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TECHNICAL COMMENT

A PROBLEM ON MARKOV CHAINS

Franco Giannessi¹

Abstract. A problem (arisen from applications to networks) is posed about the principal minors of the matrix of transition probabilities of a Markov chain.

Keywords: Markov chains, stochastic matrices.

1. The problem

Let the Markov chain (P^0, P) be given, where P is the $n \times n$ matrix, whose entries are the transition probabilities, and $P^0 \in [0, 1]^n$ is the initial distribution [1]. Every $K \subseteq \{1, \ldots, n\}$ identifies a principal minor of P, denoted by P_K ; let $I_{|K|}$ be the identity matrix of order |K|. It is not difficult to show that

$$0 \le \det(I_{|K|} - P_K) \le 1, \quad \forall K \subseteq \{1 \dots, n\}$$

where det denotes determinant. Is det $(I_{|K|} - P_K)$ a (conditioned or not) probability of an event related to Markov chain?

Reference

 S.N. Ethier and T.G. Kurtz, Markov processes: Characterization and convergence. J. Wiley, New York (1986).

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¹ Deptartment of Mathematics, University of Pisa, Via F. Buonarroti 2, 56127 Pisa, Italy; e-mail: gianness@dm.unipi.it