NEURAL NETWORKS FOR EVALUATING BINARY OBJECTS AFFINITY

Dmitrienko V.D., Leonov S.Yu., Kalashnikov V.I.
National technical university
«Kharkiv polytechnic institute»,
Kharkiv

The Hamming neural network [1, 2] is an effective tool for solving the problem of determining the proximity of discrete objects whose binary components are described using the bipolar alphabet, and as a measure of the proximity of objects, the difference between the number of identical bipolar components of the compared objects (vectors) and the Hamming distance is used between them. However, the Hamming neural network cannot be used to solve these problems if the components of the compared objects (vectors) are encoded using the binary alphabet. It cannot be used to assess the affinity (proximity) of objects (binary vectors) using the functions of Jacquard, Sokal and Misher, Kulchinsky, etc. [3]. In this regard, a method for the synthesis of neural networks using the above distances to assess the proximity of binary vectors (black and white images with binary coding of components) has been developed. This broadens the scope of neural networks for solving recognition and classification problems using proximity functions using more subtle signs of the proximity of discrete objects than the Hamming distance. The possibility of synthesis of neural networks with bipolar input vectors and affinity functions of Jacquard, Sokal and Misher, Kulchinsky, etc. [3]. The simulation of the resulting networks, which confirmed their performance.

References:
1. *Yampolsky L.S.* Neurotechnology and neurosystems / *L.S. Yampolsky*. – Kuiv.: Monograph. – «Dorado-druk», 2015. – 508 p.
2. *Dmitrienko V.D.* Hamming neural network for solving problems with several solutions / *V.D. Dmitrienko, A.Yu. Zakovorotny, S.Yu. Leonov*. – Bulletin of NTU «KPI». Series: Informatics and Modeling. – Kharkiv: NTU «KPI». – 2017. – № 50 (1271). – P. 119-129.
3. *Dmitrienko V.D.* Methods and algorithms of artificial intelligence systems / *V.D. Dmitrienko, I.P. Havina, A.Yu. Zakovorotny, M.V. Lipchansky, N.V. Mezentsev*. – Kiev: Kafedra, 2014. – 282 p.