Survival Analysis

Jun.-Prof. Dr. Dennis Dobler

(email: dobler@statistik.tu-dortmund.de)

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TU Dortmund University

General Information

Suitable modules: BS 14 / 15; MS 6 / 7; MD E1 (Methods); ME 7

ECTS: 9

Language: English

Lectures: In presence,   Mondays 12:00-14:00   and   Tuesdays 14:00-16:00

Exercises: tba

Final exam: details tba

In general, more information will follow soon!

What is Life-time Data Analysis (LDA)?

- LDA is a collection of statistical procedures to investigate data where "the outcome variable of interest is *time until an event occurs*"
(Kleinbaum, 2005)

- A more general name is *Time-to-Event Analysis*

Jun.-Prof. Dr. Dennis Dobler[0.2cm] (email: dobler@statistik.tu-dortmund.de)

What is Life-time Data Analysis (LDA)?

- Historically, the first applications of time-to-event analysis considered the outcome *time until death*, thus called *Survival Analysis*

- Other synonyms:
  - event history analysis
  - duration models
  - failure time models

What is Life-time Data Analysis (LDA)?

- **time** until an event can be measured on different scales

  - years

  - milliseconds

  - days

  - …

- possible **events** include

  - Death after surgery (yes/no)

  - Recidivism (Rearrest after release from prison)

  - Leaving a web page (after following a link on social media)

  - Dropout of a machine

  - Bankruptcy of a credit user

$\longrightarrow$ In LDA we observe an outcome tuple $\langle time, event \rangle$

Jun.-Prof. Dr. Dennis Dobler[0.2cm¹ (email: dobler@statistik.tu-dortmund.de)
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Outline

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3. Part a) **Regression models**

- Transformation models (AFT models)
- Cox Proportional Hazard Models
- Time-Dependent Covariates
- Time-Varying Effects

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3. Part b) **Extending (semi-)parametric regression models**

- Time-discrete Survival Model
- Piece-wise Exponential (Additive Mixed) Model
- Frailty and Heterogeneity

4. (& 5.) **Further Models**

- Aalen Additive Hazard Model
- Competing Risk Model

6. Extensions

- … (depending on how much time there will be left)

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References

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  Statistical Models based on Counting Processes. Springer.
- JP Klein and ML Moeschberger (1997).
  Survival Analysis: Techniques for Censored and Truncated Data. Springer.

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