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Simulation Model Tiav- Discrete-Continuous Media Education Processes

Beknazarova Saida Safibullayevna, Habibulloyev Doniyor Sa'dulloyevich

Professor of Tashkent University of Information Technologies named after Muhammad al- Khwarizmi

Researcher

ABSTRACT: The successful solution of problems of unification and normalization TIAV- discrete-continuous media education processes heavily depends on addressing the classification of objects media education process. To solve the classification problem can media courses adaptive neuro-fuzzy network, which are generated on the basis of fuzzy inference system.

Keywords: neuro-fuzzy network, TIAV- discrete-continuous media education processes, ANFIS

Adaptive neuro-fuzzy network, or hybrid networks on a plan of their developers are designed to combine the merits of neural networks and fuzzy inference systems. On the one hand, they allow you to develop and present a model system in the form of fuzzy rules of products which have clarity and simplicity of meaningful interpretation. On the other hand, for the construction of fuzzy rules products are used methods of neural networks, which is more convenient and less time-consuming process for systems analysts [4].

All information used to construct the network fuzzy inference system is contained in the set of training samples. Therefore, the quality of the network training depends on the number of examples, as well as on how well these examples describe the task.

Consider using a fuzzy inference system for solving the problem of classification, formation of training samples to generate a classification system sleeves using ANFIS and analyzed the accuracy of the system.

Fuzzy logic for classification tasks.

Classification media courses enables to increase the level of media education media courses; resolve questions of optimal variant class media courses.

Fuzzy logic - a generalization of the traditional Aristotelian logic to the case when the truth is viewed as a linguistic variable that takes the value "very true", "more or less true," "not false" and so-called These linguistic values are represented by "fuzzy sets" [4].

The classification problem consists in assigning the object specified by the vector of informative features $X = (x_1, x_2, \dots, x_n)$one of the classes described in advance$\{d_1, d_2, \dots, d_m\}$.

The classification corresponds to the mapping of the form: $X = (x_1, x_2, \dots, x_n) \to y \in \{d_1, d_2, \dots, d_m\}$.

Classification must fuzzy knowledge base of the form:

$$\text{If } x_1 = a_{1,j1} \text{ и } x_2 = a_{2,j1} \text{ and } \dots \text{ and } x_n = a_{n,j1};$$
$$\text{or } x_1 = a_{1,j2} \text{ and } x_2 = a_{2,j2} \text{ and } \dots \text{ and } x_n = a_{n,j2};$$
$$\text{or } x_1 = a_{1,jt} \text{ and } x_2 = a_{2,jt} \text{ and } \dots \text{ and} x_n = a_{n,jt};$$
$$\text{than } y = d_j, j = \overrightarrow{1,m}, \text{ with some degree of certainty.}$$

Where $a_{1,jt}$ — fuzzy term that evaluates the variable x_i in rule with the number $jt, t = \overrightarrow{1,k}; k_j$ — number of rules that describe the classd_j.

Membership degree of the object$X^* = x_1^*, x_2^*, \dots, x_n^*$ Classes media courses calculated by the formula:

$$\mu_{d_j}(X^*) = \max_{t=\overrightarrow{1,k_j}} \min_{i=\overrightarrow{1,n}} \left(\mu_{jt}(x_i^*)\right), \qquad j = \overrightarrow{1,m}$$

where $\mu_{jt}(x_i^*)$ -membership function of the input$x_i$fuzzy terms $a_{i,jt}$

As a solution to choose the class with the maximum degree of membership:

$$y = \max(\mu_{d_1}(X^*), (\mu_{d_2}(X^*), \dots, (\mu_{d_m}(X^*))$$

The hybrid network as adaptive neuro-fuzzy inference (ANFIS).

The hybrid network is a multilayer neural network is a special structure without feedback, which uses a conventional (non fuzzy) signals, the weights and the activation function.

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The basic idea underlying the model of hybrid networks is to use the existing sample data to determine the parameters of membership functions that best match a fuzzy inference system. To find the parameters of the membership functions using known procedures for training neural networks.
On the one hand, the hybrid network ANFIS represents a neural network with a single output and multiple inputs, which represent fuzzy linguistic variables. In this case the terms of the input linguistic variables describes the standard functions of accessories, and the terms of the output variable is a linear or constant function accessories.
On the other hand, the hybrid network ANFIS is a fuzzy inference system FIS (fuzzy inference system) Sugeno [4].Решениезадачиклассификациймедиакурсовсиспользованием ANFIS.
In a computing environment MATLAB integrated dozens of packages of applied engineering and math programs, one of them is the Fuzzy Logic Toolbox, which supports all phases of the development of fuzzy systems, including synthesis, research, design, simulation and implementation of real-time [4]. Functions package implements most modern fuzzy technologies, including fuzzy logic, fuzzy clustering and adaptive neuro-fuzzy setting (ANFIS).

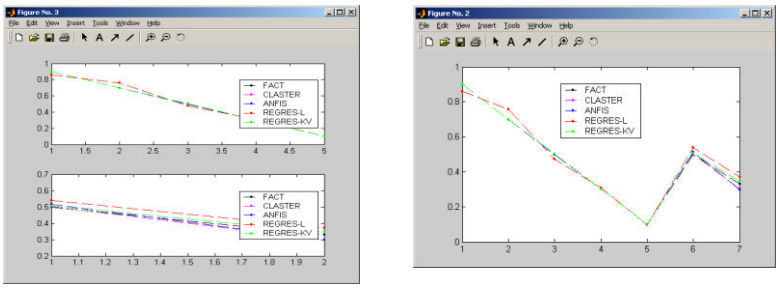

Fig.1 Editor window of hybrid systems.

Editor neuro-fuzzy network (ANFIS Editor) allows you to automatically synthesize data from experimental neuro-fuzzy network and configure them. The graphical interface of hybrid neural systems from the command window function anfisedit. Execution of function leads to the appearance of the editor of hybrid systems, the type of which is shown in Figure 1.

With the editor, made the creation or loading structure of the hybrid network, view the structure, setting its parameters, quality operation of that system. Creating a structure, configuration parameters, and verification are carried out on samples (data set) - Training (Training data), a check (Checking data) and testing (Testing data), which shall have been presented in the form of text files (with .dat extension and tab-delimited), which correspond to the first column of the input variables, and the last - the only output variable.

Training sample will be used in the process of setting the fuzzy inference system for classification.
Data is recorded in the file*m_p.dat*.In the Load data (download data) Training and choose file, clicking the Load Data ..., load the file m_p.dat.

Then mode Generate FIS (creating a fuzzy system output) select Grid partition, press the button Generate FIS ..., a window function setting accessories. For each input parameter selects pimf - pi-like membership function, and as a function parameter set to create six terms for each input variable. The membership function of the output variable is assigned as a constant.

Next we define a learning mode (Train FIS). We will not change the default method Asked settings (hybrid - hybrid) and the level of error (0), but the number of training cycles define sufficiently large. Get results in a graph of network errors, depending on the number of cycles spent learning is presented in Figure 2.
Effect of training samples to the learning process of adaptive neuro-fuzzy networks (NN).

In preparing the solution of the problem on the NA is not always possible to determine exactly how much and what kind of input data must be submitted to the input during training. In case of lack of data network can not learn the solution of the problem. The problem is compounded by the fact that in most poorly formalized areas of human activity expert often can not tell exactly what data are important. Therefore, usually the input of the network is served by a redundant set of data. To reduce training time and improve the quality of work of the National Assembly is required to

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determine what data are needed for a particular purpose. Furthermore, during the solving of this problem are defined significance of the input signals, which in many domains is an independent value [1].
In the selection of data for the NA should consider the following facts:
• when solving real-world problems using the NA is often difficult to establish a link with the output index data available, so spend collecting as many data;
• the correlation between the data does not allow for their ranking and therefore can not use a simple algorithm to reject in order of importance.
• In order to reduce the effect of the factor "very large dimension", often simply removed a number of variables; with the possible removal of which carry important information.
To ensure that you receive only useful (informative) data necessary to perform a large number of sorting data sets and architectures of the National Assembly. However, it is practically difficult to implement even in the presence of powerful and effective neyrons, figure 2 [1].

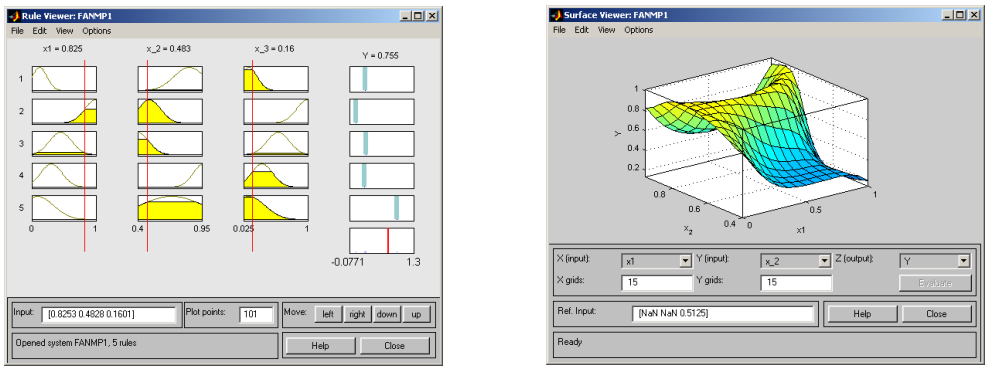

Fig. 2. Graphics of TIAV- discrete-continuous media education processes on

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