Section number : 12

ON STOCHASTIC APPROXIMATION METHODS IN SYSTEMS ANALYSIS

GABRIEL V. ORMAN

Department of Mathematical Analysis and Probability,
"Transilvania" University of Brasov, 2200 Brasov, Romania;
e-mail: ogabriel@unitbv.ro

Abstract

From some time past our interest was focused to find new possibilities for characterizing the process of generation of the words by generative systems. In our previous papers [4] and [5] we have introduced some numerical functions able to characterize classes of derivations according to a given generative system (as the phrase-structure grammars known in formal languages) up to an equivalence. They are referred to as "derivational functions". In this paper we consider equivalence classes of derivation and we establish some new properties of symmetry and invariance. A like limit theorem result is olso obtained.

On the other hand it is known that a precise definition of the Brownian motion involves a measure on the path space, such that it is possible to put the Brownian motion on a firm mathematical foundation. Much scientific work has been done on its applications in such diverse areas as molecular and atomic physics, chemical kinetics, solid-state theory, stability of structures, population genetics, communications, and many other branches of the natural and social sciences and engineering.

In the last part of this paper we refer to an appplication of asymptotic theory of stochastic differential equation in mathematical genetics ([7], [8], [10]).

Keywords. Brownian motion, stochastic differential equation, Markov processes, transition probabilities.

2000 MS Classification: 60J65, 60J70.

References

[1] Gnedenko, B.V., *The Theory of Probability*, Mir Publisher, Moscow, 1976.

[2] Loève, M., *Probability Theory*, Springer-Verlag, New York, 1977.

[3] Orman, G.V., *Limbaje formale*, Ed. Tehnica, Bucuresti, 1982.

[4] Orman, G.V., *On the numerical functions utilized in the study of a class of discrete systems*, Journal of Systems Science, Vol. 19, No. 1, pp. 27-37, 1993.

[5] Orman, G.V., *On the Characterization of some Generative Grammars by Numerical Functions*, In: Current Issues in Mathematical Linguistics, ed. C. Martin-Vide, Elsevier Science B.V., North Holland, Amsterdam, 1994, pp. 151-160.

[6] Orman, G.V., *Random Phenomena and some Systems Generating Words*, Yugoslav Journal of Operation Research, Vol. 6, No. 2, 1996, pp. 245-256.

[7] Orman, G.V., *Symmetry and Invariance in some Generative Systems*, In: Proceedings of 19^{th} International Conference "Information Technology Interfaces ITI'97", June 17-20, Pula, Croatia, 1997, pp. 369-374.

[8] Orman, G.V., Bocu, D., *On the Convergence of Standard Problems of Genetic Search (II)*, Proc. International ICSC Symposium on Engineering of Inteligent Systems EIS'98, University of La Laguna, Tenerife, Spain, 1998, pp. 263-267;

[9] Orman, G.V., *Derivational Operators in Generative Systems*, In: Proceedings of 13^{th} International Conference on SYSTEMS SCIENCE, Vol. I, September 15-18, Wroclaw, 1998, pp. 129-136.

[10] Orman, G.V., *Stochastic Methods for Generative Systems Analysis*, In: "Advances in Data Science and Classification", ed. A. Rizzi, Springer, Berlin, 1998, pp. 205-210.

[11] Orman, G. V., *Handbook of limit theorems and stochastic approximation*, "Transilvania" University Press, Brasov, 2003.