LEARNING AND OPTIMIZATION OF FEEDFORWARD NEURAL NETWORK BY MEANS OF MULTIAGENT GENETIC ALGORITHM

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Nowadays neural networks technologies are widely used in many fields: recognition of complicated visual objects of the real world (people faces on photos, moving objects), speech, written symbols, forecasting in business, economy, medicine etc.

Though, synthesis of a neural network for concrete tasks decision is a complicated procedure and id defined by such criteria as decision accuracy, number of recognition mistakes, time of learning, time of recognition etc. During neural network synthesis it is necessary to choose a network type, architecture (topology), learning algorithm and other parameters influencing quality criterion value. In the result of a synthesis a neural network is to be formed with given properties and able to solve given tasks. Major neural networks synthesis problems are the following: absence of formal choice methods of a neural network type corresponding to the class of tasks being solved, weak analysis of the points connected to automatic formatting of neural networks topology which in many cases does not allow to create neural networks of minimum complexity, insufficient validity of optimization methods choice during neural network learning which leads to big mistakes of forecasting.

One of the major tasks of the job is to suggest efficient methods of tuning and adaptation of a neural network for a concrete task. These methods are based on the optimization GA usage. In the suggested GA a multi-agent approach is used which allows to create simultaneously N populations $P_1^0, P_2^0, ..., P_N^0$, which are regarded as agents and develop independently one from another on the base of chosen strategy connected to different genetic operators and other GA parameters usage.

In this paper the main point about agents is that they are autonomous. Among main properties of agents is mobility - the ability of an agent to move and research the space; reactivity - provides an ongoing interaction with its environment and responds to changes that occur in it; ability to interact with other agents via some kind of communication; rationality - agents have directed behavior and will act in order to achieve their goals; learning/adaptation - agents improve performance over time.

Moment of interaction t_v between agents for proposed multi-agent genetic algorithm (MGA) is detected automatically. When t_v comes, agents exchange genetic information and then develop independently again. The norm of interaction (number of exchanged chromosomes) can be regulated so that every population could also create its “own” unique chromosomes.