Astérisque

AST

Summary

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Summary :

  This volume is dedicate 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. Specifical-
ly after some elementary facts, there is a complete exposition of the classical
case of repartition function for independant 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 stationnary 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.

  Randoms walks technics 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 introduce.

  Markov chain's results are developped first for the controlled case, to obtain
universal bounds (independant of the strategy) about the lost and in the case of
non-controlled chains to reach the best stratery (asymptotically, in mean). We
have to notice that this technics had been developped 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 litterature and theory of communi-
cation. 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.