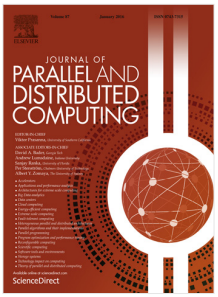
Accepted Manuscript



Decidability classes for mobile agents computing

Pierre Fraigniaud, Andrzej Pelc

PII: S0743-7315(17)30125-9
DOI: http://dx.doi.org/10.1016/j.jpdc.2017.04.003
Reference: YJPDC 3656

To appear in: *J. Parallel Distrib. Comput.*

Received date : 12 April 2016
Revised date : 23 February 2017
Accepted date : 9 April 2017

Please cite this article as: P. Fraigniaud, A. Pelc, Decidability classes for mobile agents computing, *J. Parallel Distrib. Comput.* (2017), http://dx.doi.org/10.1016/j.jpdc.2017.04.003

Decidability Classes for Mobile Agents Computing*

Pierre Fraigniaud †

Institut de Recherche en Informatique Fondamentale

CNRS and University Paris Diderot

France

Andrzej Pelc ‡

Département d'informatique

Université du Québec en Outaouais

Canada

Abstract

We establish a classification of decision problems that are to be solved by mobile agents operating in unlabeled graphs, using a deterministic protocol. The classification is with respect to the ability of a team of agents to solve decision problems, possibly with the aid of additional information. In particular, our focus is on studying differences between the *decidability* of a decision problem by agents and its *verifiability* when a *certificate* for a positive answer is provided to the agents (the latter is to the former what NP is to P in the framework of sequential computing). We show that the class MAV of *mobile agents verifiable* problems is much wider than the class MAD of *mobile agents decidable* problems. Our main result shows that there exist natural MAV-complete problems: the most difficult problems in this class, to which all problems in MAV are reducible via a natural mobile computing reduction. Beyond the class MAV we show that, for a single agent, three natural oracles yield a strictly increasing chain of relative decidability classes.

Keywords: Theory of distributed computing; mobile computing; distributed decision; rendezvous.

*A preliminary version of this paper appeared in Proc. 10th Latin American Theoretical Informatics Symposium (LATIN 2012), LNCS 7256 – see [31].

†Part of this work was done during this author's visit at the Research Chair in Distributed Computing of the Université du Québec en Outaouais. Additional supports from ANR projects DISPLEXITY and PROSE, and INRIA project GANG.

‡Part of this work was done during this author's visit at LIAFA, Université Paris Diderot, France. Supported in part by NSERC discovery grant 8136–2013, and by the Research Chair in Distributed Computing of the Université du Québec en Outaouais.