Tutorial letter 011/0/2024

Multivariate Statistical Techniques

STA4814

Year module

Department of Statistics

ASSIGNMENT 01 QUESTIONS

ASSIGNMENT 01
Unique Nr.: 647662
Due date.: 20 May 2024

Question 1 **[24 Marks]**

Four experiments were conducted to determine the moisture content of samples of a powder. Each person took a sample from each of six consignments. Their assessments are given below:

Observers	Consignments					
	1	2	3	4	5	6
1	9	10	9	10	11	11
2	12	11	9	11	10	10
3	11	10	10	12	11	10
4	12	13	11	14	12	10

(a) Analyse the data using any statistical software of your choice, but preferably SPSS, to test whether there is any significant difference among:

(i) the consignments; and (7 marks)

(ii) the observers. (7 marks)

(HINT: Use two-way ANOVA without replication)

(b) Determine the coefficient of determination of the fitted non-intercept model in (a) . (4 marks)

(c) Use the Homogeneous subset in the Post-Hoc test to determine where the difference(s) is/are, if any, (a) (i) and (ii) using the "Tukey's b" method of multiple comparisons.(3+3 marks)

Question 2 **[36 Marks]**

The "anorectic.sav" (located in the additional resources of the course website) contains data generated while working toward a standardized symptomatology of anorectic/bulimic behavior. Researchers (Van der Ham, T., J. J. Meulman, D. C. Van Strien, and H. Van Engeland 1997) made a study of 55 adolescents with known eating disorders. Each patient was seen four times over four years for a total of 220 observations. At each observation, the patients were scored for each of 16 symptoms. Symptom scores are missing for patient 71 at time 2, patient 76 at time 2, and patient 47 at time 3, leaving 217 valid observations. Use the data to answer the questions which follow.

(a) Generate the frequency distribution of the data, adding the descriptive statistics: - Mean, Standard deviation, Skewness and Kurtosis. (5 marks)

(b) Perform a reliability test on the 16 symptoms data and interpret your result. (4 + 4 marks)

(c) Perform the factor analysis on the 16 symptoms using the principal component analysis for extraction and the varimax method for rotation. (Include the scree plot, sort the factors by size and use items with factor loadings greater than 0.5). Copy the output into your answer script (10 marks)

(d) Interpret your results in (c). (5 marks)

(e) Justify whether the factor analysis model is appropriate for this data. (5 marks)

(f) Explain the essence of the rotated factor solution. (3 marks)

TOTAL **[60 Marks]**