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# A new distributed learning automata based algorithm for maximum independent set problem

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Abstract

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## Abstract:

Maximum independent set problem is an NP-Hard one with the aim of finding the set of independent vertices with maximum possible cardinality in a graph. In this paper, we investigate a learning automaton based algorithm that finds a maximum independent set in the graph. Initially, a learning automaton is assigned to each vertex of graph. In order to find candidate independent set, a set of distributed learning automata collaborate with each other. The proposed algorithm based on learning automata is guided iteratively to the maximum independent set by updating the action probability vector. In order to study the performance of the proposed algorithm, we conducted some experiments. The reported numerical results confirm the superiority of our proposed algorithm in terms of cardinality of the obtained solution.

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## Contents

### I. Introduction

An independent set in an undirected graph  $G = (V, E)$  is a subset  $I \subseteq V$ , none of its members are adjacent. Due to variety of applications, finding Maximum Independent Set (MIS) attracted many researchers. The MIS is the independent set with largest possible cardinality. Some of its most important applications are including computer vision [1], scheduling [1], pattern recognition [2] and social network [3].

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vectors, computational complexity, graph theory, learning automata, optimisation, probability, set theory

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action probability vector, distributed learning automata, maximum independent set problem, MIS problem, NP-hard problem, undirected graph

**Author Keywords**

Distributed learning automata, Maximum independent set, NP-Hard problems, Learning Automata

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