The POMDP MODELING IN THE ANALYSIS OF GENETIC ALGORITHMS

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Abstract

GA's working principles are very different from the most traditional optimization methods, the most striking differences being that the GAs work with a coding of variables instead of the variables themselves and, they develop a searching process using a population of solutions instead of a single solution. The most frequently used modeling of GA is in term of Markov chains, but the high dimensionality of the transition matrix determines that the derivation of an accurate detailed mathematical analysis of the GA's behavior becomes an extremely difficult task. A possible attempt improve the model is based on defining an evaluation function such that for each state it combines both, the current gain and some sort of mean-gain of the future evolution of the algorithm and to simplify the model without significant loss of information. HMM-based and POMDP-based issues are proposed as possible complexity reduction approaches.

Keywords: *Genetic Algorithm, Markov modelling, hidden Markov chain, partial observable Markov decision process*