UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Data Analysis

2425-3-E4102B088

Learning objectives

The course aims to introduce the concept of latent variable and the most important models with latent variables. Lectures will be alternated with lectures in the laboratory with SAS and R so as to enable students to learn the use of statistical packages and thus be able to apply the techniques learned.

Contents

- Meaning of causality in statistics Spurious correlation
- Structural models with observed variables
- Path analysis Different meanings of latent variable
- Factorial model
- Principal component analysis and factorial model
- Structural models with latent variables

Detailed program

Introduction to the meaning of causality in statistics
Spurious correlation
Structural models with observed variables. path analysis. Examples and exercises with SAS and R
Different meanings of latent variable
Factorial model: Assumptions. Communality: meaning and computation. Methods for deriving solutions: meaning and methods.
Methods of estimating factors Interpretation of results.
Methods of deriving factorial scores. Non-uniqueness of factorial solutions: non-identifiability of parameters and

indeterminacy of factorial scores. Estimation methods and Hypothesis Testing. Examples and exercises with SAS and R
Differences in factor analysis with principal component method.
Structural models with latent variables. Relationships with path analysis and factor analysis. Solution and their interpretation. Non-uniqueness of solutions. Estimation methods and hypothesis testing. Examples and exercises with SAS and R

Prerequisites

No formal prerequisites. However, knowledge of the contents of the teachings of Probability Calculus, Statistics 1, Computer Laboratory, Multivariate Statistical Analysis., Database is required

Teaching methods

Lectures will alternate between lectures in which the theoretical concepts will be imparted with many practical exemplifications and laboratory exercises in which with the help of SAS and R the techniques learned will be used on real data

Assessment methods

Written exam, 2 theory questions and 1 data analysis exercise carried out using SAS and R

Textbooks and Reading Materials

Slides and course notes
Alwin, Duane F. and Robert M. Hauser (1975) "The decomposition of effects in path analysis." American Sociological Review, vol. 40 (February): 37-40.
factor model. Rotation of the
Blalock, Hubert M., Jr. (1965) "Path analysis: sociological examples." American Journal of Sociology 72 (July): 1-16.
Blalock, Hubert M., Jr. (1971) "Path analysis: sociological examples (addenda)." Pp. 136-8 in Hubert M. Blalock, Jr. (ed.), Causal Models in the Social Sciences. Chicago: Aldine-Atherton.
Duncan, Otis Dudley, David L. Featherman and Beverly Duncan (1971) Socioeconomic Background and Achievement. New York: Academic Press.
Land, Kenneth C., (1969) "Principles of path analysis." Pp. 3-37 in Edgar F. Borgatta (ed.), Sociological Methodology, San Francisco: Jossey-Bass.
Saris, W.E., & Stronkhorst, L.H. (1984). Causal modeling in nonexperimental research. Sociometrical Research Foundation. Amsterdam, The Netherlands.
Werts, C. E., & Linn. R. L. (1970) Path analysis: psychological examples. Psychological Bulletin, ,67, 193-212.
Lawley, D. N. and Maxwell, A. E. (1971) Factor Analysis as a Statistical Method, American Elsevier, New York.
Hauser, R. M., Goldberger,A. S. The treatment of unobservable variables in path analysis. In H. L. Costner (ed.), Sociological methodology. London: Jossey-Bass, 1971. In K. G. Jöreskog, & H. Wold (Eds.). Sustems under indirect observation Causality structure prediction New York: North Holland.

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Hauser, R. M., Goldberger,A. S. The treatment of unobservable variables in path analysis. In H. L. Costner (ed.), Sociological methodology. London: Jossey-Bass, 1971.
In K. G. Jöreskog, & H. Wold (Eds.). Systems under indirect observation Causality structure prediction New York: North Holland.

Semester

2 semester 2023 - second cycle

Teaching language

Italian

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING