

EVOLUTIONARY COMPUTATION FOR AGENTS IN QUASI-ECOSYSTEM

SETSUO HASHIMOTO

Faculty of Economics
Kyoto Gakuen University
1-1 Ootani, Nanjyo, Sogabe-cho, Kameoka, Kyoto 621-8551, Japan
setsuo-h@kyotogakuen.ac.jp

FUMIO KOJIMA

Dept. of Mechanical and Systems Engineering
Graduate School of Science and Technology, Kobe University
1-1 Rokkodai-cho, Nada-ku, Kobe 657-8501, Japan
kojima@cs.kobe-u.ac.jp

NAOYUKI KUBOTA

Dept. of System Design
Tokyo Metropolitan University
1-1 Minami-Ohsawa, Hachioji, Tokyo 192-0397, Japan
“Interaction and Intelligence”, PRESTO
Japan Science and Technology Corporation (JST)
kubota@comp.metro-u.ac.jp

Received November 2004; revised April 2005

ABSTRACT. *This paper deals with a quasi-ecosystem by an evolutionary learning method for agents in the quasi-ecosystem. The quasi-ecosystem is composed of plant and herbivore agents, which are in a relationship of parasitism. The selfish behavior which satisfies themselves leads to extinction because resources in the environment are finite. Evolutionary computation is adopted to update feed rules of herbivore agents. Extinctions can be avoided by maintaining numerical balance between each species. The effectiveness of the proposal approach is demonstrated by computer simulations.*

Keywords: Genetic algorithm, Quasi-ecosystem, Prey-predator model

1. Introduction. Recently, the problem of intelligent system interacting with environments has been discussed from various points of views, e.g., soft computing, artificial life, and so on [1,2]. Quasi-ecosystems in artificial life have been studied mainly with the population dynamics and evolutionary dynamics [3,4]. The computer simulation of quasi-ecosystem can be generally divided into two types from the viewpoints of autonomy and environmental conditions. One is the research of cell automaton using simple transition rules simulating biological reproduction of species. Its computer simulation indicates complicated behaviors of the simulated species, but the species basically has no autonomy. The other is the research of multiple agents [5-10]. Each agent can take actions according to its decision rules, and can also adapt to its environment based on learning rules. The researches of multiple agents have mainly focused on knowledge sharing and cooperative