PROCESSOR SELF-LEARNING

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ABSTRACT The aim of my work is to find some new information processing methods, which would be more compliant with the results of the psychological and the neurobiological experiments on the human brain than the current methods based on symbolic and neural networks.

To achieve my goal I spent a lot of time on detailed and in depth analysis of the knowledge concerning the processing of information in the cerebral cortex and the subcortical structures. I have been working on this topic since 1991. My extensive programming experience (now twenty-five years) which I have obtained by developing utility software for state institutions, local government, research institutes and companies was essential in this project.

On 26 th September 2015 as the result of this long research I discovered a simple algorithm of a detector of interpretation of processes. Soon after this discovery I came up with an idea to use this algorithm in a new generation self-learning and self-programming processor. Thie new generation processor is characterized by the ability to acquire knowledge of the surrounding reality like the human brain, where in the structure of the knowledge base I did not include any i any knowledge interpreting constructs which provides the processor with the universal and unlimited self learning ability. For the research reasons I developed the model this processor in the form of computer software.

The preliminary results of research indicate that, if certain calculable processes send data processing results to the interpretation detector, then it can, on the basis of these results and the data, recreate the codes of these processes (called interpretations) , which can be used later to process any data, already without the mediation of these processes. The learning efficiency of the interpretation detector is incomparably higher than the efficiency of the neural network learning, mostly because this learning is done in the real time.

The further tests demonstrated that an average length sequence of data (a sequence in the experiment I called an attempt) needed to completely detect a simple (one-level) processes amounts to only 6.3 elements sequence regardless of the type of the process. I conducted measurements on a serie of 20,000 samples to detect a process, with changing the length of the sequences in the sample and with resetting the knowledge base after each attempt. Below this length of 6,3 elements not all samples lead to detection of a process, but the increase above 6,3 elements was not needed because the process was completely detected. The (self-learning) processor analyzed each series of data in about a few seconds by using an old computer (year 2004) in the standard configuration with Intel Celeron.

The chieved during the tests average of the sequence data length of 6.3 elements needed to completely detect the process is identical with the average capacity of the short-term memory of human brain (7 ± 2 elements). The tests prove that bigger capacity is not needed, because it does not improve in any way the detection performance of the process, and actually it would diminish the time efficiency. Taking further into account that the whole detection process takes place in separate time segments equal one-half clock period at a higher level of processing, more complex processes are detected by the same method at clocked 2 x 6.3 = 12.6 fold less, recalling the natural semantics with a syntax based on an the analysis of reality.

When checking the degree of equivalence of the processor self-learning and the human brain can be noted, that with the average period of repetition of the action potential of a neuron in nerve fibers of 2 ms, equtes with a processor with clock frequency of 500 Hz. The next clock frequencies for the higher levels of processing with the reduction of the timing of 12.6 times, are respectively 40 Hz, 3.2 Hz and 0.26 Hz. The first frequency 40 Hz (25 ms) coincides with the results of Ernst Poppel, Francis Crick and Christof Koch and Rodolfo Llinas on correlates of consciousness or awareness of quantization. Next frequency 3.2 Hz (0.3 s) coincides with the time of fixation of the eye during which the eye gets a "frame-picture" for the analysis of the image between successive saccadic eye movements and 0.26 Hz (about 3 seconds) with perception of the present. The successive levels represent the processing of more complex representations at the higher levels of processing. The next levels have adjustable timing periods controled by human will (mental work). While the first level of the clock 500 Hz can be associated with information processing at the symbolical, unconscious level.

The high effectiveness of learning of the self-learning processor may indicate the fact, that at a speed of learning tens of thousands of detected processes in a matter of seconds, it is able to learn the basic operations which performs arithmetic logic unit standard computer CPU (addition, subtraction, sum bit, negation bit, difference symmetrical, etc.) after less than a few dozens of tacts of his work (six tacts for another operation), providing a compact and efficient code of interpretation of learned operations, and then replace this unit in the information processing. Such a high efficiency I was able to achieve by using the mirror cells in knowledge base.

Additionally, the self-learning processor in comparison with the neural networks learns in real time, starting from the null knowledge base. It removes the demages in the knowledge base through constant learning, it provides an unambiguous, compact and efficient interpretations of the detected external processes. The code for these processes can be preliminarily set up in the genetic code of the unit. It will affect unit original behavior and allowlearning to modify it. It is an excellent model of a complex real neural network and of the nervous system of animals unicellular.

It seems, that the self-learning processor can be implemented in a wide range of applications, from the development of a new generation of self-learning by self-programming microprocessor technology a, in revising the current concepts and theories about the human brain, which may help completely cure the brain from some of the diseases. It can also be deployed to chaneg the existing methods of the computer programming, and in in the intelligent exploration of knowledge by means of robots operating with the minimal control of humen (in the conquest of space).
