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Extension of Fuzzy Neural Network Simulation on Zhuravlev's Operator Prototype

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The lack of final solution for a number of interesting cases and variety of situations, for example, for pattern recognition in fuzzy “physical” processes, have inspired the construction of new artificial models of biological neural net (NN) based on a fuzzy ground. Here we proceed from the preconception that informational description (image) x_1, x_2, \dots, x_n of the initial object to be analyzed, and which is presented to the inputs of the first layer of the NN is represented not as a set of homogeneous input signals, but as a set of different kinds of signals.

Classical papers on NN modeling mostly do not take into account of differences among inputs to a NN. In animated nature = hearing, vision, smell, sensation ect., and combinations of these, allow comprehensive evaluation of the surroundings. In this respect our supposition is that a number of combinations are singled out a priori from of possible combinations of the first layer neuron's inputs namely: e_1, e_2, \dots, e_t and $\Omega = \{e_1, e_2, \dots, e_t\}$, $e_j \subseteq \{1, 2, \dots, n\}$, $j = 1, 2, \dots, t$, where n is the number of inputs to the NN.

The NN has been presented consist of α - blocks and any separate α - block is a two layer NN, where a neuron of the first layer has a special form of thresholding function. The neuron of the α - block the second layer has the fuzzy, in contrast with [2], form of thresholding function. In it's turn α - block itself is constructed by the operator A (Zhuravlev's operator [1]) and belongs to the non-classical type of a fuzzy NN.

The scheme of α - block and the process for recognizing objects using one and formal ground for the scheme will be given. The approach open the way for non-iterative learning and convinient for application to the class extremal problem from [1]. This talk has been developed the results [1,2].

References

- [1] *Dusembaev A.E.* Mathematical models of program segmentation.-Moscow, Fizmatlit. Monography. 2001. p. 208. In Russian. ISBN 5-9221-0069-6.
- [2] *Dusembaev A.E.* Development of Neural Network (NN) Simulation on Operator Prototype. ICM' 2002, V.Short Presentations and Posters, Beijing, August 2002, p. 369.