International Journal of Innovative Computing, Information and Control
Volume **2**, Number **1**, February **2006**

 ISSN 1349-4198
pp. **221–236**

KNOWLEDGE ACQUISITION AND EVOLUTION METHODS FOR HUMAN DRIVING INTELLIGENCE

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Received February 2005; revised October 2005

Abstract. *In order to apply human's action intelligence to improving the obstacle avoidance ability of autonomous mobile robots, we focus on the analysis of typical driving intelligence of humans and address knowledge acquisition from human's driving action. In this paper, based on a developed driving simulation system, the knowledge acquisition and evolution methods for human driving intelligence are proposed. Firstly, human driving knowledge can be acquired by combining data learning and artificial supervision; next, for the problem of rule redundancy, from the perspective of structural tuning of fuzzy system, the knowledge evolution method using Genetic Algorithm is adopted to further synthesize optimal rules; finally the knowledge acquisition experiments demonstrate effectiveness and adaptability of the proposed methods. The knowledge evolution experiments provide quantitative evaluation of resulting rules and further guideline for knowledge acquisition.*

Keywords: Driving intelligence, Obstacle avoidance, Knowledge acquisition, Knowledge evolution

1. **Introduction.** In dynamic environments, obstacle avoidance is inevitably a main problem for the development of autonomous mobile robots due to the appearance of unpredictable or multiple obstacles. Much work has been devoted to the solution to improving performance of autonomous mobile robots in dynamic environments, generally including the artificial potential field methods [1-2] and the artificial intelligence methods such as genetic algorithms, fuzzy reasoning and neural network [3-7]. Comparatively, the artificial potential field methods are more efficient in real time, whereas the artificial intelligence methods feature to generate higher-level knowledge description and provide robust and improved performance, resulting in optimal global path planning.

Given that the available information on environment is ambiguous and variable, humans can usually effectively avoid obstacles so as to arrive at a goal even in complex environments. Particularly, it is worth mentioning that human's driving is a typical case involving obstacle avoidance. If the knowledge on human's driving intelligence was acquired and