DOI 10.36074/logos-31.03.2023.38

THE USAGE OF SIT-ELEMENTS FOR NETWORKS

Danilishyn Illia Vitaliovich
student for higher education in
Sumy State University

Danilishyn Oleksandr Vitaliovich
student for higher education in
Sumy State University

SCIENTIFIC DIRECTOR:

Pasynkov V.M.
PhD of physic-mathematical science,
assistant professor of applied mathematics and calculated techniques department
National Metallurgical Academy

UKRAINE

The all-encompassing monograph of Galushkin A.[1] embraces all aspects of networks but usual traditional approaches to networks are through classical mathematics, in particular through usual conformity operators. Here consider another approach – through new mathematics partition with containment operators, which though may be interpreted as a result of some conformity operators, but themselves are no conformity operators. The containment operators are more convenient for networks. Also main lay stress on the processors use, which work with triodes use, that does not use in Sit-networks in mainly. Sit-networks is represented by Sit-structure, which may constructed for necessary weights. Sit-OS (Sit operating system) are used Sit-coding and Sit-translation. In the first the coding is realized through 2-measured matrix –row (a,b), where the number b – the code of the action, the number a- the object code of this action. Sit-coding (or Self-coding) is realized through the matrix, which has 2 columns (in continuous case- 2 numbers intervals). Here initial coding is used for all matrix rows simultaneously. Sit-translation is realized by the inversion. In this case self-coding and Self-translation will be more stable in particular. The target weights f_i in $St_a^{\{fx\}}$ are chosen for necessary tasks. We will touch no questions of the applications, optimization of networks. They are detailed by Galushkin A.[1]. We touch difference of it for complex networks hierarchy only. The same simple executing programs are in the cores of simple artificial neurons of type Sit (designation - mnSt) for simple information processing. More complex executing programs are used for mnSt nodes. Unfortunately we change name St-elements [2] to Sit-elements because we find that St-elements were used by other authors early. Sit-threshold element –sgn($St_b^{\{ax\}}$), b- mnSt, x=(x_1,x_2,…,x_n) – source signals values, a=(a_1,a_2,…,a_n) – Sit-synapses weights. The first level of mnSt consists from simple mnSt. The second level of mnSt consists from $St_D^{\{mnSt\}}$ – Sit-node of mnSt in range D, D- holding capacity for mnSt node. The third level of mnSt consists from $St_D^{\{St_D^{\{mnSt\}}\}}$- Sit^2- node of mnSt in range D, thus D becomes capacity in itself for mnSt. The usage of Sit^2- nodes of mnSt is enough for our networks, but self level is more higher in living organisms, in particular Sit^n-, n≥3. Target structure or corresponding eprogram by corresponding self-code enters to target block by means of alternating current. After that here takes place the activation of all networks or its part according to indicative target. May arise the opinion that we go out from networks ideology, but in fact networks presents complex hierarchy with capacity in itself of different levels in living organisms.

Remark. Traditional scientific approaches through classical mathematics allows to describe only on usual energy level. Here is approach- on more thin energy level.

In mnSt are $St_{\mathrm{mnSt}}^{\{\mathrm{eprograms}\}}$, $\mathrm{eprogram}$ –executing program in Sit- OS . In this connection Sit-OS (or Self-OS) is based on Sit-assembly language (or Self- assembly language), which is based on assembly language through Sit-approach in turn in the case of the sufficiency of the Sit-networks elements base. The eprograms are in Sit-programming environments (or Self - programming environments), but this question and Sit-networks base will be considered in next articles. In particular, eprograms may contain Sit- programming operators. In mnSt cores the constant memory Sit with correspondent eprograms depending on mnSt.

The ideology of Sit and S_3f [2] can be used for programming. Here are some of the Sit programming operators.

1. Simultaneous assignment of the constants $\{p\} = (p_1, p_2, \ldots, p_n)$ to the variables $\{\mathrm{a}\} = (\mathrm{a}_1, \mathrm{a}_2, \ldots, \mathrm{a}_n)$. It's implemented through $St_{\mathrm{x}}^{\{\{\mathrm{a}\}:\{p\}\}}$.

2. Simultaneous check the set of conditions $\{f\} = \left(f_1, f_{2,} \ldots, f_n\right)$ for a set of expressions$\{B\} = \left(B_1, B_{2,} \ldots, B_n\right)$. It's implemented through $St_{\mathrm{x}}^{IF\{\{B\}\{f\}\}\ then\ Q}$ where Q can be any.

3. Similarly for loop operators and others.

$S_3 f$– software operators will differ only in that aggregates $\{\mathrm{a}\}, \{p\}, \{B\}, \{f\}$ will be formed from corresponding Sit program operators in form (1) for more complex operators in form (2).

Quite interesting is the OS (operating system), the principles and modes of operation of the Sit-networks for this programming. But this is already the material of the next articles.

Here is based on the elements of Sit – physics and special neural networks with artificial neurons operating in normal and Sit – modes, a model of a helicopter without a main and tail rotors was developed. Let's denote this model through Smnst. To do this, it's proposed to use mnSt of different levels, for example, for the usual mode, mnSt serves for the initial processing of signals and the transfer of information to the second level, etc. to the nodal center, then checked and in case of anomaly - local Sit – mode with the desired "target weight" is realized in this section, etc. to the center. Here, in case of anomaly during the test, Smnst is activated with the desired "target weight". Here are realized other tasks also. To reach the self-energy level, the mode $St_{\mathrm{Smnst}}^{\mathrm{Smnst}}$ is used. In normal mode, it's planned to carry out the movement of Smnst on jet propulsion with the conversion of the energy of the emitted gases into a vortex, to obtain additional thrust upwards. For this purpose, a spiral-shaped chute (with "pockets") is arranged at the bottom of the Smnst for the gases emitted by the jet engine, which first exit through a straight chute connected to the spiral one. There is a drainage of exhaust gases outside the Smnst. Otherwise, Smnst is represented by a neural network that extends from the center of one of the main clusters of Sit - artificial neurons to the shell, turning on into the shell itself. Above the operator's cabin is the central core of the neural network and the target block, which is responsible for performing the "target weights" and auxiliary blocks, the functions and roles of which we will discuss further. Next is the space for the movement of the local vortex. The unit responsible for Smnst's actions is located below the operators' cab. In Sit – mode the entire network or its sections are Sit – activated to perform certain tasks, in particular, with "target weights". In target block are used Sit-coding, Sit-translation for activation all networks to "target weights" simultaneously, then –the reset of this Sit-coding after activation. Unfortunately, triodes are not suitable for Sit -neural network. In the most primitive case usual separaters with corresponding resistances and core for eprograms may be used instead triodes since there is not necessity in the unbending of the alternating current to direct. The belt of Sit-memory operative is disposed around central core of Smnt. There are Sit-coding, Sit-translation, Sit-realize of eprograms and of the programs from the archives without extraction theirs.

Sit – structure or a eprogram if one is present of needed «target weight» are taken in target block at Sit – activation of the networks. It's used an alternating current of above high frequently and ultra-violet light, which are able to work with Sit – structures in Sit – modes by it`s nature for an activation of the networks or some of its parts in Sit – modes and at local using Sit – mode. Above high frequently alternating current go through mercury bearers that overheating does not occur. The power of the alternating current of above high frequently increase considerably for target block. The activation of all network is realized to indicative "target weights".

Supplement

Sit - elements

Definition 1. The set of elements $\{a\} = (a_1, a_2, \ldots, a_n)$ at one point x of space X we shall call Sit – element, and such a point in space is called holding capacity of the Sit – element. We shall denote $St_x^{\{a\}}$.

Definition 2. An ordered set of elements at one point in space is called an ordered Sit – element.

It's possible to $St_x^{\{a\}}$ correspond to the set of elements $\{a\}$, and to the ordered Sit - element - a vector, a matrix, a tensor, a directed segment in the case when the totality of elements is understood as a set of elements in a segment.

It's allowed to add Sit – elements: $St_x^{\{a\}} + St_x^{\{b\}} = St_x^{\{a\}\cup\{b\}}$.

Capacity in itself

Definition 3. The capacity in itself A of the first type is the holding capacity containing itself as an element. Denote $S_1 fA$.

Definition 4. The capacity in itself of the second type is the holding capacity that contains the program that allows it to be generated. Let's denote $S_2 fA$. An example of capacity in itself of the first type is a set containing itself. An example of capacity in itself of the second type is a living organism, since it contains a program: DNA, RNA.

Definition 5. Partial capacity in itself of the third type is called capacity in itself, which contains itself in part or contains a program that allows it to be generated partially. Let us denote $S_3 f$.

All holding capacities in self-space are capacities in itself by definition. The capacities in itself may to appear as Sit-holding capacities and usual holding capacities. In these cases there is used usual measure and topology methods.

Connection of Sit – elements with capacities in itself.

For example, $St_{g\{R\}}^{\{R\}}$ is the capacity in itself of the second type if $g\{R\}$ is a program capable of generating $\{R\}$.

Consider a third type of capacity in itself. For example, based on $St_x^{\{a\}}$, where $\{a\} = (a_1, a_2, \ldots, a_n)$, i.e. n - elements at one point, It's possible to consider the capacity in itself $S_3 f$ with m elements and from {a}, at m<n, which is formed by the form:

$$w_{mn}=(m,(n,1)) \quad (1)$$

that is, only m elements are located in the structure $St_x^{\{a\}}$.

Capacities in itself of the third type can be formed for any other structure, not necessarily Sit, only through the obligatory reduction in the number of elements in the structure. In particular, using the form

$$w_{m_1 \cdots m_n} = (m_1, (m_2, (\ldots (m_n, 1) \ldots))) \quad (2)$$

Structures more complex than $S_3 f$ can be introduced.

Mathematics itself

Consider first the arithmetic Sit:

1. Simultaneous addition of a set of elements $\{a\} = (a_1, a_2, \ldots, a_n)$ are realized by $St_x^{\{a+\}}$.

2. By analogy, for simultaneous multiplication: $St_x^{\{a*\}}$: enter the notation of the set B with elements $b_{i_1 i_2 \ldots i_n} = (St_x^{\{a_{1_{i_1}}*, a_{2_{i_2}}*, \ldots, a_{n_{i_n}}\}})_R$ for any $\{i_1, i_2, \ldots, i_n\}$ without repetitions, $x = St_a^{\{K\}}$,K-set of any $\{k_1 *, k_2 *, \ldots, k_n *\}$ without repetitions of their, k_i-any digit, i=1,2,…,n, R= $St_a^{\{i_1+, i_2+, \ldots, i_n\}}$, R is the index of the lower discharge (we choose an index on the scale of discharges):

index	discharge
n	n
…	…
1	1
,	0
-1	1st digit to the right of the point
-2	2nd digit to the right of the point
...	...

Then $St_x^{\{B+\}}$ gives the final result of simultaneous multiplication. Any system of calculus can be chosen, in particular binary. The simplest functional scheme of the assumed arithmetic-logical device for Sit-multiplication:

3. Similarly for simultaneous execution of various operations: $St_x^{\{aq\}}$, where $\{q\} = (q_1, q_2, \ldots, q_n)$. q_i -an operation, i = 1,…,n.

4. Similarly, for the simultaneous execution of various operators: $St_x^{\{Fa\}}$, where $\{F\} = (F_1, F_2, \ldots, F_n)$. F_i is an operator, i = 1,…,n.

5. The arithmetic itself for capacities in itself will be similar: addition - $S_1 f^{\{a+\}}$, (or $S_3 f_x^{\{a+\}}$ for the third type), multiplication $S_1 f^{\{a*\}}$, ($S_3 f_x^{\{a*\}}$).

6. Similarly with different operations: $S_1 f^{\{aq\}}$, ($S_3 f_x^{\{aq\}}$), and with different operators: $S_1 f^{\{Fa\}}$, ($S_3 f_x^{\{Fa\}}$).

7. $St_B^A -$ is the result of the holding operator action. For sets A, B we have

$St_B^A = \{A \cup B - A \cap B, D\}$, where D is self-set for $A \cap B$. There is the same for structures if it`s considereds as sets.

8. Sit-derivative of f(x_1,x_2,…,x_n) is $St_{f(x_1, x_2, \ldots, x_n)}^{\left\{\frac{\partial}{\partial x_{1_i}}, \frac{\partial}{\partial x_{2_i}}, \ldots, \frac{\partial}{\partial x_{k_i}}\right\}}$, where $x=(x_{1_i}, x_{2_i}, \ldots x_{k_i})$-any set from ($x_1$,$x_2$,…,$x_n$). Let's designate Sit- $\frac{\partial^k f(x)}{\partial x_{1_i} \partial x_{2_i} \ldots \partial x_{k_i}}$. Sit-integral of

f($x_{1,}, x_2, \dots, x_n$) is $St^{\left\{\int()dx_{1_i}, \int()dx_{2_i}, \dots, \int()dx_{k_i}\right\}}_{f(x_1,,x_2,\dots,x_n)}$, where $(x_{1_i}, x_{2_i}, \dots x_{k_i})$- any set from ($x_{1,}, x_2, \dots, x_n$). Let's designate Sit-∫…∫ $f(x)dx_{1_i}dx_{2_i} \dots dx_{k_i}$-k-multiple integral. Sit-lim of f($x_{1,}, x_2, \dots, x_n$) is $St^{\left\{\lim\limits_{x_{1_i}\to a_{1_i}}, \lim\limits_{x_{2_i}\to a_{2_i}}, \dots, \lim\limits_{x_{k_i}\to a_{k_i}}\right\}}_{f(x_1,,x_2,\dots,x_n)}$. Let's designate Sit-$\lim\limits_{\substack{x_{1_i} \to a_{1_i} \\ \cdot \quad \cdot \quad \cdot \\ x_{k_i} \to a_{k_i}}} f(x_1,, x_2, \dots, x_n)$. Self-$\lim\limits_{x\to a} = St^{\lim\limits_{x\to a}}_{\lim\limits_{x\to a}}$.

9. n the case a self- derivate it's obtained inclusions of multiple derivates. There are the same for self-integrals: there are obtained inclusions of multiple integrals.

10. Let's denote self-(self-Q) through self^2-Q , fS(n,Q)= self-(self-(…(self-Q))) = self^n-Q for n-multiple self.

Operator itself.

Definition: An operator that transforms $St^{\{a\}}_x$ into any $S_i f^{\{b\}}_x, i = 2,3$; where$\{b\} \subset \{a\}$; is the operator itself.

Example. The operator contains the set in itself.

Lim-itself.

1. Lim Sit

For example, the double limit $\lim\limits_{\substack{x\to a1 \\ y\to a2}} G(x,y)$ corresponds to $St^{\{G(x,y)\}}_{(a_1 a_2)}$.

Similarly for itself limit with n variables.

In the case of lim-itself, for example, for m variables, it's sufficient to use the form (1) of lim Sit, for n variables (n>m). Similarly, for integrals of variables m (for example, a double integral over a rectangular region- through a double lim).

The sequence of actions you can "collapse" into an ordered Sit element, and then translate it, for example, to $S_3 f$ – capacity in itself. As an example, you can take the receipt $\frac{\partial^2 u}{\partial x^2}$. Here is the sequence of steps 1)$\frac{\partial u}{\partial x}$→ 2) $\frac{\partial}{\partial x}(\frac{\partial u}{\partial x})$. "collapses" into ordered $St_x^{\left\{\frac{\partial u}{\partial x}, \frac{\partial}{\partial x}(\frac{\partial u}{\partial x})\right\}}$, ones that can be translated into the corresponding $S_1 f$. The differential operator $St_x^{\left\{\frac{\partial}{\partial x}, \frac{\partial}{\partial x}(\frac{\partial}{\partial x})\right\}}$ -itself is also interesting.

Remark. Sit-displacement of A from B will be denote through ${}^B_A St$. Then the notation ${}^C_D St^A_B$ is Sit-containment of A in B and Sit-displacement of D from C simultaneously. Let's denote ${}^B_A St^A_B$ through TS^A_B, ${}^A_A St^A_A - through\ TS^A_A$.

We can consider the concept of Sit - element as St^A_B, where A fits in holding capacity B. Then St^B_B it will mean S_1f B. Let's denote St^B_B through L(B). The rule of 2d: L(L(B))→2L(B).

Using elements of the mathematics of Sit[1], we introduce the concept of Sit – the change in physical quantity B: $St_x^{\{\Delta_1 B,\dots,\Delta_n B\}}$. Then the mean Sit - velocity will be v_{cpst}(t, Δt) =, $St_x^{\left\{\frac{\Delta_1 B}{\Delta t},\dots \frac{\Delta_n B}{\Delta t}\right\}}$and Sit is the velocity at time t:$v_{st} = \lim\limits_{\Delta t\to 0} v_{cpst}(t, \Delta t)$. Sit – acceleration $a_{st} = \frac{dv_{st}}{dt}$.

In normal use, simply Sit_x reduce to result a sum at point x of space, and when using Sit_x with "target weights", we get, depending on the "target weights", one or another modification, namely, for example, the velocity v^f_{st}(with a "target weight" f) in the case when two velocities v_1, v_2 are involved in the set $\{v_1 f, v_2\}$ for $v^f_{st} = St_x^{\{v_1 f, v_2\}}$, f − instantaneous replacement we get an instantaneous substitution $v_1 by\ v_2$ at point x of space at time t_0.

Consider, in particular, some examples: 1) $St^{e}_{\{x_1,x_2\}}$ describes the presence of the same electron e at two different points x_1, x_2. 2) The nuclei of atoms can be considered as Sit elements.

Similarly, the concepts of Sit - force, Sit - energy are introduced. For example, $E^{f}_{st} = St^{\{E_1 f, E_2\}}_{x}$ it would mean the instantaneous replacement of energy E_1 by E_2 at time t_0. Two aspects of Sit– energy should be distinguished: 1) carrying out the desired "target weight", 2) the fixing result of it. Do not confuse energy - Sit (this is the node of energies) with Sit – energy that generates the node of energies, usually with the "target weights". In the case of ordinary energies, the energy node is carried out automatically.

Remark. In fact, Sit – elements are all ordinary, but with "target weights" they become peculiar. Here you need the necessary kind of energy to perform them. As a rule, this energy lies in the region itself. This is natural, since it's much easier to control the elements of the k level by the elements of the more highly structured k +1 level.Consider the concepts of capacity in itself of physical objects. Similar to the concepts of publication: the capacity in itself of the first type contains itself, the second type contains a program (like DNA) capable of generating it, the third type - partially containing itself or a program capable of generating it, or both. The question arises about the self-energy of the object. In particular, according to the results of the publication[2]: «St^{B}_{B} will mean S_1f B.» In particular, it allows you to determine the self-energy of DNA through St^{DNA}_{DNA}, St^{Q}_{Q} - self-energy Q. The law of self-energy conservation acts on the level of self-energy already. Also, in addition to capacities in itself, you can consider the types of containment in oneself: the first type is containment in itself, the second type is the containment of oneself potentially, for example, in the form of programming oneself, the third type is partial containment in oneself. For example: self-operator, self-action, whirlwind. It's as a result of containment in oneself that capacity in itself can be formed.

Let's clarify the concept of the term capacity in itself: this is the holding capacity that contains itself potentially. Consider self-Q, where Q may be any, including Q=self, in particular it may be any action. Therefore self-Q is self-made Q, it does itself. There is a partial self-Q for any Q with partial made itself. Consider some examples for capacity in itself: ordinary lightning, electric arc discharge, ball lightning.

A self-search of the solution of the equations $f_i(x)=0$, where $i=1,2,\ldots,n$, $x=(x_1,x_2,\ldots,x_n)$, will be realized in $St^{\{f_1(x)=0?x, f_2(x)=0?x, \ldots, f_n(x)=0?x\}}_{a}$ or $St^{\{f_1(x)=0, f_2(x)=0, \ldots, f_n(x)=0\}}_{?x}$. The same for $St^{\{tasks(x)\}}_{?x}$. $St^{\{t\}}_{(o,x)}$, where $\{t\}$- time points set, (o,x)- object o in point x from space X, give to enter in necessary time moments. The same for $St^{\{t\}}_{o}$. $St^{\{God-father, God-son, Holy\ Spirit\}}_{\alpha}$is Three concept representation, where α- point in connectedness space.

References:

[1] Galushkin A. Networks: principles of the theory. Hot line-Telecom. M.,2010 (in Russian).

[2] Danilishyn I.V. Danilishyn O.V. MATHEMATICS ST, PROGRAMMING OPERATORS ST AND SOME EMPLOYMENT. Collection of scientific papers "SCIENTIA", 2023.

[3] N.Y. Belenkov. The principle of the integrity of brain activity. M., Meditsina,1980(in Russian).