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Cohen, J. W.

Analysis of random walks. (English) Zbl 0809.60081

Studies in Probability, Optimization and Statistics. 2. Amsterdam: IOS Press. VII, 382 p. Dfl. 180.00 /hc (1992).

The textbook contains four parts as follows: Part I. One-dimensional random walks. The random walk on $N_0 = \{0, 1, 2, \dots\}$ and the one-dimensional workload process are discussed, also some results from fluctuation theory are incorporated.

Part II. Two-dimensional random walks. The random walk with the state space $N_0 \times N_0$ is studied. The author gets a deeper insight into the meaning of the theory of Riemann boundary value problems for the analysis of two-dimensional random walks. The investigation of two- dimensional random-walks is aimed at the construction of analytic expressions functions of the essential joint distributions of the random walks. These generating functions form a very convenient tool to describe these distributions and it is, in general, not difficult to obtain from them the numerical values of the various characteristics of these distributions, although refined numerical techniques may sometimes be required.

Part III. The two-dimensional workload process. This process is the two-dimensional generalization of the virtual waiting time process of the $M/G/1$ queueing model. In one-dimensional queuing theory workload processes are often easier accessible to an analytic discussion than queue length processes, and it seems that a similar conclusion applies for two-dimensional generalizations.

Part IV. The N-dimensional random walk. The random walk with the state space $\{0, 1, \dots\}^N$ is studied. The model for this random walk is the immediate generalization of the two-dimensional case studied in Part II, and the problem setting for the N-dimensional case is actually the same as that for the two-dimensional case. However, the results that can be obtained are less substantial when compared with those for the two-dimensional random walk.

Reviewer: G.Oprişan (Bucureşti)

MSC:

60G50 Sums of independent random variables; random walks
60-02 Research exposition (monographs, survey articles) pertaining to probability theory
60K25 Queueing theory (aspects of probability theory)

Cited in **15** Documents

Keywords:

fluctuation theory; random walks; generating functions; workload process

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