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APPLICATION OF NEURONETWORK
TECHNOLOGIES IN IP-TELEPHONY

Vyhovskyi M.S.
Institute of Telecommunication Systems,
National Technical University of Ukraine
" Igor Sikorsky Kyiv Polytechnic Institute "
E-mail: mvyhovsky@hotmail.com

ПРИМЕНЕНИЕ НЕЙРОСЕТЕВЫХ ТЕХНОЛОГИЙ В IP-ТЕЛЕФОНИИ

Рассмотрена возможность применения нейросетевых технологий в IP-телефонии. Основные этапы инженерной техники построения нейросетевых моделей выбираются на основе адаптивной нейронной сети.

The opportunity of application of neuronetwork technologies in IP-telephony has been considered. The basic stages of the engineering technique of neuronetwork models construction are selected on the basis of an adaptive neural network.

The basic feature of IP-Telephony is low cost of information transfer and use of the same channels for transferring the mixed traffic. For processing and analysis of initial data it is possible to use neural network (adaptive systems) as against expert systems they do not require beforehand known mathematical model. Neural networks have found application in those areas where it is necessary to solve problems of forecasting and management [1,2,4].

Application of neural networks is required, if traditional methods of solving a problem of forecasting and management do not give positive result, suitable to practical application. Or for solving a problem there are no known methods and algorithms. At the same time the initial data have implicit laws or the latent nonlinear dependences. To these conditions there corresponds technology of IP-Telephony. Qualitative granting services require a large amount of the initial data, the organization of constant supervision over behavior networks (monitoring), to reliability of the received data, methods and algorithms of their processing.

The analysis of jobs in the field of the control and diagnostics shows, that for application of neuronetwork technologies in IP-Telephony method Fault Detection and Identification (FDI), based on comparison of results of measurements of parameters of the network received with the help of system of monitoring with settlement parameters, calculated on mathematical model approaches [2, 5]. The basic stages of an engineering technique include the preliminary analysis of the data at a stage of production of a problem and a choice of architecture of a neural network; data processing for adjustment of adaptive system; a choice of algorithm of training, testing and the analysis of accuracy neuronetwork decisions.

For researching the application of neuronetwork technologies in IP-Telephony it is offered to use software product, carrying out classification of packages of IP-Telephony on the basis of an adaptive neural network.

In Figure 1 the structure of software product of modeling of a neural network which includes three basic functional blocks is shown: the interface of the user; the block of preliminary processing of statistics; the block of performance and the data processing, received on an output of a neural network.

The neural network carries out processing the information and passes result to the block of performance and processing the received data which will transform the received data from an output of a neural network to managing signals. The software is developed in programming language Delphi and will consist of the following program modules: NEURONET.dll; Set Net.pas; StatUnit.pas, TchUnit.pas; WorkUnit.pas; GrafUnit.pas.

Functions of the basic program modules are tabulated 1. All functions of software product are realized as classes. The neural network is realized as dynamic library NEURONET.dll.

Class NeuroNet - represents the general description of a network including the identifier, a kind of a network, purpose and scope, and also others most general characteristics. NeuroNet, realizes training a neural network by a method of return distribution of a mistake.

Library NeuroNet,allows:

- To train a multilayered neural network a method of return distribution of a mistake;
- To change parameters of training;
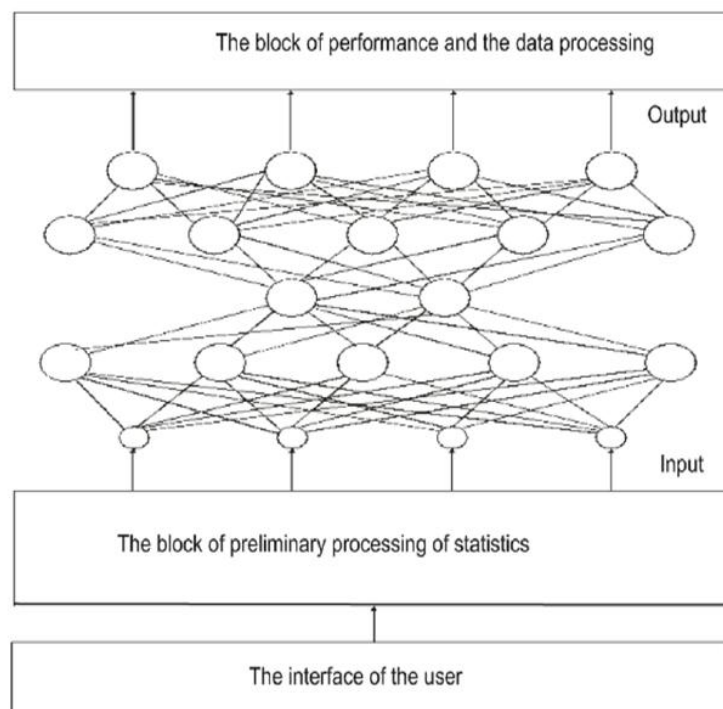- To save the trained network file.

Fig. 1. Structure of the software of algorithms of processing
IP-Telephony packages on the qualifier with a neural network.

Moduls	Functions	The classes realizing functions
NEURONET.dll	Creationa of a neural network	TEvent
SetNet.pas	Installation of a neural network in initial position	TSet_Net
StatUnit.pas	Processing in statistic	TStat proc, TStat calc
TchUnit.pas	Training of a neural network	TTeach
WorkUnit.pas	Classification of packages on the basis of a neural network	TProc_start, TAction, TFunc
GrafUnit.pas	Performance of the target information in a graphic kind	TGraf

Fig. 2. Functions of the basic program modules.

In quality activation functions neurons use sigmoid:

$$1 / (1 + exp(\alpha + NET)) \qquad (1)$$

Where α- a steepness of function; NET - the weighed sum of entrance signals and a threshold level neuron.

To increase the effectiveness of training neural network is applied:

- The schedule of training - speed of change of weight factors in regular intervals decreases on all a grade level from initial speed up to final;

- Inertian changes of weights- at correction of weight its change in the previous iteration is taken into account. It allows avoiding local minima. Structure NeuroNet - the structure containing the description of a neural network. The basic properties:

- Alpha - an alpha (a steepness of function of activation);

- Moment - the moment of inertia;

- StartSpeed - initial speed of training;

- FinishSpeed - final speed of training.

The offered variant of neuronetwork technologies for IP-Telephony assumes, that the system works in two basic modes. The first mode is used when the quantity of channels on which there come packages of IP-Telephony is known and limited. The second mode is used in the absence of such information. The software product can be used as the qualifier which is carrying out processing IP-telephony packages on the boundary router.

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