SYLLABUS DEL CORSO

Statistical Models

2526-3-E4102B089

Learning objectives

The course aims to introduce the main descriptive and modeling techniques for longitudinal data. At the end of the course the student will have the opportunity to recognize the longitudinal data, the related characterizing aspects and critical issues. Furthermore, the student will become familiar with the main models for the analysis of longitudinal data, identifying the application contexts in which each model can be applied, and being able to experiment and apply the knowledge acquired on real data with R.
In particular, the specific objectives are the following:

1. Knowledge and understanding of model theory for longitudinal data
2. Applied knowledge and understanding, i.e. knowing how to estimate and interpret models depending on the application context, addressing the peculiarities of longitudinal data
3. Ability to learn and deepen new knowledge through in-depth materials indicated during the course that the student can tackle independently based on the knowledge acquired.

Contents

Introduction to longitudinal data, the random effects model, the fixed effects model, the multilevel model, introduction to time to event data, survival analysis, Practical applications using R.

Detailed program

All the topics are complemented by examples using R.

1. Basic concepts: change over time, between- and within-variations

2. Definition and description of longitudinal data: creation of a longitudinal dataset, descriptive statistics
3. Fixed effects models and random effects models for longitudinal data
4. The multilevel model: levels of analysis, estimation, interpretation
5. Flexible specifications of the time dimension: unbalanced panels, time-varying predictors
6. Non-linear changes
7. Study of time-to-event data: elements of survival analysis

Prerequisites

Basic inference and linear models.

Teaching methods

Theoretical lectures and labs using R.

Assessment methods

Written exam with theoretical questions and practical problems to be solved using R.

Textbooks and Reading Materials

Main textbook
• Singer, J. D., & Willett, J. B. (2003). Applied longitudinal data analysis: Modeling change and event occurrence. Oxford university press.

Complements from
• Fitzmaurice, G. M., Laird, N. M., & Ware, J. H. (2012). Applied longitudinal analysis. John Wiley & Sons.
• Snijders, T. A., & Bosker, R. (2011). Multilevel analysis: An introduction to basic and advanced multilevel modeling.

Further reading
• Hedeker, D., & Gibbons, R. D. (2006). Longitudinal data analysis. John Wiley & Sons.
• Greene W (2018) Econometric Analysis
• Wooldridge, J (2010). Econometric analysis of cross section and panel data. MIT press.
• Baltagi, B (2008). "Econometric analysis of panel data." Rohn Wiley .

Semester

Second semester.

Teaching language

English

Sustainable Development Goals

QUALITY EDUCATION