Petrov, Valentin V.
Limit theorems of probability theory. Sequences of independent random variables. (English)
Zbl 0826.60001
Oxford Studies in Probability. 4. Oxford: Clarendon Press. ix, 292 p. (1995).

As its title suggests, the book under review is devoted to the study of laws of large numbers, central limit theory and laws of the iterated logarithm for sums of independent random variables. These classical limit theorems retain a special place at the foundation of the theory of probability, since any study of these classical results traces the history of probability theory from its roots to modern times, while simultaneously providing the student with the necessary basis for the investigation of new areas in probability and for the study of mathematical statistics.

The author has two audiences in mind for the book. It is intended to serve as a textbook for a senior undergraduate or a graduate course on classical limit theory for students with a solid grounding in the theory of probability, and also as a comprehensive source of information on sums of independent random variables. In the opinion of this reviewer, the book succeeds on both counts.

After a review of important probabilistic concepts in Chapter 1, the author dedicates Chapter 2 to the study of inequalities for sums of independent random variables, including such well-known inequalities as the Kolmogorov and Hájek-Rényi inequalities, but also inequalities involving the moments of sums of independent random variables and concentration functions. Chapter 3 presents a thorough exposition of necessary and sufficient conditions for the weak convergence of normed sums to an infinitely divisible distribution. The fourth chapter contains familiar forms of the central limit theorem and criteria for row-sums of row-independent arrays of random variables to obey the weak law of large numbers. Chapter 5 establishes rates of convergence, both uniform and nonuniform, in the central limit theorem and presents a variety of asymptotic expansions related to the central limit theorem. Strong laws of large numbers are the focus of Chapter 5, whereas Chapter 6 presents both classical and generalized laws of the iterated logarithm. The book concludes with a huge bibliography containing nearly 500 references.

The book is organized in a logical and economical fashion, and is well-written. After presenting the fundamental results relevant to a particular topic, each chapter concludes with bibliographical notes and several pages containing statements of other results – including very recent papers – which extend or amplify those which have been discussed earlier in the chapter. The presentation and proofs are self-contained; the informed reader should rarely have a need to refer to another source in order to understand the material. Proofs are careful and concise, yet generally easy to follow. The few typographical errors noticed by the reviewer caused no confusion. Petrov's book is a welcome addition to the literature on the study of sums of independent random variables and their limiting properties. Readers who are interested in learning about classical limit theory or in catching up on recent developments in the field will be well-rewarded for reading this book.

Reviewer: R.J.Tomkins (Regina)

MSC:

60-01	Introductory exposition (textbooks, tutorial papers, etc.) pertaining to probability theory

Cited in **2** Reviews
Cited in **556** Documents

Keywords:

laws of large numbers; central limit theory; laws of the iterated logarithm; sums of independent random variables; Hájek-Rényi inequalities; row-independent arrays; generalized laws of the iterated logarithm