Week-06-L-03

Agricultural Statistics in Practice

Multivariate Analysis

Factor Analysis and it's Types

Dr. Amandeep Singh

Imagineering Laboratory
Indian Institute of Technology Kanpur





Factor Analysis

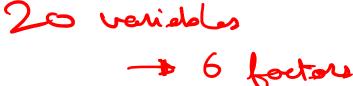












- Factor analysis is a technique that reduces a large number of variables into a smaller set of factors.
- It captures the shared variance among variables and creates a common score for further analysis.
- It is a component of the general linear model and assumes linear relationships among variables.
- Factor analysis helps to identify underlying factors and their impact on the data.









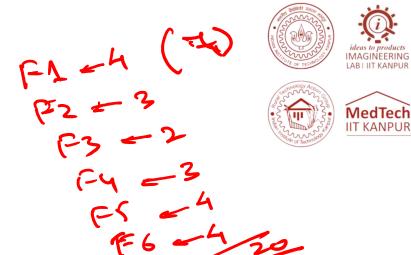


## **Objectives**

- Determine the optimal number of factors needed to explain common themes in a variable set.
- Assess the <u>(relationship between each variable</u> in the dataset and the common factors.
- Interpret the meaning and significance of the identified common factors.
- Evaluate the degree to which individual data points reflect the underlying themes or factors.







- Confirmatory Factor Analysis: (CFA)
- Determines the relationship between factors or variables in a dataset.
- Evaluates if data aligns with a specific hypothesis or theory.
- Tests constraints imposed on a model and confirms the presence or absence of relationships.
- Focuses on confirming connections between observed variables and underlying factors.









## Types

- **Exploratory Factor Analysis:**
- Aims to uncover the latent structure within a large set of variables.
- Identifies relationships between measured variables in a dataset.
- Does not rely on pre-defined hypotheses or theories.
- Focuses on revealing connections between different variables dataset.











- ✓ Principal Component Analysis (PCA): It extracts factors based on highest variances, sequentially removing variance determined by each factor.
- Image Factoring: Relies on the correlation matrix and utilizes the OLS Regression method to predict the factor.
- Common Factor Analysis: Removes common variance and assigns it to factors, useful in Structural Equation Modeling (SEM) and does not include unique variances.
- Maximum Likelihood Factor: Extracts factors based on the correlation metric, with a focus on determining the maximum likelihood of the factor.

## Thank You

