

58. Biometrisches Kolloquium, Berlin

Education for Statistics in Practice

Thursday, March 15, 2012 (09:00 – 10:30, 11:00 – 12:30)

Education for Statistics in Practice: “Analysis of survival data with the Cox model, and beyond”

by Per Kragh Andersen

Education for Statistics in Practice

For many years the members of the German Region of the Biometric Society have been actively developing and implementing novel statistical methods. Such developments go hand-in-hand with increasing recognition of the importance of continuing education, or life-long learning, for researchers at all stages of their career. At the annual meeting of the society, methodological developments are regularly presented. To further strengthen the educational work of our society, it was decided to start a series of lectures called *Education for Statistics in Practice*. This series is aimed at researchers who are interested in the application of sophisticated statistical techniques to real data. To reach our intended audience it was decided to integrate the series into the main programme of the Society's annual meeting. The format is designed to give an expert the opportunity to present a practical overview of a topic that is directly relevant for practicing researchers in a half-day lecture. State of the art statistical techniques and software will be discussed; issues that arise when using these in practice will be addressed.

Analysis of survival data with the Cox model, and beyond (by Per Kragh Andersen)

Survival analysis has developed into a separate discipline within both theoretical statistics and biostatistics over the last decades. It focuses on time to event data, the distinguishing feature being presence of incomplete observation, most importantly in the form of right-censoring. Thus, for some subjects under study the event will not occur during the observation time frame, thereby preventing the computation of both a simple average time to event and a simple fraction of event-free subjects at given points in time. This had led to the development of special statistical models and methods for survival analysis, many of these based on the hazard function.

The lecture will review this development with special emphasis on concepts, applications and software implementations (and less so on the mathematical theory behind the methods). We will first fairly briefly take you to the level of the highly celebrated Cox proportional hazards model but then we will move on to a discussion of alternative regression models including the accelerated failure time model and Aalen's non-parametric additive hazard model. The concept of time-dependent covariates and their interpretation will be discussed with special emphasis on how the simple one-to-one relationship between the hazard function and the cumulative failure probability may be lost when time-dependent covariates are considered. The concept of competing risks where failure may be due to a number of different causes will be covered including methods for analyzing survival data with competing risks. Again, relationships between (cause-specific) hazards and cumulative failure probabilities will be highlighted.

The methods will be illustrated using data from, primarily, medical applications and software implementations in SAS and R will be exemplified.

Per Kragh Andersen is Professor in the University of Copenhagen, Denmark, leading the Department of Biostatistics at the Department of Public Health. His current research includes the analysis of survival data and follow-up studies and other applications of statistics in epidemiology. He authors more than 200 publications in medical, statistical and other journals and books.

