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Research on Intensive Facts about Explicit Case of Tacit Knowledge

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Abstract

In the current knowledge-based economy,the role of knowledge resources in cultivating the core competitiveness of enterprises has become increasingly prominent,especially those difficult to encode, and highly personalized tacit knowledge, but also play a multiplier role.Tacit knowledge determines the effective level of human knowledge application and knowledge innovation.Attribute reduction is an important part of the construction of case knowledge system.In this paper, through several methods of attribute reduction,they are AHP, PCA, CV, Entropy Method and RS,comparative analysis them from the method theory, advantages and disadvantages, applicable objects and areas of application,combined with the characteristics of tacit knowledge itself index data,the rough set is innovatively applied to the tacit knowledge dominance case,and uses this theory to carry on the attribute reduction to the case storehouse carries on the numerical simulation,but also proved that the algorithm more in line with the practical application needs, but also more feasible and effective.

1. Introduction

In the field of knowledge, knowledge is divided into Articulated Knowledge and tacit knowledge according to clarity,Articulated knowledge is the visual knowledge that can be encoded using mathematical tools, can be easily represented and processed by computers, and can be easily communicated between individuals and groups;The latter is difficult to visualize, it is difficult to compile code and exchange of knowledge[1].There are scholars to "knowledge iceberg" to the overall knowledge of human beings, the ice above the explicit knowledge is small, and most of the ice below the tacit knowledge.Tacit knowledge not only occupies the vast majority of human knowledge structure, its status and significance is also more important,Tacit knowledge is gradually gaining more and more scholars' deep research on its proportion superiority and effective promotion to organization knowledge

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innovation.Tang Weihe Tian Ruixue in his research results in a number of previous scholars integrated understanding of tacit knowledge to sum up the connotation of tacit knowledge,from the point of view of understanding and summarizing the tacit knowledge of tacit, individual, situational cultural characteristics[2].Tacit knowledge of enterprises in the industry's competitive advantage is also a big help.Scholars Xiao zhenhong and Li yan in their research results through hundreds of companies to obtain the relevant data from the survey, confirmed from the empirical point of view of corporate knowledge is conducive to the integration of tacit knowledge and innovation, and thus the positive competitive advantage of enterprises influence[3].Case studies have also been used by some scholars in knowledge management. In the research of Liu shanghui and Zeng wenshi scholars, case-based reasoning technology is used to study medical diagnosis[4].The above research results laid the theoretical foundation of KM tacit knowledge management to a certain extent. The research results have important significance for the further development of tacit knowledge management in knowledge management field,However, if the in-depth analysis can be easily found, most of the existing research results are only in the field of importance, the basic concept of meaning, the role and significance, as well as the realization of strategies and other theoretical aspects of the discussion, there are few research results on how to implement the mechanism, so it is difficult to form an effective guide to the practice domain.

The study of this paper uses the case model to realize the tacit knowledge explicit,Case database corresponding to the knowledge base of attribute reduction,Each case in the case database corresponds to a piece of knowledge,While the set of cases corresponds to the attribute set and decision set in the knowledge base,Knowledge base may contain redundant knowledge, and too many properties, the first will occupy a lot of space in the database, the increase in data information must have a greater impact on the latter part of the calculation rate,But also in the same search process will consume more time.Through the reduction, not only can make the knowledge representation of information system more concise, and attribute reduction for the case to improve the speed of later information to optimize the selection of the basis.

2. Comparative Analysis of the Methods for the Reduction of Typical Attributes

The In this chapter, we use the methods of AHP[5], principal component analysis[6], entropy weighting[7], variation coefficient[8] and rough set[9] to compare and analyze the theory, advantages and disadvantages, applicable objects and application fields.As shown below:

Table 1. Comparative Analysis of Attribute Reduction Methods.

method	principle	Advantages and disadvantages	Applicable objects and applications
AHP	The indexes are clustered and aggregated, and the weights of the weights are compared	Advantage:Systematic, concise,the required quantitative data less Disadvantages:When the number of indexes is too high, the calculation difficulty coefficient increases; the quantitative data is less; the exact value of eigenvalues and eigenvectors is complex	No special structural features, multi-objective, multiple criteria, multi-segment period of the problem, used in economic
PCA	Through the variable transformation method to related variables into irrelevant integrated index, maintain the total variance of the variable unchanged, calculate the variance of each attribute and weight	Advantage:Eliminating the correlation between indicators; with a small amount of indicators instead of the original indicators; objective and reasonable; calculation of norms to facilitate Disadvantages:The original evaluation index is less relevant to reduce the effect of poor; the main components of the information contained in the absence of missing; determine the number of principal component	Mathematical Modeling, Quantitative Geography, Demography, Molecular Dynamics Simulation, Water Quality Assessment and Mathematical Analysis
Entropy weight method	The greater the information entropy of the attribute index, the greater the difference of the index, the higher the contribution to the information, the larger the weight value should be established	Advantage:Objectivity, the calculation process is simple Disadvantages:There are limitations in the case of changes in the values of the indicators; there is a lack of horizontal comparisons among the indicators; the weight of the indicator depends on the sample	Social sciences, risk assessment, management science, economic evaluation, engineering technology and other fields
Coefficient of variation	The ratio of the standard deviation of the data and the average of the various factors according to the size of the coefficient of importance of the degree of order	Advantage:Objectivity, the original data information calculation results, the calculation process easy to understand Disadvantages:There are limits to the solution of the fuzzy problem; there are differences between its magnitude and the selection of the dimension standard	Analysis of comprehensive evaluation of medical quality, regional disparities, performance evaluation
RS	Defining an equivalence relation, the relation produces a domain of discourse, removing unimportant attributes while maintaining the ability to classify	Advantage:Mathematical models that describe incompleteness and fuzziness, and good associativity Disadvantages:There is a limitation to the problem of incomplete information system; the ambiguity of the original data lacks the corresponding processing mechanism; the description of the boundary area is simple	Knowledge Discovery, Intelligent Information Processing, Data Mining, Expert Systems, Artificial Intelligence, Pattern Recognition, Machine Learning and Inductive Reasoning

After comparative analysis of various reduction attribute methods,Rough set method can discover the rules of the problem based on the information contained in the original data, while the pre-test knowledge is a non-essential condition, which coincides with the explicit characteristics of tacit knowledge.The problems encountered in the search for knowledge, in general, can be considered as ambiguity.Tacit knowledge of the general form of human subconscious feeling, preference habits, work and life experience, and a variety of insight and other capabilities.Corresponding to the value of the property will be full of uncertainty, that qualitative value is much more than the quantitative value,Therefore, in view of the good effect of rough set theory in dealing with fuzzy problems, it is undoubtedly a wise choice to use the theory to analyze the ambiguity of the data.And the form of the case table and knowledge base better fit, more conducive to the excavation of tacit knowledge.

3. Tacit knowledge explicit case attribute reduction method

3.1. Transformation of Tacit Knowledge Explicit Case to Knowledge

Tacit knowledge is represented by a case in which a case corresponds to an object in the knowledge system that composes the universe of discourse;While the case description of the characteristics of the indicators corresponding to the knowledge of the conditions of the system attribute set;All indicators have the corresponding index value, according to different indicators of the value of those who have experience will make the appropriate results to determine the final result, the results of this judgment is corresponding to the knowledge system of decision attributes;After the above analysis process, the case base of implicit knowledge is transformed into the knowledge system.Subsequent knowledge systems only need to transform the decision table according to the rough set theory adopted in this paper,Then, the process of attribute reduction is discussed according to the following basic theory.
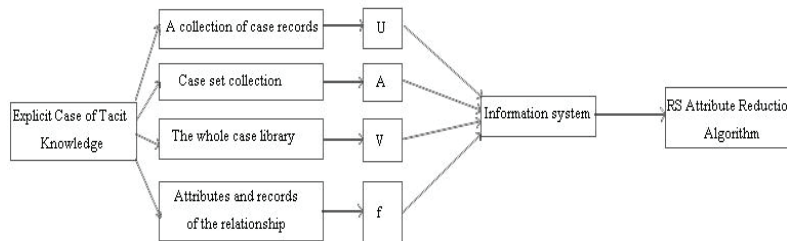

Fig. 1. Case Transformation Diagram

3.2. Attribute Reduction Based on Rough Set

In this section, some basic definitions of rough set are presented .

- Definition 1 (Knowledge and Universe).

In the RST, knowledge is considered as a kind of classification ability,Rough set knowledge can be considered as a family of equivalence relations, which represents the division of individuals in the universe into a series of equivalent classes.Any scientific theory has its object of study, constitute an empty collection, known as the domain.On the domain of elements, known as the individual.Correspondingly, the object of this paper is a case-base containing tacit knowledge. In the case-base, each attribute can be divided into a group of equivalence relations.

- Definition 2 (Information or knowledge system).

Suppose $S=(U,A,V,f)$ is an information system,$U =\{u1,u2,\cdots,u|u|\}$ is a finite nonempty set,The elements in U are called objects；$A =\{a1,a2,\cdots,a|A|\}$ is a nonempty finite set of attributes；f: $U \times A \rightarrow V$ is an information function,$\forall x \in U, a \in A, f(x,a) \in Va$.Each information system can be represented by an information table, which is a relational database when there is no duplicate tuple in the system..when $A=C \cup D, C \cap D=\emptyset$,The information system (U, A, V, f) is called the information table. The attributes of C and D are called condition attribute and decision attribute respectively.Corresponding system S, U is a collection of case records in the knowledge case, A is the collection of aspects in the case.

- Definition 3 (Indiscernibility relation and Elementary set).

Unequivable relations, also known as equivalence relations, are one of the important concepts of rough set theory, which plays an important role in the theory of rough set. It can show the granular structure of knowledge profoundly. The equivalence relation is the prerequisite of defining other concepts.In the knowledge representation system, each property corresponds to an indistinguishable relationship.Each set of facets in the tacit knowledge base is an equivalence relation.Suppose $S=(U,A,V,f)$s an information system,if $R \sqsubseteq A$,The equivalence relation of the attribute set R is given $IND(R)=\{x,y \in U, a \in R, f(x,a)=f(y,a)\}$,if$(x,y) \in IND(R)$,X and y are said to be unresolvable with

respect to the set R.The equivalence relation IND(R) of attribute set R forms a partition of U,It is represented by U/IND(R) or U/R.The equivalence class of an attribute R is defined as: $[x]=\{\forall y \in U| (x, y) \in IND(R)\}$.

Elementary set also known as the basic category by the domain of the indiscernible objects in the composition of the composition that is the intersection of primary concepts, is composed of domain knowledge of the particles.

- Definition 4 (Attribute reduction).

Attribute reduction is the ability to maintain the classification ability of fixed premise, through knowledge reduction to obtain knowledge classification criteria, through knowledge reduction to remove the middle of some important or unrelated attributes, find the minimum attribute set determine the classification knowledge.Let S =(U,A,V,f)be an information system,Where A is a family of equivalence relations, attribute a $\in$ A， if IND(A-{a})=IND(A)，It is not necessary to that a is A；If a is not satisfied, then it is necessary for A to be called.Each facet set in the tacit knowledge library is composed of attribute sets, and then each set is reduced in turn according to the number of basic sets to determine whether a set of aspects can be reduced.Each facet set in the tacit knowledge library is composed of attribute sets, and then each set is reduced in turn according to the number of basic sets to determine whether a set of aspects can be reduced.

4. Case Study of Tacit Knowledge Based on Rough Set Theory

In view of the good effect of rough set theory in dealing with fuzzy problems,Using this theory to analyze the ambiguity of the data, and the convenient fit of the case set to the knowledge system transformation,In this paper, the case study of the use of case studies demonstrate the rough set theory based on past cases can be summed up to diagnose whether the patient is suffering from influenza essential properties to help doctors more quickly and efficiently to make judgments,And then show that the rough set theory in the explicit case of tacit knowledge intensive practical and scientific simplicity.

4.1. Case information table and Simplified decision table

The following medical data sheet that determines whether a person is suffering from influenza by measuring symptoms such as body temperature, cough, headache, whole body pain, runny nose, and sneezing.In the table: condition attribute set C={a1,a2,a3,a4,a5,a6}, decision attribute set D={d}.

Table 2. Medical record table-Medical decision table.

U	body temperature	cough	headache	pain	runny nose	sneezing	influenza
1(x1)	Normal-0	No-0	No-0	Yes-1	Yes-1	No-0	No-0
2(x2)	Normal-0	No-0	Yes-1	No-0	Yes-1	No-0	No-0
3(x3)	Higher-1	No-0	Yes-1	No-0	No-0	Yes-1	Yes-1
4(x4)	High-2	Yes-1	Yes-1	No-0	No-0	No-0	Yes-1
5(x5)	High-2	Yes-1	No-0	No-0	Yes-1	Yes-1	Yes-1
6(x6)	Higher-1	Yes-1	Yes-1	No-0	No-0	No-0	Yes-1
7(x7)	Normal-0	No-0	Yes-1	No-0	No-0	No-0	No-0
8(x8)	Normal-0	Yes-1	No-0	Yes-1	Yes-1	No-0	No--0
9(x9)	Higher-1	Yes-1	No-0	No-0	No-0	Yes-1	Yes-1
10(x10)	High-2	No-0	Yes-1	Yes-1	Yes-1	Yes-1	Yes-1

4.2. Indistinguishable relation

The Theory of Unreliable Relation of RS R $\subseteq$ A,The equivalence relation of the attribute set R is given IND(R)={ x,y $\in$ U,a $\in$ R,f(x,a)=f(y,a)},if(x,y) $\in$ IND(R), then x and y is about the set R is not distinguishable.The property can be obtained on the domain in the indissoluble relationship. U={x1,x2,x3,x4,x5,x6,x7,x8,x9,x10},The set of attribute values for attribute a1 is{0,1,2},A property value of 0 corresponds to the

collection{x1,x2,x7,x8},value of 1 corresponds to a collection{x3,x6,x9},value of 2corresponds to {x4,x5,x10},The attribute a1 is divided into U is U/a1={{x1,x2,x7,x8},{x3,x6,x9},{x4,x5,x10}};

Similarly, the remaining attributes of the composition of the U are:U/a2={{x1,x2,x3,x7,x10},{x4,x5,x6,x8,x9}};

U/a3={{x1,x5,x8,x9},{x2,x3,x4,x6,x7,x10}};

U/a4={{x2,x3,x4,x5,x6,x7,x9},{x1,x8,x10}};

U/a5={{x3,x4,x6,x7,x9},{x1,x2,x5,x8,x10}};

U/a6={{x1,x2,x4,x6,x7,x8},{x3,x5,x9,x10}}.

4.3. Attribute base set

The complete set of attributes and the basic set following the removal of the attributes are shown in the following.

Property Complete Works:

U/A={{x1},{x2},{x3},{x4},{x5},{x6},{x7},{x8},{x9},{x10}};

After subtracting the attribute a1,the basic set is

U/(A-{a1})={{x1},{x2},{x3},{x4,x6},{x5},{x7},{x8},{x9},{x10}};

Similarly available,after subtracting the attribute a2,

U/(A-{a2})={{x1,x8},{x2},{x3},{x4},{x5},{x6},{x7},{x9},{x10}};

After subtracting the attribute a3, the set is

U/(A-{a3})={{x1},{x2},{x3},{x4},{x5},{x6},{x7},{x8},{x9},{x10}};

After subtracting the attribute a4, the set is

U/(A-{a4})={{x1},{x2},{x3},{x4},{x5},{x6},{x7},{x8},{x9},{x10}};

After subtracting the attribute a5, the set is

U/(A-{a5})={{x1},{x2,x7},{x3},{x4},{x5},{x6},{x7},{x8},{x9},{x10}};

After subtracting the attribute a6, the set is

U/(A-{a6})={{x1},{x2},{x3},{x4},{x5},{x6},{x7},{x8},{x9},{x10}}.

4.4. Attribute reduction

The following table compares the attributes of the complete set table with the attributes set after reduction:

Table 3. Basic set of changes in the table

	Reduced Attributes						
	Not reduced	a1	a2	a3	a4	a5	a6
Number of basic sets	10	9	9	10	10	9	10

The number of changes in the basic set available: Attribute a1,a2,a5 are necessary attributes a3,a4,a6 are redundant attribute.Realistic diagnosis of headache, body pain and sneezing is not a necessary condition to determine whether a person is cold.After attribute reduction, the information content can be kept unchanged, which not only makes the knowledge representation of information system more concise, but also lays the foundation for the later optimization of information computing speed.

5. Conclusion

In the current era of knowledge economy, the role of knowledge resources in cultivating the core competitiveness of enterprises has become increasingly prominent[10], especially tacit knowledge, but also play a multiplier role.Knowledge base may contain redundant knowledge, while too many properties will not only occupy a lot of storage space, and increase the computational complexity of the search of information systems.Through the reduction, not only can make the knowledge representation of information system more concise, and attribute

reduction for the case to improve the speed of later information to optimize the selection of the basis.This paper is based on the characteristics of explicit cases of tacit knowledge.The case is easy to be transformed into the information knowledge base, one case corresponds to one record in the data table, the case in the aspect set corresponds to the attribute of the data table, and the attribute reduction has been the hot topic of the rough set theory research all along.Rough set theory and its reduction method are used to reduce the attribute of the knowledge base, and this method is used to simulate the process of the attribute reduction of the case database. It is proved that the rough set theory is effective in the explicit case of tacit knowledge The result of attribute reduction is more effective, more reasonable, more feasible, more effective and more suitable for practical application.

The results of this paper have enriched the application of Rough Set theory in the explicit field of tacit knowledge. Based on the previous achievements, it not only remains in the definition of concept, the important role of tacit knowledge, Methods and other concepts of the level of discussion and analysis,In this paper, the research will be carried out at the level of concrete implementation mechanism. The case will include explicit information and explicit redundant data, which provides a theoretical basis for the formation of the following case base and the realization of decision rules mining and retrieval.In this paper, the research on how to implement the mechanism is carried out, and the research results are instructive to the practical field. In addition, the application field and application direction of rough set are broadened.

Acknowledgements

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