Research on the fusion decision of system target

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Abstract

At present, the uncertainty of decision making system can not be effectively measured by decision level fusion.The above method has no judgment on the target data with noise.So this paper uses rough set theory and other data mining methods. It analyzes and studies the key link of target fusion recognition.The main work has the following aspects:1) this paper constructs a measure of variable precision boundary conditions based on entropy;2) an overall continuous attribute discretization method based on attribute importance is proposed;3) through the combination of algebra view and information view of two kinds of theory, based on improved discernibility matrix and information entropy of attribute reduction algorithm is proposed in this paper;4) a target fusion model and a target type recognition algorithm are proposed for the target type identification

Keywords

rough set; attribute reduction; D-S evidence theory; uncertainty measure; target recognition

1. Introduction

After understanding the research background and significance of the combat command system,on this basis, we study the direct relationship between the battlefield situation analysis and estimation of target fusion technology and algorithm.In this paper, a variety of artificial intelligence techniques, such as rough set theory, evidence theory, clustering method, are applied to the target fusion recognition process.For the recognition of target fusion, we need to understand the technology of sensor fusion and its functional model.According to the uncertainty of the sensor, the information fusion process is needed to give a joint identity to the observed entities. Secondly, we should see the impact of the uncertainty of information on target fusion recognition[1]. Under the conditions of information lack, information ambiguity, information conflict and information complex, it is possible to make a correct understanding and judgment of the available information. Finally, the target fusion recognition in dynamic and unknown environment will be the future research direction in the future.

Since then, we have to understand the rough set theory and its application, to understand its origin and development, know its characteristics and its research status. And then, based on the main content and the structure of this paper, we study the research.

2. Model research

According to the characteristics of the target fusion system in the operational command and decision system, the relationship model based on tolerance relation is demanded:

$$T(B) = \{(x, y) \in U \times U | \forall b \in B, b(x) = b(y) \lor b(x) = * \lor b(y) = *\}$$

The improvement is carried out, and the similarity is proposed:

$$\underline{L^B}(X) = \{x \in U | L_B(X) \subseteq X\} = \{x \in X | L_B(x) \in X\}$$

$$\overline{L^B}(X) = \{x \in U | L_B(X) \cap BX \emptyset\} = \cup \{L_B(X) | x \in X\}$$

The variable precision rough set model is given, and the positive and negative domains of X will be reduced with the decrease of the classification error. The boundary region will be enlarged, and the

approximate set will be limited when the cutter tends to 0.5.In the process of multi-sensor target fusion,it is able to deal with the incompleteness caused by the lack of target data. It also presents an approach to estimate the null value based on the similarity of the tolerance relation.Of course, it can be used directly by the incomplete decision information system with the null value, the rough approximation of the incomplete decision information system knowledge is given by using the similarity based on the tolerance relation instead of the non resolution relation. Indirect method can be used, and the system can be transformed into a complete decision-making information system based on the method of estimating the similarity of tolerance relation, so that the system can be used directly by the maturity of the discretization method and the method of attribute reduction[2].

3. Uncertainty measurement

Based on the importance of the uncertainty measurement criteria for the study of the operational command decision system based on rough dependence, rule dependence, and beta dependence degree, this paper constructs the boundary region variable precision conditional entropy.As a new metric, the uncertainty of decision system is caused by the existence of the system boundary, and the boundary region can be used to describe the uncertainty of the set[3].The object is divided into two parts, one is the object set which is based on variable precision parameter, the other is the object set which is inconsistent with the variable precision parameter.In the problem of continuous attribute discretization and attribute reduction algorithm, the variable precision conditional entropy of the boundary region is used as a heuristic algorithm, which can be obtained.

4. Processing of continuous attributes discretization

In the view of the characteristics of the target motion feature in the battle command decision system, the discrete processing is required.In this paper, we study the generation algorithm of the candidate breakpoints set and the method of redundant breakpoint reduction.In the case that the system is able to distinguish between the system resolution, it presents an overall continuous attribute discretization method based on attribute importance. Thereby reducing the number of candidate breakpoints. Grouping selection of candidate breakpoints according to the consistency of the object can reduce the number of the number of generating breakpoints.According to the importance of the order, the properties of the discrete processing can better ensure the consistency of the system.The algorithm is based on the basic conditions on the boundary line,so as to define the importance of the break-point[4]. It can judge the importance of all the candidate breakpoints, and delete the importance of zero. In addition, it can also reduce the scale of the decision table, improve the operation efficiency of the decision making system. Experimental results show that the proposed algorithm has the advantages of low time complexity, and has the advantages of less discrete breakpoints.

5. Attribute reduction

Attribute reduction of decision system is one of the core problems of rough set method, and the method of attribute reduction can be studied from two aspects of algebra theory and information theory. Based on these two theories, this paper presents a method of attribute reduction based on the resolution matrix and information entropy.

Firstly, based on the problem of the existing resolution matrix in the process of dealing with inconsistent decision system, this paper constructs a new resolution matrix. New discernibility matrix according to the classification error rate parameter knife, weeding out the noise of the weakly consistent and inconsistent objects equally considered, the matrix elements of the selected to does not change the conditional entropy as a criterion .The attribute core based on the improved resolution matrix is defined by the information entropy.Secondly, using heuristic method, attribute core is used as the initial value, the attribute importance of information entropy as the criterion, and the most important attribute is added to the kernel. The results show that the proposed method of attribute reduction can provide less number of attributes and rules[5].

6. Research on target fusion recognition algorithm

Based on the measurement of the decision level fusion recognition framework, a target fusion recognition algorithm is proposed.Including the algorithm of track correlation and target type recognition, a clustering analysis method based on hierarchical and density is proposed.The application of multi-sensor track correlation is studied by using this method.With the advantages of low time complexity, low memory capacity and easy implementation, it has certain reference value for improving the real-time processing capability and intelligent level of the multi-sensor system[6].

Aiming at the deficiency of single data fusion method, the target type recognition algorithm based on fusion rough set and D-S evidence theory is used for the D-S evidence theory.Both of them are used to deal with the uncertainty problem, and make full use of rough set theory.It does not require a priori knowledge and strong data analysis ability. It can make up for the deficiency of D-S evidence theory, which makes the improved reliability description more theoretical, and the algorithm has higher computational efficiency and higher recognition accuracy.
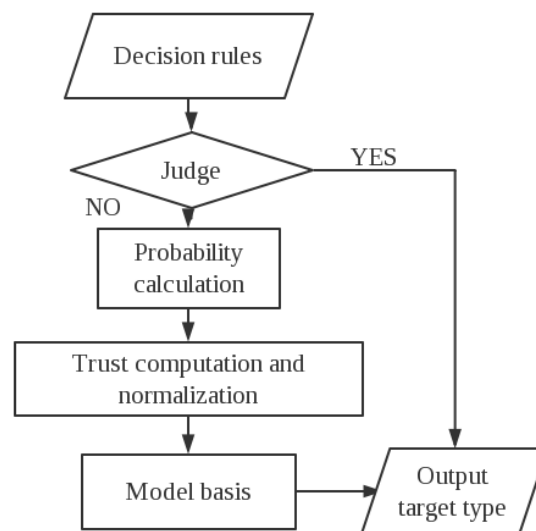

Figure 6.1 Principle diagram of the measurement process

7. Conclusion

In this paper, based on the theory of information entropy and variable precision rough set model, the paper constructs a measurement criterion based on the variable precision of boundary conditions.In the reduction algorithm, the boundary region variable precision condition entropy is used as the heuristic algorithm to judge the criterion, which has the advantages of fast computation speed, high accuracy and good anti-noise ability.

The method of continuous attribute discretization based on attribute importance is presented, and the advantages of generating a break point are presented;in the discrete processing of the prior knowledge database for different sample sizes, the time required for the discretization algorithm is the shortest.Based on the theory of two kinds of theories, the algorithm of attribute reduction based on improved resolution matrix and information entropy is proposed.This algorithm can provide the number of attribute reduction attributes, and the recognition accuracy is higher, and it also has good effect on the data containing noise.

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