Multivariate Analysis Techniques

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I
FACTOR ANALYSIS

Utility:

- Determines latent relationships among variables
- Helps in reducing number of variables and data overload

Technique

- Based on interdependence or correlation between variables

- Leads to identification of weighted linear combination of variables viz. Factors.

Main Steps

1. Data Base:

observed values of certain variables (k) in respect of certain objects (n)

2. Standardized Score:

To find scale free and comparable data

3. Correlation Matrix

	V_1	V_2	V_3	V_4	V_5	V_6
V_1	1.00	0.55	0.43	0.32	0.28	0.36
V_2	--	1.00	0.50	0.25	0.31	0.32
V_3	--	--	1.00	0.39	0.25	0.33
V_4	--	--	--	1.00	0.43	0.49
V_5	--	--	--	--	1.00	0.44
V_6	--	--	--	--	--	1.00

4. Determination of Factors:

Centroid Method or
Principal Components Method

5. Results:

	FACTORS			COMMONALITIES
	F_1	F_2	F_3	
V_1	0.86	0.12	0.04	0.76
V_2	0.84	0.18	0.10	0.75
V_3	0.68	0.24	0.15	0.54
V_4	0.10	0.92	0.05	0.86
V_5	0.06	0.94	0.08	0.89
V_6	0.12	0.14	0.89	0.83
Eigen Values:	1.94	1.85	0.84	4.63
Proportion of Total Variance	0.32	0.31	0.14	0.77
Proportion of Common Variance	0.42	0.40	0.18	1.00 (100%)

II
CLUSTER ANALYSIS

Utility:

- Generally used for market segmentation, analysis of consumer behaviour etc.

Technique:

- Based on identifying interdependence

- A group of items with high internal homogeneity and high external heterogeneity, called “clusters” are identified

* Typically, applied to data with interval scales

Main Steps:

1. Data required:

   Responses on various attributes of number of respondents

2. Measurement of similarity:

   Euclidean Distance Function

   Mahalanobis Distance Function

3. Cluster Identification

III
CONJOINT ANALYSIS

Utility:

- Determining relative value of different attributes of an item
- Identification of the most desirable combination of attributes of a product or service

Technique:

- Based on interdependence
- Applies to categorical data only

Main steps:

1. Identification of attributes
2. Developing alternative sets
3. Getting respondents` preferences
4. Determination of “Utility”:

   Means value to the respondent

IV
DISCRIMINANT ANALYSIS

Utility:

- Classification of individuals or observations into two or more mutually exclusive groups

Technique:

- Dependence relationship
- Dependent variable:
  Non-metric or categorical
  Independent variable:
  Metric or continuous
- Discriminant function: A linear combination of variables

Main Steps:

1. Identification of *a priori* groupings
2. Identification of variables
3. Application of factor analysis
4. Developing ratio/ variable profiles
5. Developing discriminant function

   Which has the greatest variance between groups in relation to the variance within groups. Thus, maximizes Fisher`s F ratio
6. Calculation of cut-off point

Mean discriminant score of two groups/ 2

Shrivastava-Yadav Model

For prediction of sickness

- Sample of 78 companies (39 each from sick and non-sick categories)
- 36 financial ratios
- Factor analysis based identification of 10 factors
- 5 picked up (with 5, 3, 5, 1, and 1 ratios respectively in each)
- 99 ratio profiles identified and discriminant analysis carried out for them
- 7 best listed down (based on error one yr. prior to sickness)

- 17 new combinations were then tried (now for six-yrs. period before sickness)
- finally:

Y = 19.8927 V9 +0.0047 V25 + 0.7141 V31 + 0.4860 V35

where

V9 = EBIT / Total tangible assets

V25 = Current Assets/ C. Liab.

V31 = Net Sales / TTA

V35 = Defensive assets / Total Op. Exp.

Predictive accuracy of this model:

Yr prior to sickness	1	2	3	4	5	6
Predictive accuracy (%)	95	87	86	82	79	78

THANK YOU

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