Multivariate Correlational Analysis: An Introduction

Assignment.

Mertler & Vanetta, Chapter 7
Kachigan, Chapter 4, pps 180 - 193

Terms you should know.

Multiple Regression . . . . . .

Linear Equations . . . . . .

Least Squares Criterion . . . . . .

Residual . . . . . .

Regression Coefficient . . . . . .

Beta weight . . . . . .

Multiple Regression Techniques . . . . . .

Standard or Simultaneous . . . . . .

Formulas and Symbols You Should Know.

R . . . . . .

R^2 . . . . . .

$1 - R^2$ . . . . . .

B . . . . . .

β . . . . . .

$$\frac{R^2 / k}{(1 - R^2)/(N - k - 1)}$$ . . . . . .

Computations You Should be Able to Perform.

The following are results from a validation study done by undergraduates. They were looking at the relationship between five scales in the *Activity Vector Analysis* (AVA) scales and the Recklessness scale taken from Cloninger's *Temperance and Character Inventory*. The five AVA scales are Assertiveness (V-1), Sociability (V-2), Calmness (V-3), Conformity (V-4), and Conscious Restraint (V-5). It was predicted that there would be a negative relationship between Calmness (V-3) and Recklessness. It was also thought that there would be a complex relationship between the AVA vectors but it was not known what this relationship would be.

Table 1. Descriptive Statistics

	Mean	Std. Deviation	N
Recklessness(1)	19.79	3.99	102.00
SCV1	45.81	9.69	96.00
SCV2	46.51	9.49	96.00
SCV3	48.40	10.76	96.00
SCV4	52.18	13.06	96.00
SCV5	46.26	9.67	96.00

Table 2. Correlations

		Recklessness(1)	SCV1	SCV2	SCV3	SCV4	SCV5
Recklessness(1)	Correlation	1.000	-.061	.124	-.283	-.025	-.247
	Sig. (1-tail)	.	.277	.114	.003	.405	.008
	N	102	96	96	96	96	96
SCV1	Correlation	-.061	1.000	.520	.388	.412	.670
	Sig. (1-tail)	.277	.	.000	.000	.000	.000
	N	96	96	96	96	96	96
SCV2	Correlation	.124	.520	1.000	.455	.435	.433
	Sig. (1-tailed)	.114	.000	.	.000	.000	.000
	N	96	96	96	96	96	96
SCV3	Correlation	-.283	.388	.455	1.000	.294	.640
	Sig. (1-tail)	.003	.000	.000	.	.002	.000
	N	96	96	96	96	96	96
SCV4	Correlation	-.025	.412	.435	.294	1.000	.287
	Sig. (1-tail)	.405	.000	.000	.002	.	.002
	N	96	96	96	96	96	96
SCV5	Correlation	-.247	.670	.433	.640	.287	1.000
	Sig. (1-tail)	.008	.000	.000	.000	.002	.
	N	96	96	96	96	96	96

Table 3. Model Summary, Stepwise Regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.283	.080	.070	3.9425
2	.401	.160	.142	3.7862

a Predictors: (Constant), SCV3
b Predictors: (Constant), SCV3, SCV2

Coefficients

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	24.948	1.863		13.390	.000
	SCV3	-.107	.038	-.283	-2.857	.005
2	(Constant)	21.224	2.181		9.733	.000
	SCV3	-.162	.041	-.428	-4.008	.000
	SCV2	.137	.046	.319	2.988	.004

a Dependent Variable: Recklessness(1)

1. How many people completed the AVA?
2. Which AVA variables are significantly correlated with Recklessness?
3. Was the basic research hypothesis supported? Why or why not?
4. Using 'eyeball' statistics does there appear to be evidence for multicollinearity among the predictors?
5. What variable was selected in the first step of the stepwise regression? Why was this variable entered first?
6. What is R?
7. What variables were entered in the second step?
8. How much additional variability was added in the second step?
9. What is the standard error of R?

Concepts and Interpretation.

1. What is meant by multicollinearity? What influence does it have on multiple regression analyses?

2. How can you detect multicollinearity?

3. How can you deal withy multicollinearity?

4. What assumptions are made about the data in a multiple regression analysis.

5. What can you learn from each of the following multiple regression techniques?

   a. Simultaneous

   b. Forward stepwise

   c. Backward stepwise

SPSS Assignment #6.

NAME: _____

1. Using SPSS, conduct the following:
   a. Calculate the correlation between age and the five AVA vectors using the C-Scores.
      i. What is the highest correlation?
      ii. What is the lowest correlation?
      iii. How do you interpret the correlation between age and Conscious Restraint?
   b. Calculate the multiple regression predicting V-5 from the other four vectors?
      i. Do a full regression.
         (1) What is R?
      ii. Do a stepwise regression.
         (1) What variable accounts for the most variance in this calculation?
         (2) What is the Beta weight for this variable?
         (3) What is the beta weight for this variable?
         (4) What is the standard error of estimate?
         (5) Do you think that you could make a fairly accurate prediction of V-5 from the other four vectors? Why or why not?