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BOOK REVIEWS

CRAIOVEANU, MIRCEA – *Introduction to Differential Geometry* (Romanian: Introducere în geometria diferenţială), Editura Universităţii de Vest, Timişoara, 2008, 421pp.

This is a second edition of a textbook in Differential Geometry, published in 2004, at Editura Mirton and contains the principal notions and results from the field running on tensor algebra, differential manifolds, tangent vectors and vector fields, tensor fields and differential forms, linear connections on the tangent bundles. This material is devoted to the undergraduate students in mathematics, as well as to the researches interested to this subject. The author envisaged the introduction of the fundamental notions and methods of differential geometry in a modern manner which could permit to the reader future study of the original memoirs and papers as well as recent treatises. He also insisted on the naturallity of the considered operators. The chapters contain with some several applications and exercises.

The part of the tensor algebra and differential calculus contains the following subjects: tensor, exterior and symmetric algebras for finite dimensional spaces, tangent vectors to Euclidean spaces, differentiations of the germs of functions, vector fields and open sets in Euclidean spaces. Next, in the chapter devoted to the differentiable manifolds and differentiable mappings, the author presents the concept of n-dimensional differentiable manifolds (smooth), then the differentiable mappings between differentiable manifolds, partition of unity, covering mappings and quotient manifolds. After defining the notion of the tangent vector, the author considers the tangent space in a point of the differential manifold and introduces the concept of vector field. After defining the Morse function, integral flow of vector field and the concept of the Lie derivative are studied. The book also contains tensor fields and differential forms, the behavior of these objects to the action of differentiable mappings, the Lie derivative for tensor fields and differential forms and the exterior differential for differential forms. The linear connections are defined as differential operators on the Lie algebra of vector fields on a differential manifold and they are naturally extended to the tensor fields. The torsion and curvature tensor field are introduced. The last con-

cepts considered in the book are the induced connections and the parallel transport.

This book is well written and it is conceived as a sort of handbook which provides an easy access to the present state of knowledge in the field of differential geometry.

C.L. Bejan, V. Oproiu

JACOBSEN, MARTIN – *Point Processes Theory and Applications*, Marked Point and Piecewise Deterministic Processes, Birkhäuser, Boston-Basel-Berlin, 2006,x+328pp., ISBN-10 0-8176-4215-3, ISBN-13 978-0-8176-4215-0.

The aim of this book is to present a detailed and mathematically rigorous exposition of the basic theory of marked point processes developing randomly over time, along with its applications in various topics in applied probability. The relation of these particular point processes with the piecewise deterministic stochastic processes in continuous time is treated on a large scale. The text is divided in three parts, containing 11 chapters and 2 appendices.

In the first part, the author focuses on point processes that generate only finitely many points in finite time intervals. More precisely, recording the time occurrences of the events results in a simple point process (SPP), while a marked point process (MPP) is obtained if at each occurrence the type or mark of the event is also registered. In Chapters 2 and 3, the definition and the construction of simple and marked point processes are given, together with the equivalent description of an SPP as a counting process (CP), respectively of an MPP as a random counting measure (RCM). Piecewise deterministic processes (PDP) are defined and identified with certain marked point processes, by considering the time points at which a given stochastic process jumps, marked with the type of event associated with some characteristic of the jump. Chapter 4 contains the basic theory of CPs and RCMs, including their characterization of their distributions in terms of compensators, compensating measures and martingale properties. Likelihood processes are treated in Chapter 5, while Chapter 6 treats stochastic dependence between finitely many RCMs as well as RCMs with independent increments. One of the key sections of the book is Chapter 7, in which the theory of deterministic Markov processes, time homogeneous or not, is developed, by using the previously studied theory of RCMs. In particular, it investigates the description of general PDPs as MPPs using jump times and characteristic of jumps to describe the times when events occur and their marks.

Part II deals with applications of the just developed theory, by using marked point processes and random counting measures in order to discuss concrete examples of models relevant for applications in statistics and topics from applied probability. In Chapter 8, the author considers the problem of estimating an unknown survival distribution based on observation of an iid sample subjected to right-censoring, as well as the estimation problem for the Cox regression model. Chapter 9 presents three different models: a branching process for the evolution of a population with age-dependent birth and death intensities; a classical model from risk theory with a discussion on the probability of ruin and the distribution of the time to ruin; a model for how a soccer game develops over time, using a simple Poisson model as starting point. A model based on a piecewise deterministic Markov process is set in Chapter 10 in order to describe the price of a finite number of risky assets. Concepts from mathematical finance are used in this framework. In the last chapter, there are given some examples of queueing models, such as the classical GI/G/1 model, with the emphasis on stationarity, or the description of some models of queueing networks that are not just Markov chains.

The third part contains two appendices: one on a frequently used differentiation technique of cadlag functions and one of some fundamentals from the theory of stochastic processes with an introduction to martingales in continuous time.

The text is designed for graduate students or researchers specializing in the use of probabilistic models for point processes and piecewise deterministic processes. To them, the importance of the book, both from the practical and from the theoretical standpoint, is unquestionable. Each chapter starts with an appealing introduction, including hints to the most important references. Many examples and exercises are given, and the reader is guided by clearly stated comments and indications. The reader-friendly structure and the style in which it has been written, recommends it as an essential part of every mathematical library.

Adrian Zălinescu

BALAKRISHNAN, N.; KANNAN, N.; NAGARAJA, H.N. (Eds.) – *Advances in Ranking and Selection, Multiple Comparisons, and Reliability* Methodology and Applications, Birkhäuser, Boston-Basel-Berlin, 2005, xli+412pp., ISBN 0-8176-3232-8.

This volume is written in honour of Professor S. Panchapakesan and reflects his diverse interests and also recognize his important contributions to

different areas of statistics (of ranking and selection, order statistics, reliability theory, stochastic inequalities and inference). The articles present in this volume were written by a group of friends, colleagues of S. Panchapakesan, and have been organized into 20 chapters.

At the beginning there are several pages with biography and a list of publications of S. Panchapakesan.

The Part I, *Inference*, contains 5 articles and present: Historical review and recent developments of the Score Test, The EM algorithm (which is used to find the maximum likelihood estimates MLEs of the parameters) and optimal censoring schemes, Inference guided data exploration, Discriminating between normal and Laplace distributions and, finally, A simple classification rule for directional data.

The Part II, *Ranking and selection*, contains 4 articles: On some ranking and selection procedures for MANOVA models with applications, A restricted subset selection rule for selecting at least one of the t best normal populations in terms of their means, Selecting the best population with two controls: an empirical Bayes approach, Simultaneous selection of extreme populations: optimal two-stage decision rules.

The Part III, *Multiple comparisons and tests*, contains 3 articles: Comparing variances of several measurement methods using a randomized block design with repeat measurements (a case study), Impact of missing data and imputation methods on multiple test procedures, Asymptotic second-order efficiency for two-stage multiple comparisons with components of a linear function of mean vectors.

The Part IV, *Agreement assessment*, contains 2 articles: Measuring agreement in method comparison studies (a review), Measures of concordance for assessing agreement in ratings and rank order data.

The Part V, *Reliability,* contains 3 articles: Cost-effective analysis of optimal order-replacement policies, Estimating reliabilities following purely sequential sampling from exponential populations, Empirical Bayes estimations of mean lifetime for an exponential distribution (unequal sample size case).

The Part V, *Biostatistics*, contains 3 articles: Bayesian analysis of mixtures of improper survival distributions, Multivariate survival analysis with PVF frailty models, A two-stage design for choosing among experimental treatments in clinical trials.

The twenty articles in this volume reflect recent developments in the fields mentioned above. This book marks the main advances in these areas of research containing theory, methods, applications and extensive bibliographies. All this elements recommends this work as a significant scientific contribution and an important instrument for researchers and graduate students in the statistics and applied mathematics.

Lucian Maticiuc