International Journal of Innovative Computing, Information and Control
Volume **6**, Number **8**, August **2010**

ICIC International ©2010 ISSN 1349-4198
pp. **3737–3749**

STUDY ON DECISION MAKING METHOD UNDER UNCERTAIN INFORMATION BASED ON D-S EVIDENCE THEORY

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Received April 2009; revised August 2009

Abstract. *On the basis of attributes of basic element in combination with those of non-basic element, a solution to a decision model based on least point's principle is substantively improved, which makes the model further perfect in theory. By introducing relative plausibility function, expected support and decision matrix, respectively, we systematically solve some key problems in the model, such as exhaustive search in the power set of a frame of discernment, selection strategy of choosing a certain basic element from candidates to remove it, and formal estimation for control parameters. As a summary of studies, we modify and redefine the general algorithm of the least point's decision model in order to make it a practical decision making method which can be widely used in the fields of expert system, intelligent decision making, and pattern recognition, etc. Finally, two real system examples are employed to examine the validity of the decision results by the improved approach experimentally, which also helps us to have an insight into the essential nature of the decision model based on least point's principle.*
Keywords: Dempster-Shafer evidence theory, Least point's principle, Decision making

1. **Introduction.** Dempster-Shafer evidence theory [1-3], originated from Dempster's work on multi-valued mapping in the 1960s [1], belongs essentially to the field of AI, and for its practical performance in engineering as well as ability to treat uncertain or inexact information, it has been widely used recently in the fields of uncertain reasoning [4], multi-source information fusion [7], pattern recognition [8], and management or business intelligent decision making under uncertain information [9,10].

In particular, as to some specific problems which need to be subjectively estimated or qualitatively forecasted by decision-makers, such as determination of statistical index system, leading group election, and medical diagnosis, it is easy for domain experts to indicate SOME states appearing by what possibility, while difficult or even impossible for them to indicate just ONE state appearing or not. To make some decisions under this uncertain information, traditional probability theory or Bayesian method suffers from great limitations in application. Most of current solutions are based on rough set or fuzzy set, and need to be combined with other methods, for instance, genetic algorithm. As a