Diffusion Processes And Their Sample Paths Flywingsore

Diffusion processes and their sample paths

These notes are based on a one-quarter course given at the Department of Biophysics and Theoretical Biology of the University of Chicago in 1916. The course was directed to graduate students in the Division of Biological Sciences with interests in population biology and neurobiology. Only a slight acquaintance with probability and differential equations is required of the reader. Exercises are interwoven with the text to encourage the reader to play a more active role and thus facilitate his digestion of the material. One aim of these notes is to provide a heuristic approach, using as little mathematics as possible, to certain aspects of the theory of stochastic processes that are being increasingly employed in some of the population biol ogy and neurobiology literature. While the subject may be classical, the nov elty here lies in the approach and point of view, particularly in the applica tions such as the approach to the neuronal firing problem and its related dif fusion approximations. It is a pleasure to thank Professors Richard C. Lewontin and Arnold J.F. Siegert for their interest and support, and Mrs. Angell Pasley for her excellent and careful typing. I . PRELIMINARIES 1. Terminology and Examples Consider an experiment specified by: a) the experiment's outcomes, ~, forming the space S; b) certain subsets of S (called events) and by the probabilities of these events.

Diffusion processes and their sample paths by K.Ito and H.P.McKean

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Since its first publication in 1965 in the series Grundlehren der mathematischen Wissenschaften this book has had a profound and enduring influence on research into the stochastic processes associated with diffusion phenomena. Generations of mathematicians have appreciated the clarity of the descriptions given of one- or more- dimensional diffusion processes and the mathematical insight provided into Brownian motion. Now, with its republication in the Classics in Mathematics it is hoped that a new generation will be able to enjoy the classic text of Itô and McKean.

Diffusion Processes and their Sample Paths

Focusing on one of the major branches of probability theory, this book treats the large class of processes with continuous sample paths that possess the "Markov property". The exposition is based on the theory of stochastic analysis, which uses such notions as stochastic differentials and stochastic integrals. The diffusion processes discussed are interpreted as solutions of It\\o's stochastic integral equations. The book is designed as a self-contained introduction, requiring no background in the theory of probability or even in measure theory. In particular, the theory of local continuous martingales is covered without the introduction of the idea of conditional expectation. Krylov covers such subjects as the Wiener process and its properties, the theory of stochastic integrals, stochastic differential equations and their relation to elliptic and parabolic partial differential equations, Kolmogorov's equations, and methods for proving the smoothness of probabilistic solutions of partial differential equations. With many exercises and thought-provoking problems, this book would be an excellent text for a graduate course in diffusion

processes and related subjects.
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