Universitat Autònoma de Barcelona

2019/2020

Survival Analysis

Code: 104867
ECTS Credits: 6

Degree	Type	Year	Semester
2503852 Applied Statistics	OB	2	2

Contact

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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Teachers

Anna Espinal Berenguer

Prerequisites

It is necessary to have knowledge of:

- descriptive statistics
- probability
- statistical inference
- software (SAS and/or R)

In addition, it's recomended that you are doing or having done the subject Linear Models

Objectives and Contextualisation

In this subject, the basic concepts for the analysis of time to event will be introduced: censor indicator, Kaplan-Meier estimator and introduction to parametric and semi-parametric models for survival data.

Competences

- Critically and rigorously assess one's own work as well as that of others.
- Make efficient use of the literature and digital resources to obtain information.
- Select and apply the most suitable procedures for statistical modelling and analysis of complex data.
- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.

- Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
- Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
- Use quality criteria to critically assess the work done.
- Work cooperatively in a multidisciplinary context, respecting the roles of the different members of the team.

Learning Outcomes

1. Critically assess the work done on the basis of quality criteria.
2. Identify the statistical assumptions associated with each advanced procedure.
3. Identify, use and interpret the criteria for evaluating compliance with the requisites for applying each advanced procedure.
4. Make effective use of references and electronic resources to obtain information.
5. Reappraise one's own ideas and those of others through rigorous, critical reflection.
6. Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
7. Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
8. Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
9. Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
10. Work cooperatively in a multidisciplinary context, accepting and respecting the roles of the different team members.

Content

1. Basic concepts:.
    1. Incomplete data:
        1. Censor indicator
        2. Survival function
        3. Risk function
        4. Mean residual live
    3. Non- parametric inference for right censoring data
        1. Estimators of survival function
        2. Comparison of survival curves
        3. Estimator of the mean and median survival time
    5. Introduction of parametric models for survival times
        1. Distributions of non negatives random variables
        2. Accelerated failure time model. Definition and properties
    7. Introduction of Cox model (Proportional-Hazards Model)I
        1. Cox model
        2. Partial likelihood function
        3. Interpretations and propierties of estimators

Methodology

Indepedendent learning:

- Practice activities
- Problems solutions
- Learn basic concepts

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Problem resolution	14	0.56	5, 2, 3, 9, 6, 7, 4
Theory	21	0.84	2, 3, 7, 4
Type: Supervised			
Practices	20	0.8	5, 1, 2, 7, 10
Type: Autonomous			
Complete each practice	30	1.2	7
More concepts	30	1.2	7
Problems solutions	10	0.4	5, 1, 10, 4

Assessment

For the practices evaluation, a hackaton will be carried out. In this session, a database will be analyzed, a code (with the software proposed) with the solution of the problem and a report that includes the methodologies used, technical details and interpretation of the results.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Final Exam	40%	3	0.12	2, 3, 8, 6, 7
Hackathon	30%	20	0.8	5, 1, 10, 4
Midterm exam	30%	2	0.08	2, 9, 8, 6, 7

Bibliography

- Allison, P. (2010). . 2nSurvival analysis using the SAS system: A practical guideed. Cary: SAS Institute Inc, cop. The datasets of the book:http://www.pauldallison.com/Download1.html
- Collett, D. (2003). . 2nd edition. NewModelling survival data in medical researchYork : Chapman & Hall
- Hosmer, D.W., Lemeshow, S. and May, S. (2008). Applied survival analysis.. 2n ed. Wiley.Regression modeling of time-to-event data
- Klein, J. P. and Moeschberger, M.L. (2003). Survival analysis: techniques for. 2nd ed. Springer.censored and truncated data

- Kleinbaum, D.G. (2005). . Springer Science +Survival analysis: A self-learning textBusiness Media. On-line version: http://http://www.springerlink.com/content/t447g2/#section=522105&