

Relevant SAS Output

Case Study in Discriminant Analysis

(1) Counts

The DISCRIM Procedure

| | | | |
|--------------|----|--------------------|----|
| Observations | 24 | DF Total | 23 |
| Variables | 2 | DF Within Classes | 22 |
| Classes | 2 | DF Between Classes | 1 |

(2) Class levels

Class Level Information

| brand | Variable Name | Frequency | Weight | Proportion | Prior Probability |
|-------|---------------|-----------|---------|------------|-------------------|
| A | A | 12 | 12.0000 | 0.500000 | 0.500000 |
| B | B | 12 | 12.0000 | 0.500000 | 0.500000 |

(3) SSCP matrices

a. Within

Within-Class SSCP Matrices

brand = A

| Variable | spreadability | durability |
|---------------|---------------|-------------|
| spreadability | 15.00000000 | 9.00000000 |
| durability | 9.00000000 | 23.00000000 |

brand = B

| Variable | spreadability | durability |
|---------------|---------------|-------------|
| spreadability | 14.00000000 | 12.00000000 |
| durability | 12.00000000 | 26.00000000 |

b. Between

Between-Class SSCP Matrix

| Variable | spreadability | durability |
|---------------|---------------|-------------|
| spreadability | 13.50000000 | -4.50000000 |
| durability | -4.50000000 | 1.50000000 |

c. Total

Total-Sample SSCP Matrix

| Variable | spreadability | durability |
|---------------|---------------|-------------|
| spreadability | 42.50000000 | 16.50000000 |
| durability | 16.50000000 | 50.50000000 |

(4) Simple statistics

a. Total

| Simple Statistics | | | | | |
|-------------------|----|-----------|---------|----------|--------------------|
| Total-Sample | | | | | |
| Variable | N | Sum | Mean | Variance | Standard Deviation |
| spreadability | 24 | 102.00000 | 4.25000 | 1.84783 | 1.3593 |
| durability | 24 | 102.00000 | 4.25000 | 2.19565 | 1.4818 |

b. Brand=A

| brand = A | | | | | |
|---------------|----|----------|---------|----------|--------------------|
| Variable | N | Sum | Mean | Variance | Standard Deviation |
| spreadability | 12 | 42.00000 | 3.50000 | 1.36364 | 1.1677 |
| durability | 12 | 54.00000 | 4.50000 | 2.09091 | 1.4460 |

c. Brand=B

| brand = B | | | | | |
|---------------|----|----------|---------|----------|--------------------|
| Variable | N | Sum | Mean | Variance | Standard Deviation |
| spreadability | 12 | 60.00000 | 5.00000 | 1.27273 | 1.1282 |
| durability | 12 | 48.00000 | 4.00000 | 2.36364 | 1.5374 |

(5) Univariate test statistics

| Univariate Test Statistics | | | | | | | |
|-----------------------------------|--------------------------|---------------------------|----------------------------|----------|--------------------|---------|--------|
| F Statistics, Num DF=1, Den DF=22 | | | | | | | |
| Variable | Total Standard Deviation | Pooled Standard Deviation | Between Standard Deviation | R-Square | R-Square / (1-RSq) | F Value | Pr > F |
| spreadability | 1.3593 | 1.1481 | 1.0607 | 0.3176 | 0.4655 | 10.24 | 0.0041 |
| durability | 1.4818 | 1.4924 | 0.3536 | 0.0297 | 0.0306 | 0.67 | 0.4206 |

(6) Multivariate Statistics

Multivariate Statistics and Exact F Statistics

| Statistic | Value | F Value | Num DF | Den DF | Pr > F |
|------------------------|------------|---------|--------|--------|--------|
| Wilks' Lambda | 0.52294557 | 9.58 | 2 | 21 | 0.0011 |
| Pillai's Trace | 0.47705443 | 9.58 | 2 | 21 | 0.0011 |
| Hotelling-Lawley Trace | 0.91224490 | 9.58 | 2 | 21 | 0.0011 |
| Roy's Greatest Root | 0.91224490 | 9.58 | 2 | 21 | 0.0011 |

(7) Canonical analysis

a. Canonical correlations

Canonical Discriminant Analysis

| Canonical Correlation | Adjusted Canonical Correlation | Approximate Standard Error | Squared Canonical Correlation |
|-----------------------|--------------------------------|----------------------------|-------------------------------|
| 0.690691 | 0.682084 | 0.109042 | 0.477054 |

Eigenvalues of $\text{Inv}(E) \cdot H$
 $= \text{CanRs} / (1 - \text{CanRs})$

| Eigenvalue | Difference | Proportion | Cumulative |
|------------|------------|------------|------------|
| 0.9122 | | 1.0000 | 1.0000 |

b. Coefficients

i. Total

Total-Sample Standardized Canonical Coefficients

| Variable | Can1 |
|---------------|--------------|
| spreadability | 1.401570673 |
| durability | -0.836651841 |

ii. Pooled

Pooled Within-Class Standardized Canonical Coefficients

| Variable | Can1 |
|---------------|--------------|
| spreadability | 1.183783038 |
| durability | -0.842654801 |

iii. Raw

Raw Canonical Coefficients

| Variable | Can1 |
|---------------|--------------|
| spreadability | 1.031061224 |
| durability | -0.564628766 |

c. Class means

Class Means on Canonical Variables

| | brand | Can1 |
|---|-------|--------------|
| A | | -.9144531097 |
| B | | 0.9144531097 |

(8) Linear discriminant function

Linear Discriminant Function for brand

| Variable | A | B |
|---------------|----------|----------|
| Constant | -5.90408 | -9.52959 |
| spreadability | 1.72857 | 3.61429 |
| durability | 1.27959 | 0.24694 |

(9) Resubstitution

a. Number classified

Number of Observations and Percent Classified into brand

| From brand | A | B | Total |
|------------|-------------|-------------|--------------|
| A | 11 91.67 | 1 8.33 | 12 100.00 |
| B | 2 16.67 | 10 83.33 | 12 100.00 |
| Total | 13 54.17 | 11 45.83 | 24 100.00 |
| Priors | 0.5 | 0.5 | |

b. Error counts

Error Count Estimates for brand

| | A | B | Total |
|--------|--------|--------|--------|
| Rate | 0.0833 | 0.1667 | 0.1250 |
| Priors | 0.5000 | 0.5000 | |