

intelligence and other related fields. Researchers in these fields have developed many methods to represent uncertain knowledge and draw inferences from them. Among these methods are the certainty factor model in MYCIN [Buchanan and Shortliffe, 1984], the Bayesian probability theory (as in PROSPECTOR) [Duda et al., 1976], belief networks [Pearl, 1986b, Pearl, 1986a], Dempster-Shafer's evidence theory [Shafer, 1976, Gordon and Shortliffe, 1985], Zadeh's possibility theory (fuzzy logic) [Zadeh, 1979], and so on. One of the most appealing contenders is the mathematical theory of evidence which was developed by Arthur Dempster, then formulated and extended by Glenn Shafer [Shafer, 1976]. The theory is a generalization of probability theory with its origins in a theory of upper and lower probabilities. Therefore, it reduces to standard Bayesian reasoning when the knowledge is accurate but is more flexible in representing and dealing with ignorance and uncertainty.

In this paper, we present two results that relate to the use of Dempster-Shafer theory. First, we present and analyze four methods to induce uncertain rules from a training instance set for Dempster-Shafer theory. To the best of our knowledge, there is no such attempt in the literature. Second, we show that these "correct" induced rules exhibit the sociopathicity property when they are used in evidential reasoning. The study of the sociopathicity property raises an important concern to all the above mentioned methods for reasoning under uncertainty. As the matter of fact, the sociopathicity property is not unique to Dempster-Shafer theory, as it has been shown that the certainty factor model and Bayesian methods also possess this property [Wilkins and Ma, 1991, Ma and Wilkins, 1990a].













