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Summary

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Summary :

This volume is dedicated to large deviations with a special emphasis to non standard applications in statistics. In fact there are two main parts.

In the first one, probabilistic fundamental tools are introduced. Specifically after some elementary facts, there is a complete exposition of the classical case of repartition function for independent equidistributed variables with values in Polish and separable Banach spaces, mainly to reach the results of Donsker and Varadhan. Some extensions useful for applications are detailed, specifically for random walks, starting from the ideas of Borovkov, and for Markov chains, also in the spirit of Donsker Varadhan's work.

The second part is dedicated to statistical applications. Classical results are applied to the theory of likelihood tests for an ordinary sample, or for the sample of a gaussian stationary process. The Chernoff's inequalities are used to obtain an improvement of the famous result of Le Cam, about the speed of estimation of a parameter in a finite dimension metric space.

Random walks techniques are used to study the asymptotic efficiency of various tests on change-point model (specifically Brown-Durbin-Evans tests and likelihood test). A new test is introduced.

Markov chain's results are developed first for the controlled case, to obtain universal bounds (independent of the strategy) about the loss and in the case of non-controlled chains to reach the best strategy (asymptotically, in mean). We have to notice that this technique had been developed since the year 1978 to obtain analog results for sequential procedure in various kinds of processes, as martingales jump process, martingales, point process.

Almost all results in this part are new.

The last paper is dedicated to electronic literature and theory of communication. Probably, it is, for an immediate future, one of the most important way for which large deviations are a central tool. Many non trivial problems remain opened.

Key words : large deviations, empirical functions, likelihood tests, boundary crossings, change point models, controlled Markov chains, sequential analysis, Shannon theory, coding.