Book Reviews

Spiegelman, Clifford H., Park, Eun Sug, and Rilettt, Laurence R. Transportation Statistics and Microsimulation. *Boca Raton, London, New York: CRC Press, 2010. ISBN 9781439800232.*

Transportation Statistics and Microsimulation

by Sunanda Dissanayake

While transportation engineers and especially graduate students in transportation engineering use statistics for various purposes, their general level of understanding seems to be lacking in many situations. Even though a majority of engineering graduates have taken some type of a statistics course during their undergraduate course of study, such courses are typically taught by faculty members in statistics or mathematics and lack the practical applications that are common in transportation engineering. On the other hand, graduate level statistics courses offered by statistics or mathematics departments are too theoretical and do not offer much assistance to graduate students in transportation engineering. With this background, there has been a need for textbooks covering practical statistical applications in transportation-related topics for a long time, and this book seems to be addressing that need.

The first several chapters of the book (2-5), which consists of 15 chapters, cover the background details, such as standard probability and statistical techniques, that are needed to follow the more advanced sections in the rest of the book. They cover such topics as basics of graphical methods, numerical summary methods, random variables, probability mass functions, and common probability distributions and provide easy-to-follow examples from various applications of transportation such as speed measurements, traffic volume data, pedestrian arrivals, and driving under influence situations.

The next several chapters (6-9) cover statistical inferences or what is commonly known as hypothesis testing for single and multiple variables as well as continuous and categorical data. A commonly used statistical modeling technique, regression, is discussed in the next chapters (10-11), where the authors discuss simple linear regression, multiple linear regression, and generalized linear models. Simple and multiple linear regressions are typically used in transportation applications to predict a certain continuous variable as a function of a number of independent variables, whether they are continuous or discrete. However, when it comes to predicting dependent variables of a discrete nature, alternative approaches need to be sought, and the authors provide the details of Poisson and negative binomial regression models to serve that purpose. Both these methodologies have common applications in safety analysis, especially in modeling crash frequency among many other transportation-related areas.

More advanced concepts such as experimental design, uncertainty estimation, and Bayesian estimation are discussed in Chapters 12-14, where the authors do a commendable task of transforming these more advanced topics into a simple, easy to understand format. Finally, in the last chapter, transportation microsimulation models that are becoming more common for modeling large-scale traffic and planning studies are described, which could be used by more advanced and creative students.

A number of transportation statistics related examples are provided throughout the book so that more hands-on experience could be gained by actually working on the example problems. The data for some examples are, however, available at a website for downloading. While this may not create any critical challenges in most situations, it would be more helpful if the data could be made available in the book itself either in print format, in an appendix, or in a CD/DVD that comes with

the book, so that everything could be self-contained. Even though many concepts in statistics are learned by manual methods, in practice many users prefer to use statistical packages, which reduce the time consuming nature of the calculations. Accordingly, it makes perfect sense for the authors to have adopted a software package (JMP by SAS) to do the problem solving. While the authors justify the selection of this specific package on the basis of its strong graphics capabilities, this selection could be turning away some of the students or courses that follow other popular software packages. Nonetheless, while it is much easier to use the authors' choice of software package if one is using their textbook, one can still apply alternative packages to the concepts presented in the book.

All in all, this textbook fulfills a need in the area of transportation statistics by providing basic concepts via an easy to follow format and practical examples.

Sunanda Dissanayake *is an associate professor at the department of civil engineering at Kansas State University. She received her B.Sc. (Eng), M.Eng., and Ph.D. degrees from the University of Moratuwa in Sri Lanka, Asian Institute of Technology in Thailand, and University of South Florida, respectively. Dissanayake has more than two decades of experience in the area of transportation engineering, focusing on both teaching and research in the area of traffic engineering and highway safety. She is a registered professional engineer and actively participates in activities related to professional societies such as Institute of Transportation Engineers, Transportation Research Board, and American Society of Civil Engineers.*