

Renewed SOM model using supervised learning*

Gabriela Andrejková, Jozef Oravec

Institute of Computer Science, Faculty of Science, P. J. Šafárik University in Košice

e-mail: gabriela.andrejkova@upjs.sk, jozef.oravec@gmail.com

The paper deals with Acyclic Graph Data Structures (AGDS) and with model of a self-organizing map (SOM) that has been modified for processing of AGDS. The motivation was found in the real world of the Academic Information System (AIS) at P. J. Šafárik University in Košice. To the SOM Neural Network (SOM NN), there are added contexts and counters which are built in a training phase of the neural network. And the network can be trained to the structures of boolean or arithmetic expressions together with the structure of expressions. The model of the developed NN is in the Fig. 1 and it is called a Neural Network with Lateral Weights and Supervised Training. (NN LWST).

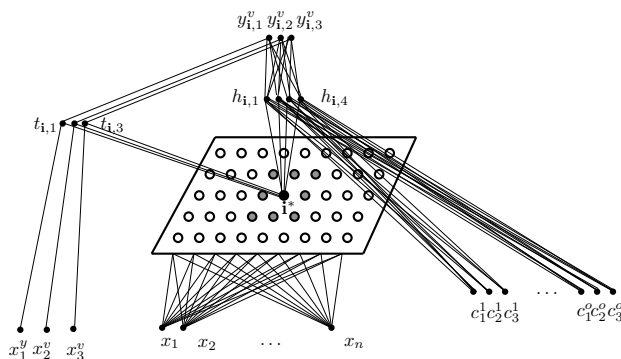


Fig. 1: An example of NN LWST network.

The trained NN LWST in active phase can compute more information which is used to built an answer to some questions about subjects in study programs. The working application was tested on the study programs in informatics, the test results are very closed to the real values.

Criteria of evaluation of NN LWST:

- **Winner differentiation WD** describes the ratio between the number of winner neurons and the number of different inputs. If $WD < 1$, some winners are computed for different inputs. The situation is the best one if $WD = 1$.
- **Confidence of right answers.** Let p^S be the sum of all the numbers of predecessors of the vertex v_D together with the subject in the training set and p^N be the sum of all the numbers of predecessors of the vertex v_D together with the subject computed by a neural network, then the confidence of right answer is

$$d^o = \frac{p^N}{p^S}.$$

- **Mean Error (ME), Mean Absolute Error (MAE) and Mean Squared Error (MSE).**

From experiments, we can follow that the errors of the network with the $N \times N$ lattice must not depend on the high of data structure (expression).

*This work was supported by Slovak grant agency VEGA 1/0479/12.