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Mathematical Model of Interaction of MTT Information Processes Production

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Abstract: A mathematical model that describes the interaction of educational process management tools with the knowledge base, without the parameters of the matching model. Adaptation describes the learning process by taking adaptation parameters, learning process adjustment, learning process completion model to the learning process completion model. A suitable knowledge base is obtained from effective algorithms in the implementation method. For example, if semantic management is used to represent the knowledge base of an adaptive system, the adaptation model can be based on graph theory algorithms.

Keywords: object, modeling, dynamic, identity, functional, data.

An information process is a set of sequential actions (operations) carried out with information (in the form of information, data, facts, ideas, hypotheses, theories, etc.) to achieve a result (achieve a goal) [6].

MTT in the field of information technology is a complex object that includes many separate subsystems. Each of the subsystems is a separate information process. At each stage of the study, a large amount of data is collected, processed and collected. It is necessary to develop a mathematical model of the interaction of information processes. This model allows for the structure of the data used during the operation of the system, as well as for predicting the state of the system at any stage of training by changing the input data.

The first stage of modeling is to determine the nature of the interaction of the system with the external environment. For this, it is necessary to determine the input and output parameters of the system.

These effects are divided into three groups:

1. educational standards requirements;
2. labor market requirements;
3. Graduate parameters.

Within the interaction of each student with the system, these effects are divided into static and dynamic. Static requirements include standards and labor market requirements, because these requirements do not change during the educational process. A learner's parameters are dynamic because they change during the learning process.

We call the set of values of input effects realized during the entire life of the system as the input process and denote it by Xt, then

$$X_t = \{x(t) : t \in T\}.$$

The set of input effect values should be divided into two subsets: Xt, as mentioned above,

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XD is a set of values of dynamic effects that have different values at each moment of time t;

Xs is a set of static exposure values that do not change throughout the training period.

$$\text{And so,} X_t = \{X_D, X_S\}.$$

We call the set of values of the output effect realized during the entire operation of the system as the output process and define it as follows.

Yt, then

$$Y_t = \{y(t) : t \in T\}.$$

There is a relationship between the input and output parameters of the system, which we write in the form of an equation

$$A(T, X_t, Y_t) = 0. \qquad (1)$$

For example, as you can see from the input and output parameters above, the graduate's identification information, input to the system, allows the content of the graduate's personal profile to be output. Such dependence of input and output parameters within the distance education system is clearly visible in the technology of implementation of client-server "request-response" programs. This technology ensures the behavior of the system located on the server, which is determined by the parameters entered by the graduate.

However, there is not always a direct relationship between the input and output parameters of a system. Often, an incoming input parameter changes an internal property of the system, which is used for its further operation

We denote by $z(\xi)$ the set of internal properties of the system determined at time ξ and take into account in (1), they have the following form

$$B(T, z(\xi), X_t, Y_t) = 0 \qquad (2)$$

The appearance of $z(\xi)$ in the equation serves one purpose - to provide a clear connection between Xt and Yt. By its very meaning, $z(\xi)$ represents a set of existing properties of the system, the knowledge of which allows us to determine its future behavior at the present time.

We rewrite equation (2) in the following form:

$$Y_t = G(T, z(\xi), X_t), \qquad (3)$$

Where G is the output operator;

This view of the system is more convenient because it allows you to define the output parameters of the system.

It follows from equation (2) that at any time the system is in a certain state, so equation (3) can be written for any $\xi = t \in T$ and is part of the output process.

And so,

$$Y_{t\eta} = G(t\eta, z(\xi), X_{t\eta}), \qquad (4)$$

Above, we noted that the state of a system is a set of its internal properties. Let's express the state space in the form of the Cartesian derivative.

The functional model of MTT reflects the interaction between system components and the process of converting input data into output data. According to the IDEF0 standard of functional modeling, the input and output data, standards and rules for each process, as well as the resources necessary for the progress of these processes, are defined. In the course of MTT activities, standards and regulations are educational standards, labor market requirements, and standards for the operation of distance education systems.

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