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INFORMATION SYSTEM WITH FUZZY WEIGHTS

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ABSTRACT. In order to relax some strict assumptions such as noise-free, importanceidentical for each tuple and attribute in the traditional information system (IS), some new concepts like variable precision rough model (VP-model), uncertain information system (UIS), have been suggested by some researchers. However, how to give some proper related setting (certainty and importance), and how to classify such an IS are still open problems. In this paper, we first evaluate each attribute and tuple's importance using, not a singleton value but, a fuzzy number (or suppose the original information system is along with such fuzzy numbers). Then, based on the IS with the fuzzy numbers, we give a new definition of rough set. As a result, the traditional IS is a special case in our proposal. Example shows our model is more practical than the traditional one. Keywords: Rough set, Information system, Fuzzy weight, Rule extraction

1. Introduction. The effective use of computers in various realms of human activities strongly depends on the efficiency of algorithms implemented in these computers. So far many theoretical foundation stones for the algorithm have been set up, in which the rough set theory [1, 2] is a powerful approach to extract classification rules from a database. In general, such a database regarding the knowledge we are interested in is given in the form of information system (IS), which actually indicates an approximation space. In the traditional IS, as partly pointed out by some researchers [3, 4, 5, 8, 9], the approach for rule extraction implements fully correct or certain classification rules without considering other factors like noises, different importance for each example (or tuple) and each attribute. The limitations above severely reduce the applicability of the rough set approach to problems which are more probabilistic than deterministic in nature. In order to improve the reality of IS, some new concepts, such as variable precision rough model (VP-model) [3], uncertain information system (UIS) [5], have been suggested. In an UIS based on VP-model, considering data's noise tolerance degrees, two classification factors, which are corresponding with the positive region and the negative region, respectively, must firstly be set up for whole system, then, the certainty and importance for each tuple are necessary to be given. However, when we extract rules based on the UIS, there are some tough tasks to encounter. The following are some of them. (1) It is difficult to set up some singleton values for the classification factors, each certainty and importance. For example, you say the importance factor for a condition contribute is 0.85, and I may say the one is 0.86. Such a little difference 0.01 may lead to a completely different classification