100 VIII International Scientific and Technical Conference «Information Technologies in Science, Education and Production^) (ITSEP-2020)

ITs Ip

001.51; 005

S.I. MATORIN, V.V. MIKHELEV, A.G. ZHIKHAREV

-

SYSTEM-OBJECTIVE REPRESENTATION OF CONCEPTUAL KNOWLEDGE WITH DESCRIPTION LOGIC

»

:

The paper uses the possibilities of applying the system-object approach « Unit-Function-Object» in terms of descriptive logic for describing conceptual knowledge. Conceptual knowledge is represented using a hierarchy of conceptual systems. The results allow us to improve the existing ways of presenting conceptual knowledge, as well as develop models of conceptual knowledge that reflect the systemic reality that exists when solving classification problems.

Keywords: system-object approach «Unit-Function-Object», the presentation of conceptual knowledge, conceptual systems, systems-classes, systems-facts, descriptive logic.

( )

[1].

[2, 3].

« -

- ». ,

(« - »),

(« - »),

[4-6].

[7, 8] - -

,

,

-

, - ,

. - ,

- ,

( ).

, . .

, , ,

, . . , .

, , .

- ( ) [9-11].

,

- : (-)

- (-) , . .

- . : -

( ) - ( ).

-

( ),

,

( ).

1. - « - - »

, ,

(. .),

[12].

, .

,

, .

,

.

(- -),

, , , [7, 8].

, . .

. - s

- [7]: ^ = [(Ls?, Ls!);

fs(Ls?)Ls!; (Os?, Os!, Osf)], (Ls?, Ls!) - us

Ls? Ls! ;

fs(Ls?)Ls! - fs, ,

Ls? Ls!

; (Os?, Os!, Osf) - ( )

(, ,).

- ^', -

, -

, [8]:

VS' 3AS' $= [S^{i-1}; RS`cRS^{i-1}]$, (1)

S'^1 - - ,

US $S;$ - ,

102 VIII International Scientific and Technical Conference «Information Technologies in Science, Education and Production^) (ITSEP-2020)

I I Q c D
Information TeohtiDlogie
ir atHiK®, EduHUena   44

$$R^{\wedge '} (\qquad FS`) \qquad S`, \qquad\qquad RS''$$

$S''; \wedge -$.

2. -

, .

,

.

, - .

.

ALC [13, 14] ALC

.

$$\{ \ ; \ 1; \ ; \qquad ; \ ^{\wedge} ; \qquad ; \quad U \ D; \quad . \quad ; \ VR. \quad \}$$

• $^{\wedge}$ - ( ). A - ,

C, D - , R - .

, ,

, -

, , ,

- .

, ,

- $ABox.$,

$K = TBox \ ^{\wedge} ABox.$ ALC $ALCOIQ,$

[14]. $ALCOIQ$

- .

.

$SHOIQ \ ALC$ [13]. $ALCOIQ$

$RBox$ ($TBox$ $ABox),$ -

. $SHOIQ$ $R \wedge S,$ R, S - .

, R $S, \ S$ - $R.$

3. ( )

$SHOIQ$ « » « » - .

- ($t)$ - ( ),

( ) - .

- ,

- , - :

$$C^{\wedge}nt(Sj) = \qquad i \quad 3RS''^{\wedge\wedge},$$

$i = 0, N, i$ - ; l, j, Ij, pj - .

- . ,

(-).

- ($V \ I)$ - ,

- , .

-

:

$$Vol(s'j) = sj^{\wedge}, i \quad ^{s}i,_{2} \quad ^{Si^{\wedge\wedge}}N,$$

$sj^{\wedge} \quad sjj, p = 1, Ni. \ Nj$ - i- .

- . ,

. . , «

, , ,

, » [15].

-

- ( ).

.

1. -

(-) -

(-) ,

.

. - S^{ij} Rsj,

i - , j - , l -

. $SHOIQ$,

« » (Vol) « » $(Cont)$ - : S^{ij} - , RS^{ij} -

( ).

, - ( ) sJi , S^{ij}, . .

$Si_{,+}\backslash$ Sjj . - (-) $RSj^{\wedge}$ $^{\wedge}$.

$RS\backslash j, RSj^{i}$ RSh $RBox$:

$$TBox = \begin{vmatrix} SI_{1,P} & Sj \end{vmatrix}, RBox = \begin{vmatrix} RSU_p & RSj \end{vmatrix} \tag{2}$$

(1) , - ( )

S^{jj}. , -

, , .

, $RSji$ - $RS]\_j$. $RS]\_j$ - -

, . . (-).

- $S\backslash j$ $SHOIQ$. ,

:

^{s}lj , $3^{r s}J; ^{\wedge}$.

Ij - - (-) ^{s}j ; Pj

- - S^{j}_{ij} .

(1).

$TBox$ $RBox$:

$$TBox = \begin{vmatrix} \bullet Sj & SI,, & SRS^{ip\wedge} \\ \ddots & & \end{vmatrix}; RBox = \begin{vmatrix} RSjj & RSn\_ij & 3RSkiipjj \end{vmatrix}$$

104 VIII International Scientific and Technical Conference «Information Technologies in Science, Education and Production^) (ITSEP-2020)

I I Q c D
Information TeohtiDlogiea
ir atHiK*. EduHUena 44

-                                      (-   ),

.

,

-        ,   -   ,

,   . .   ,

.

:

$$Vol(\char`^_{0,\char`^0}) \quad ... \quad Vol() \quad V\char`^l( ) . . . \qquad (3)$$

$$Cont(^{S}o,po) \qquad . . . \qquad C^{o}nt(^{S}l^{p}p\text{-}k\char`^) \qquad (4)$$

(3)   ,   ,   -

,   ,   ,

, $= 0, {}_{0} =0.$

-        S_0 ,

1.

1 -   -

2.   -   ,

-                          -   .

-        S_0 ,   .

,   (-   ) $S\char`°i  \char`^Si^0i,$ $S\char`°i S_0;$

$RS*\char`°l  S_0;  Vol(S_0) = S\char`°i RS*\char`°i.  Cont(S_0) = RS*\char`°i, RS*\char`°i$ -   -   ,

,   . .

. $RS\char`°i$ -   ,   «   ».

(3)   (4).

2.

,   . .   ,   .

,   .

,

,

. , ,

. ,

,

,

- « - - »

.

, , -

« - » « - » ,

. *ALCOIQ*

SHOIQ -

. « » « » -

,

- .

( ),

.

1. . ., . ., . .
: . . . - 2- .,
. - .: « », 2012.
2. . ., . C 72 :
. - : - , 2007.
3. . , . . :
. - : - . - , 2017.
4. Ackoff R.L., General system theory and systems research: Contrasting conceptions of system science. // In Proceedings of the Second Systems Symposium at Case Institute of Technology. 1964.
5. . ., . . - .: , 1982.
6. . . :
[ ]. http://gtmarket.ru/laboratory/expertize/6566. 2012.
7. . ., . ., . ., . . -
// . . .
2013. 8 (151). 26/1.
8. . ., . ., . . //
. - 2019. - 3 - . 12-23.
9. . ., . .
// - . .
2. 1996. 8.
10. . ., . . //
8- « ( )». -
.: , 2019.
11. . ., . .
( ) // . 2. 2020. 4.
12. . . . - .:
, 1978.
13. Schmidt-Schauss M., Smolka G. Attributive concept descriptions with complements //
Artificial Intelligence. Elsevier Science Publishing Company, Inc. 1991. 48 (1).

106 VIII International Scientific and Technical Conference «Information Technologies in Science, Education and Production^) (ITSEP-2020)

ITs Ip

14. Baader F., Calvanese D., McGuinness L., Nardi D. Patel-Schneider P.F. The Description logic handbook: theory, implementation, and applications. Cambridge University Press. 2003.

15.   . .   :   . - 3-   .,   .
 . -   .:   , 1989.

    «   », .
 . . .,   ,
E-mail: matorin@softconnect.ru

                                                         , .   («   »)

E-mail: keeper121@ya.ru

                                                         , .   («   »)

 . . .,
E-mail: zhikharev@bsu.edu.ru