	5	5.0000	0.333333	0.333333
bellydan	bellydan	5	5.0000	0.333333	0.333333
politici	politici	5	5.0000	0.333333	0.333333

Pooled Covariance Matrix Information

Covariance Matrix Rank	Natural Log of the Determinant of the Covariance Matrix
4	0.38667

The DISCRIM Procedure
Pairwise Generalized Squared Distances Between Groups

$$D^2(i|j) = (\bar{X}_i - \bar{X}_j)' \, COV^{-1} \, (\bar{X}_i - \bar{X}_j)$$

Generalized Squared Distance to group

From group	admin	bellydan	politici
admin	0	77.68532	25.14460
bellydan	77.68532	0	27.90946
politici	25.14460	27.90946	0

The DISCRIM Procedure
Canonical Discriminant Analysis

	Canonical Correlation	Adjusted Canonical Correlation	Approximate Standard Error	Squared Canonical Correlation
1	0.970481	0.963344	0.015545	0.941834
2	0.814155	0.798467	0.090107	0.662849

Eigenvalues of Inv(E)*H
= CanRsq/(1-CanRsq)

	Eigenvalue	Difference	Proportion	Cumulative
1	16.1922	14.2262	0.8917	0.8917
2	1.9660		0.1083	1.0000

Test of H0: The canonical correlations in the current row and all that follow are zero

	Likelihood Ratio	Approximate F Value	Num DF	Den DF	Pr > F
1	0.01961069	13.82	8	18	<.0001
2	0.33715124	6.55	3	10	0.0100

The DISCRIM Procedure
Canonical Discriminant Analysis

Total Canonical Structure

Variable	Can1	Can2
read	0.501543	-0.326770
dance	0.988676	-0.137490
tv	0.870725	0.447979
ski	0.762946	-0.153062

Between Canonical Structure

Variable	Can1	Can2
read	0.877480	-0.479613
dance	0.993263	-0.115878
tv	0.918130	0.396278
ski	0.986131	-0.165969

Pooled Within Canonical Structure

Variable	Can1	Can2
read	0.145376	-0.228037
dance	0.922261	-0.308780
tv	0.537024	0.665194
ski	0.278589	-0.134560

The DISCRIM Procedure
Canonical Discriminant Analysis
Total-Sample Standardized Canonical Coefficients

Variable	Can1	Can2
read	0.018261344	-0.668274819
dance	3.112399048	-1.508589983
tv	0.939269988	2.465444147
ski	-0.085702316	-0.419490983

Pooled Within-Class Standardized Canonical Coefficients

Variable	Can1	Can2
read	0.016411781	-0.600589963
dance	0.869166285	-0.421287737
tv	0.396721290	1.041334435
ski	-0.061140572	-0.299267509

Raw Canonical Coefficients

Variable	Can1	Can2
read	0.012974652	-0.474808056
dance	0.952123961	-0.461497594
tv	0.474172636	1.244632708
ski	-0.041536839	-0.203312237

Class Means on Canonical Variables

group	Can1	Can2
admin	-4.347308175	-0.922471653
bellydan	4.466326504	-0.850639955
politici	-0.119018329	1.773111608

The DISCRIM Procedure
Linear Discriminant Function

$$\text{Constant} = -.5\ \bar{X}_j'\ \text{COV}^{-1}\ \bar{X}_j \qquad \text{Coefficient Vector} = \text{COV}^{-1}\ \bar{X}_j$$

Linear Discriminant Function for group

Variable	admin	bellydan	politici
Constant	-12.19602	-74.39378	-31.10485
read	3.13549	3.21574	1.91047
dance	1.91503	10.27355	4.69688
tv	-0.20061	4.06798	5.15934
ski	1.38042	0.99973	0.65675

The DISCRIM Procedure
Classification Results for Calibration Data: WORK.PROFILE
Resubstitution Results using Linear Discriminant Function
Generalized Squared Distance Function

$$D^2_j(X) = (X-\bar{X}_j)'\ \text{COV}^{-1}\ (X-\bar{X}_j)$$

Posterior Probability of Membership in Each group

$$\Pr(j|X) = \exp(-.5\ D^2_j(X)) \ /\ \text{SUM}\ \exp(-.5\ D^2_k(X))$$

Posterior Probability of Membership in group

Obs	From group	Classified into group	admin	bellydan	politici
1	bellydan	bellydan	0.0000	1.0000	0.0000
2	bellydan	bellydan	0.0000	1.0000	0.0000
3	bellydan	bellydan	0.0000	1.0000	0.0000
4	bellydan	bellydan	0.0000	1.0000	0.0000

5	bellydan	bellydan	0.0000	0.9973	0.0027
6	politici	politici	0.0028	0.0000	0.9972
7	politici	politici	0.0001	0.0000	0.9999
8	politici	politici	0.0000	0.0000	1.0000
9	politici	politici	0.0000	0.0021	0.9979
10	politici	politici	0.0000	0.0000	1.0000
11	admin	admin	1.0000	0.0000	0.0000
12	admin	admin	1.0000	0.0000	0.0000
13	admin	admin	1.0000	0.0000	0.0000
14	admin	admin	1.0000	0.0000	0.0000
15	admin	admin	0.9821	0.0000	0.0179

The DISCRIM Procedure
Classification Summary for Calibration Data: WORK.PROFILE
Resubstitution Summary using Linear Discriminant Function
Generalized Squared Distance Function

$$D_j^2(X) = (X-\bar{X}_j)' \, COV^{-1} \, (X-\bar{X}_j)$$

Posterior Probability of Membership in Each group

$$Pr(j|X) = \exp(-.5\, D_j^2(X)) \,/\, SUM_k \exp(-.5\, D_k^2(X))$$

Number of Observations and Percent Classified into group

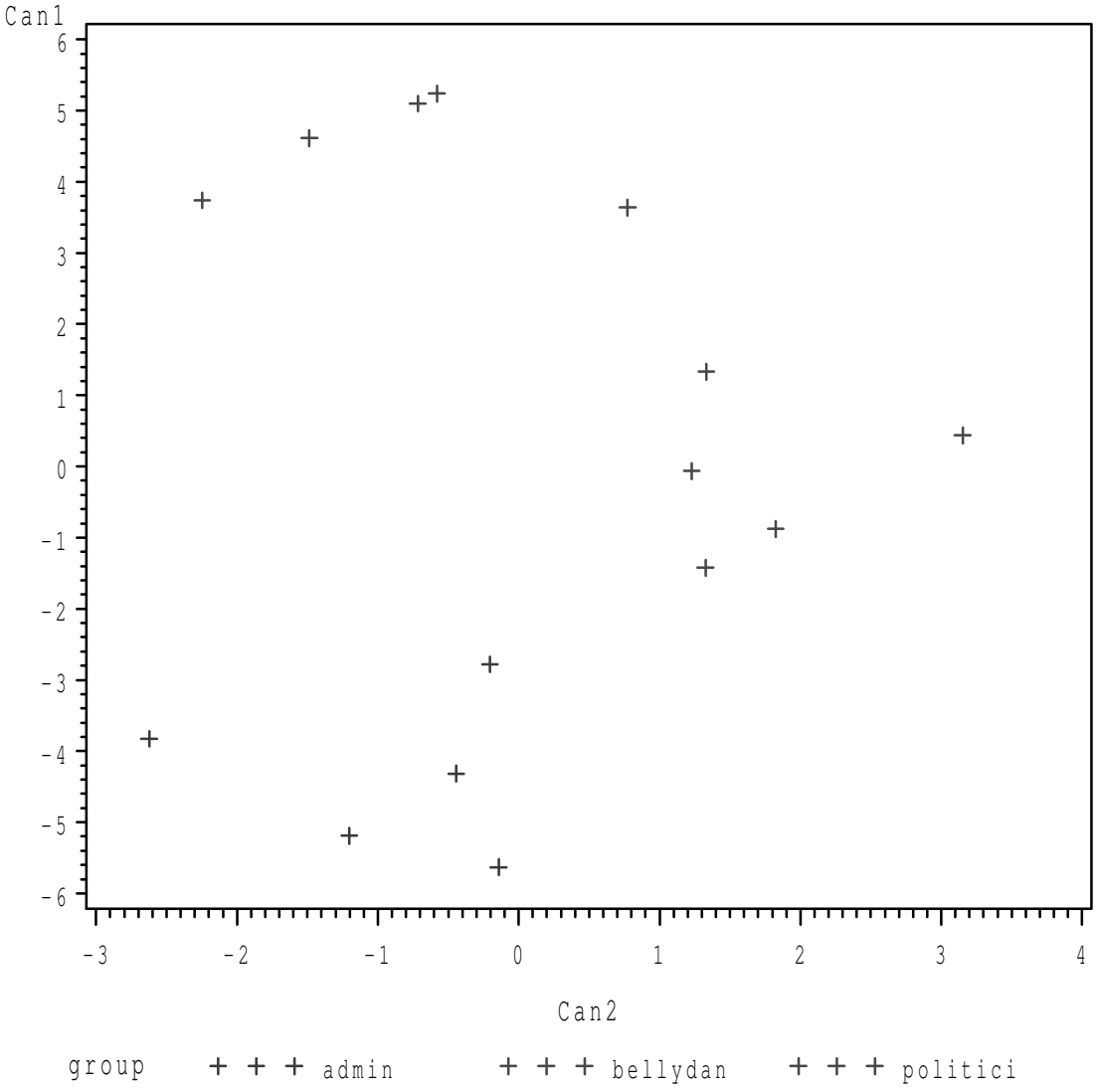
From group	admin	bellydan	politici	Total
admin	5	0	0	5
	100.00	0.00	0.00	100.00
bellydan	0	5	0	5
	0.00	100.00	0.00	100.00
politici	0	0	5	5
	0.00	0.00	100.00	100.00
Total	5	5	5	15
	33.33	33.33	33.33	100.00
Priors	0.33333	0.33333	0.33333	

Error Count Estimates for group

	admin	bellydan	politici	Total
Rate	0.0000	0.0000	0.0000	0.0000
Priors	0.3333	0.3333	0.3333	

g	d	a	b e l l	p o l i	_ I

Obs	roup	read	ance	tv	ski	Can1	Can2	Can3	Can4	dmin	ydan	tici	NTO_
1	bellydan	7	10	6	5	5.23731	-0.58059	.	.	0.00000	1.00000	0.00000	bellydan
2	bellydan	8	9	5	7	3.74092	-2.24515	.	.	0.00000	1.00000	0.00000	bellydan
3	bellydan	5	10	5	8	4.61258	-1.48554	.	.	0.00000	1.00000	0.00000	bellydan
4	bellydan	6	10	6	8	5.09973	-0.71571	.	.	0.00000	1.00000	0.00000	bellydan
5	bellydan	7	8	7	9	3.64109	0.77379	.	.	0.00000	0.99729	0.00271	bellydan
6	politici	4	4	4	4	-1.42116	1.32687	.	.	0.00283	0.00000	0.99717	politici
7	politici	6	4	5	3	-0.87950	1.82520	.	.	0.00008	0.00000	0.99992	politici
8	politici	5	5	5	6	-0.06496	1.22857	.	.	0.00001	0.00000	0.99998	politici
9	politici	6	6	6	7	1.33277	1.33359	.	.	0.00000	0.00214	0.99786	politici
10	politici	4	5	6	5	0.43777	3.15133	.	.	0.00000	0.00000	1.00000	politici
11	admin	3	1	1	2	-5.62995	-0.14110	.	.	1.00000	0.00000	0.00000	admin
12	admin	5	3	1	5	-3.82437	-2.62365	.	.	1.00000	0.00000	0.00000	admin
13	admin	4	2	2	5	-4.31529	-0.44271	.	.	0.99999	0.00000	0.00001	admin
14	admin	7	1	2	4	-5.18696	-1.20233	.	.	1.00000	0.00000	0.00000	admin
15	admin	6	3	3	3	-2.77997	-0.20257	.	.	0.98209	0.00000	0.01791	admin


Can1
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-3
-2
-1
0
1
2
3
4
Can2
group + + + admin + + + bellydan + + + politici