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ENCODING OF NEURAL NETWORK MODEL EXIT SIGNAL, THAT IS DEVOTED FOR DISTINCTION OF GRAPHICAL IMAGES IN BIOMETRIC AUTHENTICATE SYSTEMS

Abstract. Article is devoted to a problem of enhancement of technologies of application of neural network models for recognition of graphic images in the biometric authentication systems. It is shown that a significant shortcoming of modern technologies is the insufficient efficiency of training neural network models, which is associated with the insufficient quality of statistical data processing. One of the important reasons of it is absence of correlation between the expected output signal of educational examples and closeness of standards of the recognized classes. It is offered to increase quality of educational examples due to use of the procedure of neural network coding of value of the expected output signal of educational examples which allows to consider closeness of standards of the recognized classes in this signal. The coding procedure of the expected output signal providing use of a probable neural network is developed. Feasibility of application of a probable neural network is defined proceeding from low resource intensity of its training. Besides, in its educational examples the expected output signal can be provided not by number, but the name of the expected class. The appropriate mathematical apparatus is created. As a result of numerical experiments it is shown that application of the developed procedure allows to reduce by 30-50% the number of the computing iterations necessary for achievement of the given error of training of a multi-layer perceptron which is basic neural network model for recognition of graphic images in the systems of biometric authentication. It specifies prospects of use of the proposed solutions for increase in efficiency of the neural network technologies applied in the systems of biometric authentication.

Keywords: neural network model, training, educational example, biometric authentication.

Introduction. The proved ability of neural network models (NNM) to effectively approximate multivariate table valued functions provided their broad application for recognition of graphic images in the systems of biometric authentication (SBA) [1-3]. Though the practical experience of use of the known neural network systems and the analysis of sources [4-20] specifies rather powerful scientific and practical practices in this direction, but the same analysis specifies also insufficient learning efficiency of NNM which are a basis of the specified systems. We will mark that in the modern SBA the greatest distribution was gained by NNM like a two-layer perceptron, a convolution and deep neural network. In fact these NNM are modifications of a classical multi-layer perceptron. Key parameters which define learning efficiency of such models is time and an error of training [7-10, 21]. Values of these parameters directly depend on quality of educational examples which in case of the given statistical selection shall be provided due to different processing procedures of statistical data [15, 17].

Results [4, 6, 7, 16, 19] demonstrate that the majority of approaches to processing of statistics assume performing procedures which only adapt parameters of educational examples to the look suitable for application in NNM. At the same time [8] specify data that to reduce time and an error of training it is possible due to reflection in the expected output signal of educational examples of closeness of standards