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# Human Brain - As A Biological Computer

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## ABSTRACT

The article mainly provides the basis for the development of an artificial intelligence machine, as well as natural intelligence - this is the human brain and the question of the study of the natural intelligent human brain. Fig. 3. list of letters 11..

## 1. Introduction

A computer is an artificial intelligence machine. The mathematical calculating and deciding machine is based on the logic of the model of one arithmetic-logical operation, and on the basis of this model the logical element "or" is developed.

The rest of the arithmetic-logical operation is performed by appropriate algorithms and implemented by the developed program.

Used the capabilities of logical algebra to perform arithmetic and logical operations developed logical elements or not. Which is the basis in the creation, (development) of an artificial intelligence machine.

Comment. 1. We present the functioning of the human brain or a natural intellectual body performing the arithmetic-logical operation of disjunction $\Lambda$.

Theorem**:** All arithmetic-logical operations are performed by logical operations by disjunction.

## 2. Evidence:

1. Arithmetic-logical addition disjunction $F = B_1 \Lambda B_2 \Lambda B_3 \Lambda ... B_n$,
2. Arithmetic-logical operation of subtraction: $F = B_1 \Lambda B_2$.
3. The arithmetic-logical operation of multiplication - conjunction.

$F = B_1 \Lambda B_2 \Lambda B_3 \Lambda ... B_n = B_1 \nu B_i$

4. Arithmetic division operation:

$F = B_1 \Lambda_1 \overline{B_2} \Lambda B_1 \Lambda_2 \overline{B_2} \Lambda B_1 \Lambda \overline{B_2} = \sum_{i=1}^{N} N \Lambda B_1 \Lambda B_2; \quad B_1 \prec B_2.$

5. Other arithmetic-logical operation is performed by appropriate algorithms.

## 3. Definition:

Let be $X - \{x_1, x_2, ..., x_{n,...}\}$ source alphabet of arguments. We will consider the functions

$f(x_{01}, ..., x_m)(x_1 \neq x_p \quad npu \quad \nu \neq \mu)$, whose arguments are defined on the set $E^2 = \{0,1\}$ and such that $f(l_1 - l_n) \in E^2$

When These functions will be called functions of the algebra of logic or Boolean functions. [1]

From function definitions $f(x_1, ..., x_n)$, it follows that for its values, corresponding to each of the sets of values, i.e. write out the following table.

1-table

| $X_1$ | $X_2$ | … | $X_n$ | $f(X_1,...X_n)$ |
|---|---|---|---|---|
| 0 | 0 | … | 0 | $f(0,...0)$ |
| 0 | 0 | ... | 1 | $f(0,...0,1)$ |
| … | … | .. | … | ……………… |
| … | … | … | … | ……………… |
| 0 | 1 | … | 1 | $f(0,...1)$ |
| 1 | 1 | … | 1 | $f(1,...1)$ |

From the table it is easy to see that the variable takes various values. For convenience, we use the standard arrangement of sets: if we consider a set as writing a number in binary terms, then the arrangement of sets will correspond to the natural arrangement of numbers $0,1...2^n - 1$. Next we see that each function $f(x_1,..,x_n)$, mapping is determined

$$\underbrace{\left[E^2 \times E \times ... E^2 \rightarrow E_n^2\right]}_{n\ раз}$$

We denote by the system of all functions of the algebra of logic over the alphabet X, which also contains the constant 0 and 1.

If we fix n variables, namely, $(x_1, ..., x_n)$ then the table will differ, only the values of the first column.

Therefore, the following statement is true [2].

Theorem. Number $P_2(\Pi)$ all functions from $P_2$, dependent Π variables $x_1, ..., x_n$ variables $2^{2n}$ [3].

We introduce the "elementary" functions of the algebra of logic:

1) $f_1(x) = 0$ - constant 0
2) $f_2(x) = 1$ - constant 1
3) $f_3(x) = x$ - identical function
4) $f(x) = \bar{x}$ - negation (read "NOT")
5) $f_5(x_1 x_2) = (x_1 \wedge x_2) = (x_1 x_2)$ - conjunction $x_1$ and $x_2$
6) $f_6(x_1 x_2) = (x_1 \vee x_2) = (x_1 x_2)$ - disjunction $x_1$ and $x_2$ (read « $x_1$ or $x_2$ »
7) $f_7(x_1 x_2) = (x_1 \rightarrow x_2)$ - implication $x_1$ and $x_2$ (read « from $x_1$ following $x_2$ »
8) $f_8(x_1 x_2) = (x_1 + x_2)$ - addition $x_1$ and $x_2$ by …2
9) $f_9(x_1, x_2) = (x_1 / x_2)$ Schaeffer function
10) $f_1(x_1, x_2) = (x_1 \cong x_2)$ equivalence

2-table

**Disjunction**

| X | 0 | 1 | X | x |
|---|---|---|---|---|
| 0 | 0 | 1 | 0 | 1 |
| 1 | 0 | 1 | 1 | 0 |

3-table

**Function Values**

| $x_1$ | $x_2$ | $(x_1 \cdot x_2)$ | $(x_1 \vee x_2)$ | $(x_1 \rightarrow x_2)$ | $(x_1 + x_2)$ | $(x_1 / x_2)$ | $(x_1 \cong x_2)$ |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 |

The tables that give the values of these functions. notice, that $(x_1 \cdot x_2) = \min(x_1, x_2)$; $(x_1 \vee x_2) = \max(x_1, x_2)$;

**Definition**. Functions $f_1(x_1,...,x_n)\ u\ f_2(x_1,...,x_n)$ are called equal $(f_1 \equiv f_2)$, if function $f_2$ can be obtained from by adding and removing dummy arguments.

**Theorem**. Each function of the algebra of logic can be expressed in the form of a formula through negation, conjunction, and disjunction [4].

It is established that any function of the algebra of logic can be expressed as a formula in terms of elementary functions $\overline{x}, x_1 \cdot x_2, \quad x_1 \vee x_2$.

It is shown that some other systems of elementary functions also possess this property.

The following relationship exists between denial, conjunction and disjunction:

$$x = x$$

$$\overline{(x_1 \cdot x_2)} = (\overline{x_1} \vee \overline{x_2}),$$

$$\overline{(x_1 \vee x_2)} = (\overline{x_1} \cdot \overline{x_2})$$

The following conjunction and disjunction properties are satisfied:

$$(x \cdot x) = x, \quad (x \vee x) = x$$

$$(x \cdot \overline{x}) = 0, \quad (x \vee \overline{x}) = 1,$$

$$(x \cdot 0) = 0, \quad (x \vee 0) = x,$$

$$(x \cdot 1) = x, \quad (x \vee 1) = 1$$

Identities can easily be verified by matching functions corresponding to the right and left parts of the identity.

1936-37 By fasting and Turing, it is independent of each other and almost simultaneously with the work of Church and Kleene about first defining the concept of an algorithm, and then using it to determine the class of computable functions.

Founding the algorithmic process that a suitable arranged “machine” can perform. On these machines, it was possible to implement or simulate all the algorithmic processes that have actually ever been described by mathematicians.

The rule and laws of functions of the algebra of logic given below will be considered only standard Turing machines.

Let the alphabet of a Turing machine be given in the form of a set $A = \{S_0, S_1, ..., S_n\}$, where corresponds to an empty cell, and the number of states of the control device is specified as a set $Q = \{q_0, q_1, ..., q_m\}$, Where

- corresponds to the final state. [4]

The final set of characters and the alphabet with which the machine works is called the external alphabet, the final set of states of the control device is called the internal alphabet. Suppose that at some point in time the Turing machine is in the state shown in Fig. 1.

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $S_0$ | $S_j$ | $S_j$ | $S_j$ | $\cdots$ | $S_j$ | | | | $S_j$ | $S_j$ | $S_0$ | |

**Fig. 1**

The configuration of the machine for this case will be presented in the form of a word.

$S_0$, $S_{j1}$, $S_{j2}$,…, $q_i S_j^2,...S_{jr} S_0...,$ Where

$S_0$ - empty cell symbol;-

r - number of filled cells on tape;

$S_{j1}$ - state of the first left non-empty cell;

$S_{jr}$ - state of the cell currently being viewed;

$q_i$ - control device status.

Consider an example of a Turing machine with alphabets $A = \{0,1\}, \quad Q = \{q_0, q_1\}$ and teams $q_1$ $q_1$Л, $q_1$0 $q_1$1C.

Let the word 11100 be on the tape. The head is above the first unit on the left. As a result of the Turing machine's work, this word turns into 11110. At the end of the machine's work, the head stands above the rightmost unit. [five]

Standard Turing Machine with External Alphabet $A = \{0,1\}$ called non-stop if it is able to execute only commands of the form:

$q_a^0 \to q_\beta aT;$

$\overline{q_a \bar{1}} \to q_\beta 1T$

Where, $a = \{0,1\}, T = \{C, Л, П\}$, those. if it can enter 1 in an empty cell, but cannot delete character 1 if it is already entered in the cell.

The set of all commands that a machine can execute is called its program.

Continuing these studies, a universal Turing machine was built, and computers were developed.

The artificial intelligence machine is a model of performing arithmetic and logical operations in an explicit form of a model of one arithmetic - logical operations, addition operations

(V) disjunction.

Question: If one simulates a more complex one more step, one step of the complex arithmetic-logical operation is performed by a natural intellect, the human brain of which will be the applied side of the result of this model. If it is possible to simulate, not arithmetic-logical, but other activities, for example, synsonation, smells, feelings, good or bad, guessing thoughts, and then on. We need to model the next in complexity of action, the ability of the human brain.

All scientific people and researchers in the field of artificial intelligence, whether it be computer specialists, or its elements, algorithms and algorithms, algorithmic languages, or general cybernetics in different directions, in different areas will agree that the artificial intelligence machine is mathematical - countable decisive machine, while the natural intellect is the human brain. [8,9,10,11]

There is a point of view that the human brain is biological - a natural computer is certainly incomparable with a great and very great opportunity to compare modern computers, even all computers are taken in place.

In terms of speed, the volume of the memo, the tasks to be completed, it is even more than a few billion times complete. Therefore, for the study of the human brain there is no possibility of modern development of humanity, as well as mathematical tools, logic, and many other reasons [6].

The study of the human brain requires reliable information to determine its structure, about the laws that the human brain functions, about communication with other objects, both internal and external, control issues, control algorithms, executive mechanism algorithms and other functionalities of the human body must have appropriate comprehensive knowledge, and knowledge of mathematical tools, as well as accurate information about the work of the human brain, like the algorithms of each performance, about the language that the human brain works, and their rules, the organization of the program, and the process, automated programs were compiled and so on. In order to study and cognition of the human brain, further research is being carried out [7].

With the advent of man, the human brain is created without flaws, completely and fully. Because the creator, so created.

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