

REPORT ON SPECIAL LECTURE

Lecture Topic: “**Factor Analysis and its Application in Geography**”

Venue: Diamond Harbour Women’s University

Date: 15/06/2022

Platform: Online mode

Delivered by: *Prof. Sanat Kumar Guchhait, Professor, Department of Geography, The University Of Burdwan.*

Prof. Sanat Kumar Guchhait, Professor, Department of Geography, the university of Burdwan West Bengal, has delivered a special lecture through online mode on “**Factor Analysis and its Application in Geography**” on 15.06.2022 (Wednesday) from 11 am to 1:30pm to the students of Geography department of Diamond Harbour Women’s University.

In his valuable lecture, he provides an overview of the entire subject and also presents the topic in an impressive manner with appropriate practical examples. Factor analysis refers to a method that reduces a large variable into a smaller variable factor. Furthermore, this technique takes out maximum ordinary variance from all the variables and put them in common score. He also discussed the methods that we use in factor analysis from the data set, such as Principal Component Analysis (PCA), Maximum Likelihood Method, First Centroid Method etc. He also critically explained Factor loading, Eigen values, Factor scores, Correlation matrix etc. with proper example and data set. From his valuable discussion, the students and research scholars got a clear idea about the key components of factor analysis, such as Exploratory factor analysis and Confirmatory Factor Analysis. From his monumental lecture, research scholars got an opportunity to think about their research from a new dimension.

All research scholars and more than 60 students of M.Sc (2nd and 4th semester) of the department were present in this valuable lecture. Also the teachers of our department were present in this lecture on that particular day.

FACTOR ANALYSIS AND ITS APPLICATION IN GEOGRAPHY

Date : 19.05.21

SANAT GUCHHAIT

You SANAT Shovan 91 others

MULTIPLE REGRESSION

$$Z_i = a_1 X_{i1} + a_2 X_{i2} + a_3 X_{i3} + \dots + a_n X_{in}$$

PRINCIPAL COMPONENT ANALYSIS

Variable	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8
1	0.371	0.331	0.344	0.343	0.337	0.372	0.263	0.307
2	0.269	0.302	0.302	0.302	0.302	0.302	0.302	0.307
3	0.204	0.051	1.000	0.671	0.123	0.689	0.582	0.307
4	0.001	0.089	0.671	1.000	0.022	0.798	0.613	0.307
5	0.626	0.581	0.123	0.022	1.000	0.047	0.291	0.307
6	0.113	0.098	0.689	0.798	0.047	1.000	0.881	0.307
7	0.155	0.083	0.582	0.613	0.201	0.801	1.000	0.307
8	0.774	0.652	0.072	0.111	0.724	0.120	0.152	0.307

FIRST CENTROID FACTOR

Variables	1	2	3	4	5	6	7
1	1.000	0.709	0.204	0.081	0.626	0.113	0.155
2	0.709	1.000	0.051	0.089	0.581	0.098	0.083
3	0.204	0.051	1.000	0.671	0.123	0.689	0.582
4	0.081	0.089	0.671	1.000	0.022	0.798	0.613
5	0.626	0.581	0.123	0.022	1.000	0.047	0.291
6	0.113	0.098	0.689	0.798	0.047	1.000	0.881
7	0.155	0.083	0.582	0.613	0.201	0.801	1.000
8	0.774	0.652	0.072	0.111	0.724	0.120	0.152

Column sums: 3.662 3.263 3.362 3.365 3.324 3.666 3.587

Normalizing V_1 : $0.371, 0.331, 0.344, 0.343, 0.337, 0.372, 0.263, 0.307$

Normalizing factors: $(0.662)^2 + (0.263)^2 + (0.302)^2 + (0.302)^2 + (0.302)^2 + (0.302)^2 + (0.307)^2 + (0.307)^2 = (0.7372)^2 = 0.543$

Normalizing U_1 : $1.296, 1.143, 1.261, 1.201, 1.145, 1.208, 1.280, 1.143$

Normalizing factors: $(1.143)^2 + (0.327)^2 + (0.344)^2 + (0.344)^2 + (0.334)^2 + (0.374)^2 + (0.266)^2 + (0.307)^2 = 0.543$

METHODOLOGY OF P C A

- Step 1: Construction of meaningful data matrix.
- Step 2: Computation of correlation matrix (R).
- Step 3: Relation of factors.
- Step 4: Finding out Eigen value.
- Step 5: Component loading (PC).
- Step 6: Variance explained.
- Step 7: Finding out the explained matrix (R_E).
- Step 8: Subtraction of explained matrix from R.
- Step 9: Formation of residual matrix R.
- Step 10: Treatment of R' in the same way for finding out PC.
- Step 11: Score of the component of PC₁ and PC₂ and related mapping.
- Step 12: Discrimination of factors by score component in bi-axial framework.

FIRST FACTOR LOADING

Variables	Characteristics vector $x U_1^{1/2}$	PC1
1	0.371 x 1.868	0.69
2	0.331 x 1.868	0.62
3	0.344 x 1.868	0.64
4	0.343 x 1.868	0.64
5	0.337 x 1.868	0.63
6	0.372 x 1.868	0.70
7	0.263 x 1.868	0.68
8	0.365 x 1.868	0.68

