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The prosess of withdrawal of knowledge matrix on precedent

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Abstract— **In this work the process of operational withdrawal of knowledge matrix on precedent described situational vectors is precented. The new method of withdrawal president and its application in managment RFID system are precented..** ***(Abstract)***

Keywords— **knowledge matrix, precedent, minimax metod.** ***(key words)***

I. Introduction

The process of operational withdrawal by precedent is complex and ambiguous. Complexity of operational withdrawal by precedent and predict its effects exacerbated by the fact that this process is almost always done in condition of uncertainty and risk. The main objective of the management integrated circuits, such as chips or microchips, is to provide noise immunity, a decision which, when crossing signals is very difficult [1].

The development of modern information technology provides the ability to automate the procedures specific to the decision making process. Application of decision support systems increases the speed of decision-making, improves their quality through mathematical justification for the selection of alternatives and use of formal expertise, and can significantly reduce the risk of making wrong decisions due to the reduction of human factor influence on the result.

Case-based reasoning (CBR) is a method of forming conclusions, based not on a logical conclusion from the assumptions (logical reasoning), and on the search and analysis of cases of formation of such conclusions in the past.

Method of reasoning by precedents has its advantages and disadvantages compared to other methods of obtaining solutions. Among the advantages are the following [2]: ease of learning; ability to explain this decision; ability to work in subject areas that can not fully understand, explain or simulate; the possibility of learning on the job; ability to avoid repeating mistakes; ability to obtain solutions by modifying precedent to reduce the amount of computation in domains where the generation of solutions "from scratch" requires great effort.

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The main disadvantages are: the method is applicable only in areas where the principle holds regularity and holds repeatability kinds of tasks; a non-compact (without generalization) storage of knowledge (experience); the complexity and specificity of the search processes similar cases and adapting solutions.

As is well known (see, for example, [3]), for intelligent decision support based on the precedents of problem situations , is used one of the following types of rules : the rules of class recognition of precedents, which should include the current problematic situation.

The new method of organization of operational withdrawal on precedent on based knowledge matrix is presented in this article.

Earlier the work [4] was introduced withdrawal algorithm precedent under the supervision of situational quantitative vector coordinates. The main content of the results of [4] is the description of knowledge matrix and withdrawal precedent, which founded on the method of inference maximin.

The results of the present article differs from [4] that in this work for withdrawal precedent method minimax inference is based.

II. Knowledge matrix of precedents

Let's represent the knowledge matrix on precedents similar to the results of [4]. Suppose, that the precedent describes situational vector with coordinates (x_1, ..., x_n). Each row of the matrix represents a concrete situational vector, in which in the past has successfully realized a precedent.

Table 1. Knowledge matrix

n/n	Coordinates situational vector				Precedent
	x_1	x_2	…	x_n	
1.1	a_1^{11}	a_2^{11}	...	a_n^{11}	d_1
:	:	:	:	:	
$1.k_1$	$a_1^{1k_1}$	$a_2^{1k_1}$	...	$a_n^{1k_1}$	
:	:	:	:	:	:
$m.1$	a_1^{m1}	a_2^{m1}	...	a_n^{m1}	d_m
:	:	:	:	:	
$m.k_m$	$a_1^{mk_1}$	$a_2^{mk_1}$	...	$a_n^{mk_1}$	

We enumerate the line block precedent d_j two indices: the first index is the number of precedent (here it is the block number), the second index is number of situational vector in this block .

The introduced matrix defines a system of logical statements of the form " if ... then ... else ... ". Thus, the obtained system of logical operations, which is named knowledge matrix.

III. Example of matrix of knowledge on precedents

Consider as an example the behavior of code anticollision NRZ binary search algorithm presented in [5, page 164]. Let the behavior described situational NRZ code vector with coordinates $\{x_1, x_2, ..., x_n\}$, represented by linguistic variables: x_1 - the signal level of subcarrier 1 transtportera number; x_2 - the signal level of a subcarrier number transtportera 2; and so on; x_n - the signal level of subcarrier transtportera n.

Let this class observed two precedents d_1, d_2, each of which is used in two (different) cases. So , according to [5], if at least one of n carriers sends a signal to a high level , then we get precedent d1, high level.

Linguistic variables take the following standardized values (terms): x_i = {static low, static high level }, $i = 1$, ..., n. Matrix knowledge of this system is presented in Table 2.

Table 2. Example matrix of knowledge

n / n	Coordinates situational vector				Precedents
	x_1	x_2	…	x_n	
1.1	height	height	…	height	
1.2	height	low	…	low	d_1
1.3	low	height		low	
…	…	…		…	
2.1	low	low	…	low	d_2

IV. Algorithm for computing the membership function precedent

Consider the fuzzy sets, which is formed by the following relation

$$\mu_{a_1^{j1}}(x_1) \vee ... \vee \mu_{a_n^{j1}}(x_n),$$

where "$\vee$" denotes the operation "max".

Analyzing the entire block of logical statements relating to precedent d_j (corresponding block rows of knowledge matrix), we see that they represent the union of the respective fuzzy sets generated when considering the rows of the selected block. The membership function of this association, which identified with the membership function precedent d_j, will

$$\mu_{d_j}(x_1,...,x_n) = \left(\mu_{a_1^{j1}}(x_1) \vee ... \vee \mu_{a_1^{j1}}(x_n)\right) \wedge ... \wedge \left(\mu_{a_1^{jK_j}}(x_1) \vee ... \vee \mu_{a_1^{jK_j}}(x_n)\right),$$

where by «$\wedge$» denotes the operation "min". Formally presented an algorithm for determining membership functions precedent d_j can be written as :

a) fix an arbitrary point $(x_1^*,...,x_n^*) \in U_{x_1} \times ... \times U_{x_n}$,

b) for each block of the knowledge matrix corresponding to d_j, define $\mu_{dj}(x_1,...,x_n)$ at this point, according to the scheme in Tab. 3.

Table 3. Choosing of pertinent precedent

n/n	Координаты ситуационного вектора			max	min	d
	x_1	…	x_n			
⋮	⋮	⋮	⋮	⋮	⋮	⋮
j_1 ⋮	$(a_1^{j_1})^*$ ⋮	… ⋮	$(a_n^{j_1})^*$ ⋮	$\max_i (a_i^{j_1})^*$	$\min_j \max_i (a_i^j)^*$	μ_{d_j}
j_{K_j}	$(a_1^{j_{K_j}})^*$	…	$(a_n^{j_{K_j}})^*$	⋮ $\max_i (a_i^{j_{K_j}})^*$		
⋮	⋮	⋮	⋮	⋮	⋮	⋮

The operation $\min_i a_i^{js}$ is performed on numbers, standing in line "i", $1 \le i \le n$ and column "max" finds the maximum number in the corresponding line. Operation $\min_j \max_i (a_i^j)^*$ gives the minimum from maximum highlights of minima obtained lowercase $1 \le j \le K_j$ greatest. After spending such calculations for each point of the universal set, we obtain the membership function of interest to us.

V. . Selection algorithm precedent on the supervision of situational quantitative vector coordinates

Based on the current measurement point $(x_1^*,...,x_n^*)$ is formed with quantitative values of its coordinates. Only in this fixed point $(x_1^*,...,x_n^*)$ at the moment of measurement and need to determine the value of the membership function $\mu_{dj}(x_1, ..., x_n)$.

When observing the situation with quantitative vector coordinates (all the coordinates measured on a numerical scale) to choose the most appropriate precedent does not need to fully determine the membership function $\mu_{dj}(x_1, ..., x_n)$ on the entire set of points of the universal set. Sufficient to calculate their value only for fixed numerical values of the coordinates of which we got as a result of observation. It will have to use the algorithm once taking as $(x_1^*,...,x_n^*)$ coordinates of the observed situation vector.

As a result, for each use case d_j we get the number $d_j(x_1^*,...,x_n^*)$, accessories is a power d_j point $(x_1^*,...,x_n^*)$. On the basis of this interpretation, the most preferred precedent d_j^* will be a precedent for which $d_j^*(x_1^*,...,x_n^*) = \min_{1 \le j \le p} d_j(x_1^*,...,x_n^*)$.

Thus, the idea of the algorithm is included minimax method - a decision rule used in game theory , decision theory , operations research , statistics and philosophy (see, eg, [6]) .

VI. Sample of algorithm of choose precedent

RFID system operation can be represented as a process by which data is collected at a certain time. And it is not rare situation where at a certain point of time, simultaneously with data from the n labels (see [1]) , randomly overlapping .

According to the papers [7-8], the behavioral model of receiving path (RX chain) consists of Verilog- modules that implement processes detection subcarrier filtering, amplification and detection of high-frequency input signal shown in the Verilog language 16 - bit binary signal. In other words, from [4,12-13], the signal shape is a vector **x** 16 volume associated with the influence of overlapping signals. That is a distortion effect on n overlapping signals . Assume that the true signal is represented as a vector $\mathbf{l}_0$, which imposed distortion **u,** consisting of n signals (vectors) taking values from the set $\mathbf{l}_1, \mathbf{l}_2, \ldots, \mathbf{l}_d$.

Let receives data from n labels coming at a time simultaneously describes situational vector with coordinates $\{x_1, x_2, \ldots, x_n\}$, represented by linguistic variables: x_1 – energy signal from the tag number 1; x_2 - energy signal from the tag number 2; and so on ; x_n - energy signal from the label number n. Let this class observed two precedents d_1, d_2, each of which is used in two (different) cases. Linguistic variables take the following standardized values (terms):

x_i = { static low, static high level }, $i = 1, \ldots, n$.

Assume, for example, knowledge matrix for this system is shown in Tab. 4, when n=3.

Table 4. Example of knowledge matrix

n / n	*A.* Coordinates of situational vector			Precedents
	x_1	x_2	x_3	
1.1	height.	height.	height.	
1.2	height.	low.	matter.	d_1
1.3	low.	height.	low.	
1.4	matter.	height.	matter.	
2.1	low.	matter.	low.	d_2
2.2	height.	low.	low.	

Let there presidents are described by coordinates $x_1^* = 6$, $x_2^* = 8$, $x_3^* = 4$. Then, according to the algorithm of choice preferred precedent obtain the solution in Tab. 5.

Table 5. Example of choosing of pertinent precedent

n/n	Coordinates of situational vector			max	min
	x_1	x_2	x_3		
1.1	0.6	0.8	0.4	0.8	0.8
1.2	0.6	0.2	0.8	0.8	
1.3	0.6	0.8	0.6	0.8	
1.4	0.9	0.8	0.8	0.9	
2.1	0.4	0.4	0.6	0.6	0.6
2.1	0.6	0.2	0.6	0.6	

Thus, the most preferred precedent for permission is a precedent d_2.

Conclusion

Analysis conducted in this paper studies allows us to formulate the following main results.

1. Enter the knowledge matrix of precedents.
2. Described multidimensional discrete probability distribution selection precedent on supervision of situational vector.
3. Studied method for finding nemesmeschenny estimates the probability of selecting a precedent having good asymptotic properties.
4. An algorithm for the rapid withdrawal of precedent for using in the management of integrated circuits.

References

[1] Fillipenko I.V., 2011. Mathematical model of RFID CDMA. East European Journal of Advanced Technology, 5/ 3 (53): 34 - 36.

[2] Sankar K. Pal, Simon C.K. Shiu, 2004. Foundation of Soft Case - Based Reasoning. New Jersey Wiley, pp. 300.

[3] Chernyakhovskaya L.R., Fedorova N.I., Nizamutdinova R.I., 2011. Intelligent decision support in the operational management of the business processes of an enterprise. Herald of USATU. A series of management , computer technology , computer science,V 15, # 2 (42): P.172 -176.

[4] Prokhorov M.D., Fedunov B.E., 2010. Conclusion on the precedent of knowledge bases of onboard intelligent systems, placed on board anthropocentric objects. Journal of Artificial Intelligence and Decision Making, 2010/03: 62-73.

[5] Dshhunyan V.L., 2004. Electronic identification . Contactless electronic identifiers and smart cards. VL Dshhunyan. VF Shangin. Moscow. " Publisher AST": Publisher " NT Press, pp. 695.

[6] Mathematical Encyclopaedia: Minimax, 1985. Moscow. Soviet Encyclopedia.

[7] Heddles A.V., Kosolapov A.S., 2012. Investigation of the influence of structural noise immunity systems with broadband noise-like signals in coherent reception. Journal of Electronic scientific and technical publication Science and Education, # 4, April:1-15.

[8] Vertegel V.V., 2012. Modeling RFID systems. Herald SevNTU: ST. Sciences, Vip Ave, 131, Seriya: Informatika, elektronika, reception: 95-101.

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