GALAXY INTERNATIONAL INTERDISCIPLINARY RESEARCH JOURNAL (GIIRJ)
ISSN (E): 2347-6915
Vol. 12, Issue 9 September (2024)

LOGICAL MODEL OF KNOWLEDGE PRESENTATION

Kuvatov Siddik Begalievich

ABSTRACT

We consider the statements in the article to be true or false. Creating complex reasoning from simple reasoning. Calculation from elementary considerations. Computational reasoning using quantifiers. We can construct a formula $(P \wedge Q) \rightarrow R$ explained by the sentence “All men die, and Socrates dies, then Socrates dies” by defining sentences with the logical variables P, Q and R.

Keywords. Logical model, reasoning, elementary reasoning, concept of predicate, quantifier, general quantifier, conjunction, disjunction, implication, equivalence.

INTRODUCTION

Artificial intelligence is a field of computer science that deals with the development of intelligent computer systems that imitate human cognitive functions, including self-learning and search for solutions without predetermined algorithms, and obtain results that are at least comparable to the results of human intellectual activity when performing certain subjects. The main features of artificial intelligence are the ability to understand language, learn, think, and act. Artificial intelligence computer science, cybernetics, cognitive sciences, logic. is developing as an interdisciplinary field that interacts with mathematics, linguistics and psychology. The field of artificial intelligence is not homogenous and has various research directions, the main ones being state space search, machine learning, knowledge representation, and the term "heuristic programming" was the first dominant direction in the field of artificial intelligence. Within this orientation, the first paradigm of artificial intelligence is formed: Thinking as solving problems by searching in the space of options. A central concept in heuristic programming is the concept of an option tree or state space. The root of the tree represents the initial state, from which branches arise, corresponding to how the state can be changed. Leaves of a tree with no descendants correspond to cases where the termination criterion is met. Solving a problem comes down to finding the leaf that forms the conditions of the problem and tracing the path from the root of the tree to that leaf. This uses a procedure called a generating procedure, which can perform a depth- or width-wise delay. In order to form a knowledge base in intelligent systems, it is necessary to formally describe it using knowledge representation models. Declarative and procedural models can be used as such models. A typical group of declarative models usually includes network and frame models, and a group of procedural models includes logical and production models. As part of this research, a unique artificial being is created and placed in some specially created "universe". Usually, this is a virtual world with sufficiently simple laws that are not large. In some cases, the real digital world, with the Internet in the main role, is taken as a polygon for these creatures to act.

On the border of the "artificial life" direction, creatures cannot be placed in the real physical world, because the evolution of artificial creatures cannot be organized in it at the moment. Implementation in other related research areas known as "Animates" or "Adaptive Behaviors" is secondary. The main goal of research in the field of "artificial life" is to reveal the principles of the organization of biological life and the process of its development in the course of evolution. At the same time, within this direction, questions arise not only about the form of life in concrete land conditions, but also about living conditions in possible life conditions in general. The logical model is based on the calculus of first-order predicates. Feedback - asserts true or false. For example, the sentences "White Swan" and "Black Swan" are judgments. Complex considerations can be made from simple considerations.

"White bird or black bird."

"The White Bird and the Black Bird",

"If the bird is not white, the swan is black",

In turn, it will be possible to divide the complex reasoning into simple reasoning connected with the words "and" "or" "negation" "if-then". Considerations are called elementary if they cannot be divided into parts, the logic of considerations is based on logical connections between considerations. That is, it is possible to generate B based on A. "If A is true, then B is true" and so on. Elementary arguments are considered variables of logical type and are allowed to perform logical operations on them. ('-') - negation (unary operation) '- conjunction (logical multiplication) '∨'-disjunction (logical addition) "→ '∧' - implication ('if and then')

Results of calculation of logical operations.

X	Y	X	Y	X ∧ Y	X∨Y	X→Y	X↔Y
0	0	1	1	0	0	1	1
0	1	1	0	0	1	1	0
1	0	0	1	0	1	0	0
1	1	0	0	1	1	1	1

Must meet the requirements under the Implication Act.

The value of the implication result depends on two operands.

1. If the first operand (A) is true, the result value overlaps with the value of the second operand (B).

2. The implication operation is not commutative.

3. The implication result A∨B overlaps with the expression result.

Let's look at the classic Socratic discourse.

P: "All men die";

Q: "Socrates the Man";

R: "Socrates Dies"

Using the logical variables P, Q and R to define the arguments, which is explained by the argument "All men die and Socrates dies, then Socrates also dies."

(P ∧Q) →R it will be possible to construct the formula. But this formula cannot be generalized. Because it is addressed to one object (Socrates).

It is clear that the property of being a "man" of a concrete object named "Socrates" may also apply to a number of other objects, allowing the constant "Socrates" to be replaced by a variable, for example X. Then we have the appearance of a person (x) with an internal structure and whose value depends on its component.

The written function is now called a predicate rather than an elementary statement.

A predicate can be defined as follows: "under the concept of a predicate, it is necessary to understand some connection given by a set of constants or variables."

If the semantics of P and Q are not given, we cannot say anything about the predicate. However, much more can be said about the predicate given the semantics. For example, let P and Q be considerations about the areas of cities in Russia and Uzbekistan. Given lists of cities in two countries and substituting their values into variables, we will have the merit between life, and we will think about the truth of this merit.

"The area of the city of Tashkent is larger than the area of the city of Karshi":

"The area of Moscow is larger than Samarkand":

In some cases, to confirm the truth of the predicate, it is possible to give some value instead of the variable. In addition to the predicates and their connectors ("and" "or" "negation" "results" and "if" then the "for all" components are used. A quantifier is a logical operation that delimits the field of truth of a predicate. .There are two commonality quantifiers, "∀" is determined by And "for all....." is read as "optional.....for" or "optional". - availability quantifier, '∃' is marked with and reads "available or found".

The field of detection was M x ($x \in M$) quantifiable considerations can be introduced for the variable. By using quantifiers, we can further clarify the conclusion about Socrates. "all people die" makes the statement more precise, "for all x-variables, if x is a person then x-dies." A logical formula for the above reasoning can be constructed by introducing the predicates man(x) and dies(x). Man(x) →dies (x). To show that this formula is true for all x-, we use common quotients.

x I'm going (x) → Will die (x)

Variables that are in the scope of a quantifier are called bound variables. The remaining variables in the formula are called free variables.

In order to speak of the truth of a statement without assigning values to the variables, it is necessary that all the variables included in it are bound to quantifiers.

If several quantifiers are included in the logical formula, their mutual location should be taken into account. For example, let's look at the possible explanations for the boolean formula Respects (x,y) with quantized variables. There may be several placement of quantifiers. One of these – "∀x∃y"this formula can be interpreted in two ways. For an arbitrary x, there is at least one y-person that it respects. There is at least one y-person whom all x-persons respect. To eliminate this uncertainty, we introduce the order of using parentheses and quantifiers - from left to right, then we create formulas that correspond to the above comments.

1. (**x**)(*y*) respects (x,y)
2. (y)(x respects (y,x)

It is possible to see the options used by the quantifiers location and how to search for them.

3. (x)(y) respects (x,y) and (y)(x) respects (x,y) "universal mutual respect"
4. ($\ni x$)($\ni y$) respects (x,y) – at least there is such a person who respects all people.
5. (∀y)(∍x) respects (x,y) everyone is respected by someone.
6. ($\ni x$)($\ni y$) respects (x,y) – and ($\ni x$)($\ni y$) respects "there is at least one person who has not lost the sense of respect"

Negation of quantifier expressions is done according to the rules. (∀x)P(x)=(∍x) →P(x)

→(∍)P(x)=(∀x) →P(x)

Operations in predicate logic have different advantages. The highest priority is the generality quantifier. In predicate logic, complex formulas are formed by combinations of atomic formulas using logical operations.

Such formulas are called well-posed formulas. Logical model is mainly used for research models due to the high demand for qualitative and complete knowledge of the subject area.

We include examples of programs in the Prolog language.

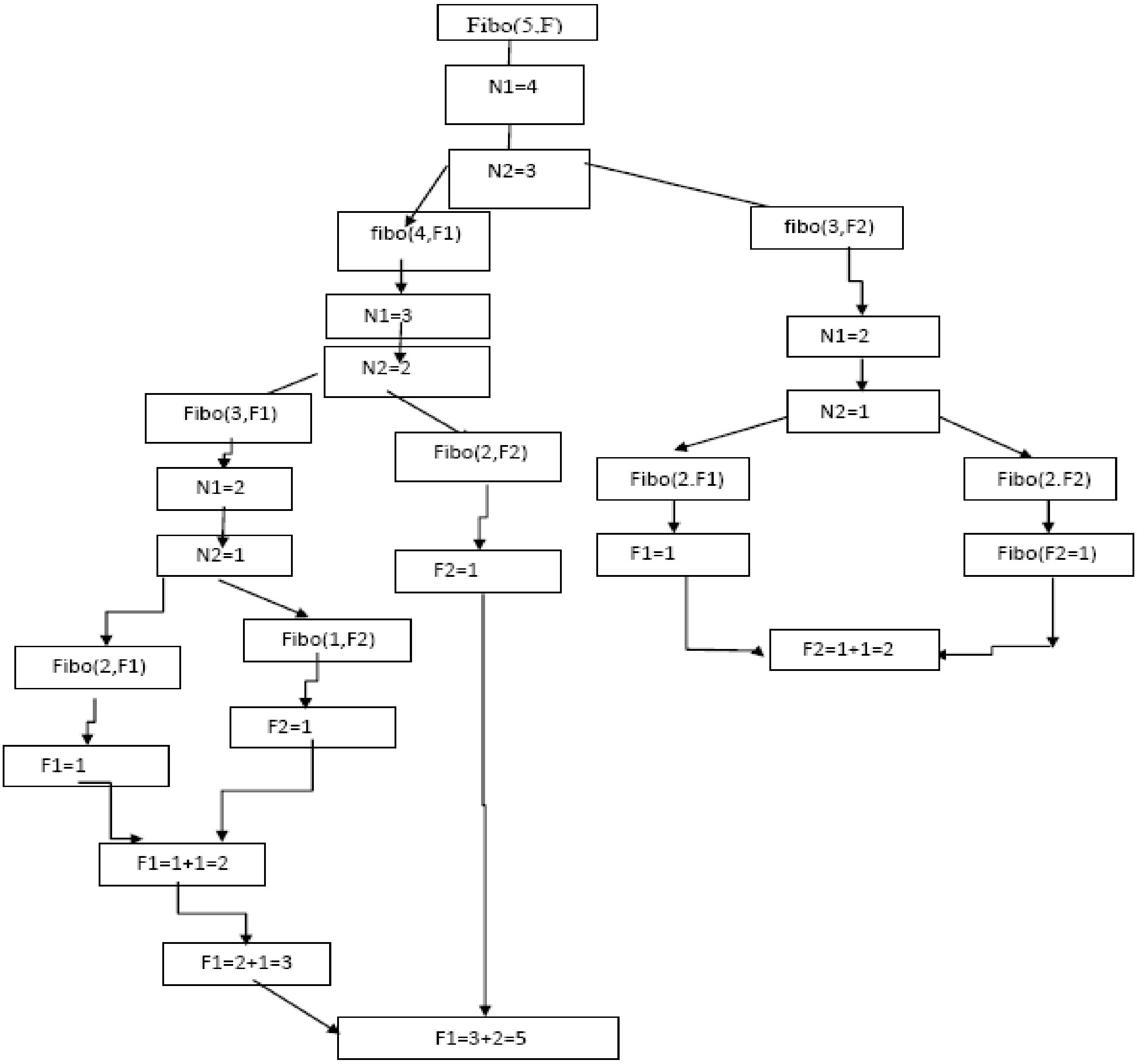
1. example. Calculate the factorial.

Factorial(1,1)

Factorial(N,F): N1 is N-1, factorial (N1,F1), F is F1*N

Here is means to assign a value, i.e. N1 variable is assigned N1 value. To assign atomic values, it is necessary to use the "=" operator instead of "is". Fibo(5.F)

1. The problem of finding N terms in a sequence of Fibonacci numbers.



fibo(1,1). fibo(2,1). fibo(N,F): N1 is N-1, N2 is N-2, fibo(N1,F1), fibo(N2.F2), F is F1+F2.

REFERENCES

1. Потапов А.С. Технологии искусственного интеллекта - СПб: СПбГУ ИТМО, 2010.-218 с.

2. Иванов В. М. Интеллектуальные системы: учебное пособие Екатеринбург: Изд.- во Уральского университета, 2015.– 92 с.

3. Остроух А.В. Интеллектуальные системы. – Красноярск:мм Научно- иновационый центр, 2015. – 110 с.

4. Морозова В. А., Паутов В. И. Представление знаний в экспертных системах: учебное пособие - Екатеринбург: Изд-во Урал. ун-та, 2017. - 120 с.

5. Исаев, С. В. Интеллектуальные системы: учебное пособие Красноярск : СФУ, 2017. - 117 с.

6. Птицына, Л. К. Интеллектуальные системы и технологии: учебное пособие/ Санкт-Петербург : СПбГУТ им. М.А. БончБруевича, 2019– 231с.