MATHEMATICAL MODEL OF THE EDUCATIONAL COMPETENCES FORMATION IN THE INTELLECTUAL SEARCH

Khaperskaya A. V.
Tomsk Polytechnic University
haperskaya@tpu.ru

Introduction

Semantic analysis is not a simple mathematical problem, despite the fact that he is in demand in virtually all areas of human life. The challenge is learning the computer to recognize and correctly interpret images that the user is trying to convey. The human being is a very complex information system - to a certain extent this is determined by highly developed in humans the ability to recognize images. The image is a description of the object. Natural language was formed largely chaotic in contrast to algorithmic languages. For this reason, there are a number of difficulties in understanding and recognition of the text [1]. So much for the development of any program through which will be the semantic analysis of the data or pattern recognition, it is necessary to start with the mathematical apparatus of decision making and system analysis.

Simulation of the formation of competencies in a dynamic environment

The formation of management competencies can not be considered effective without considering it in the context of a mathematical model, comparing the results with the expected, formed an effective system of measures and assessment of performance takes place. The basis of the developed model are the following statements:

- The individual competence of the formation occurs exclusively in the process of purposeful activity. Consequently, the process of formation of competences can be considered dynamic.

Of the basic provisions of the optimal process control theory that the mathematical model includes components such as: differential connection, the phase coordinates, controls, restrictions, circuit model of decision-making units.

In this study, the phase coordinates are certain level of knowledge and competence level of the student's desire to enhance its competence.

Let

t - time, days from the beginning educational moment;

n - the number of definite competences;

$x_i(t)$ - the degree of personal competences in the i direction in t moment;

$M(t)$ - the degree of striving to any activity which increase it competence.

We will consider the level of competence relative value, ranging from 0 to 1, where 0 represents absolute incompetence and unit - to achieve the highest possible level of competence:

$$0 \le x_i(t) \le 1, \quad i = 1,...,n \qquad (1)$$

We introduce that evaluates the overall competence of the person. To do this, you must "roll up" evaluation in various areas of expertise in a single number. Various methods such coagulation are considered in the theory of multi-criteria optimization. The simplest of these is the so-called linear convolution [2]

$$X(t) = \sum_{i=1}^{n} c_i x_i(t), \qquad (2)$$

where the weights c_i

$$c_i \ge 0, \quad \sum_{i=1}^{n} c_i = 1, \qquad (3)$$

it shows the relative value of different areas of expertise in training professional profile.

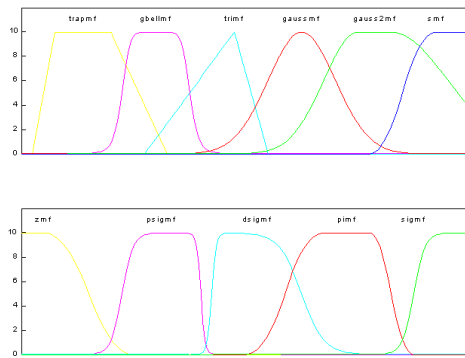The personal level activity $M(t)$ is measured in an hour per day.

Go to the control description. If we take the k like as the number of types of tasks that develop a particular competence and $m_j(t)$ it is search of j (type of activity in moment t), $j = 1,...,k$ we obtain the degree of commitment to the activities of the student, leading to an increase in its competence:

$$\sum_{j=1}^{k} m_j(t) = M(t) \qquad (4)$$

Usually, skills accumulation rate is proportional to:
1. The intensity of solutions of tasks that affect the formation of competence;
2. Predisposition trainee to solve these kinds of jobs, which are specified in paragraph 1.;
3. To reach the level of competence;
4. Scope has not yet mastered the training component.

It should be borne in mind that the effect of the competence that was available - co-rotational. Thus, such a system can be considered legitimate. Activities of trainees is not discrete and is complex and can not be selectively directed to any one element of competence. It follows that, on the one hand, the higher the skill level of the student, the more efficient operation of reference and therefore its effect on the overall growth competence. But, on the other hand, the higher the competence of the student, the greater part of the competencies they have mastered and the number of undeveloped elements of an integrated system becomes less and they have to be excluded from it. In other words, the practical working efficiency is increased, and its educational efficiency drops. It is a bi-directional impact of the current competence leads to the fact that the competence of the curve of growth in the course of business is S-shaped, as shown in Figure 1.

Picture 1. Bi-directional impact of the current competence of Matlab tools

After analyzing the above we can come to a system of ordinary differential equation:

$$\frac{dx_i}{dt} = (\sum_{j=1}^{k} \beta_{ij} m_j) x_i (1 - x_i) \quad i = 1,...,n \quad (5)$$

где β_{ij} - th coefficient of influence of activity on the j th formation of the competence of the j th direction.

The rate of change is proportional to the activity of the individual depends on the motivation for the development of expertise, content and results of operations and their evaluation of the company (Incentive), and is limited by fatigue.

A number of activities requires resource support (enough seats in the library, the bandwidth of Internet access, the number of supervisors and so forth.). It is therefore necessary to include in the model series of the type of restrictions, for example:

$$\sum_{j=1}^{k} \tilde{m}_j^q(t) \le R^q(t) \quad q = 1,...,Q$$

$$\sum_{j=1}^{k} R_j(t) \le R_{max}(t)$$

$$\sum_{j=1}^{k} R^q(t) \le R^{max}(t)$$

etc.

Results

The paper substantiates the need to develop a mathematical model of the formation of competencies for building a semantic core, which in turn, is necessary to provide intelligent search assignments for the development of competencies. Detailed description of the static and dynamic variables of the process of formation of competences. Are principles of the different models when changing its parameters? Stages of construction of mathematical models of formation of competences. These later models will be designed to provide intelligent search assignments for the development of both personal and professional competences

Conclusion

Development of a mathematical model of the formation of competencies is an important part for the implementation of an automated job search engine for the development of competencies. In addition to the social aspect, you must take into account the mathematical apparatus, which gives an insight into the implementation and systematization of jobs that need to be trained for the development of a competence. As well as the creation of semantic nucleus is impossible without data analysis system, without major aspects of decision-making, as well as mathematical modeling of real processes

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