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Entropy of high-order Markov chains beyond the pair correlations

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Abstract

The main goal of this paper is to develop an estimate for the entropy of random stationary ergodic symbolic sequences with elements belonging to a finite alphabet. We present here the detailed analytical study of the entropy for the high-order Markov chain in the bilinear approximation. In the limit of weak correlations, we present analytically the entropy of sequence by means of correlation functions of the second and third orders. The appendix contains a short comprehensive introduction into the subject of study.

Keywords: Random sequences, high-order Markov chains, entropy, long-range memory.

2010 MSC: 60J10, 68P30

1. Introduction

Our world is complex, chaotic and correlated. The most peculiar manifestations of this concept are human and animal communication, written texts of natural languages, DNA and protein sequences, data flows in computer networks, stock indexes, solar activity, weather, etc. For this reason, systems with long-range interactions (and/or sequences with long-range memory) and natural sequences with non-trivial information content have been the focus of a

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