UDC 378.1

Victor Porev.

THE METHODOLOGICAL BASICS OF INTELLIGENT SOFTWARE SYSTEM FOR CURRICULUM DESIGN

The article considers some aspects of building an intelligent information system to support the learning process. The architecture of intelligent computer software system for this subject area is offered and some elements of the system are considered.

Key words: analysys, intellectual information system, neural networks, support of educational process.

Fig.: 3. Bibl.: 6.

Relevance of the research topic. The rapid pace of development of society requires an appropriate response and improvement of educational activities. Computer systems that implement the latest methods of analyzing large amounts of information can greatly help in this.

Formulation of the problem. The development of adequate curricula requires taking into account both the experience of past years and the rapidly changing requirements of today. All this necessitates the processing of large amounts of information and computer modeling of educational activities. In recent years, more and more artificial intelligence tools are appearing, which could be used in the field of planning and management of educational processes. But the problem is the invention of an appropriate machine learning methodology in this area.

Actual scientific researches and issues analysis. It can be said that in most publications devoted to learning support systems, systems based on database management platforms dominate. The main purpose of such systems is the storage and accumulation of curricula [1, 2]. Significantly fewer publications on systems with elements of automated curriculum development, in particular [3]. In recent years, research has appeared on intelligent systems to support the learning process [4]. The article [5] proposed the structure of the system for planning the educational process and developing educational programs and curricula. An algorithm for designing sequences of teaching disciplines based on the model of interdependencies of these disciplines is presented. In [6] the concept of time portrait was proposed to describe the student's success and to analyze educational activities using neural networks of time series analysis.

Uninvestigated parts of general matters defining. Aspects of using data mining systems to plan and support educational activities are unexplored.

The research objective. The main tasks are to develop the principles of operation, build the architecture of the intelligent system and study the methodological aspects.

The statement of basic materials. Like any perfectly complex system, an intelligent system to support educational activities must be hierarchical. The following levels can be distinguished: the level of an individual student, the level of a teacher, the level of a department, the level of a faculty and the level of a university. At the student level, there is an individual student plan, tasks for the student, his success, perception and feedback. At the level of the teacher there is a management of work of students, the analysis of their success. In addition, the teacher must compile programs of disciplines and provide information at the top level. One type of such information is expert opinion on the sequence of teaching disciplines. Then it will be possible to build a graph of the sequence of studies in the specialty, which will be the basis of the information model of the educational program and curriculum (Fig. 1).

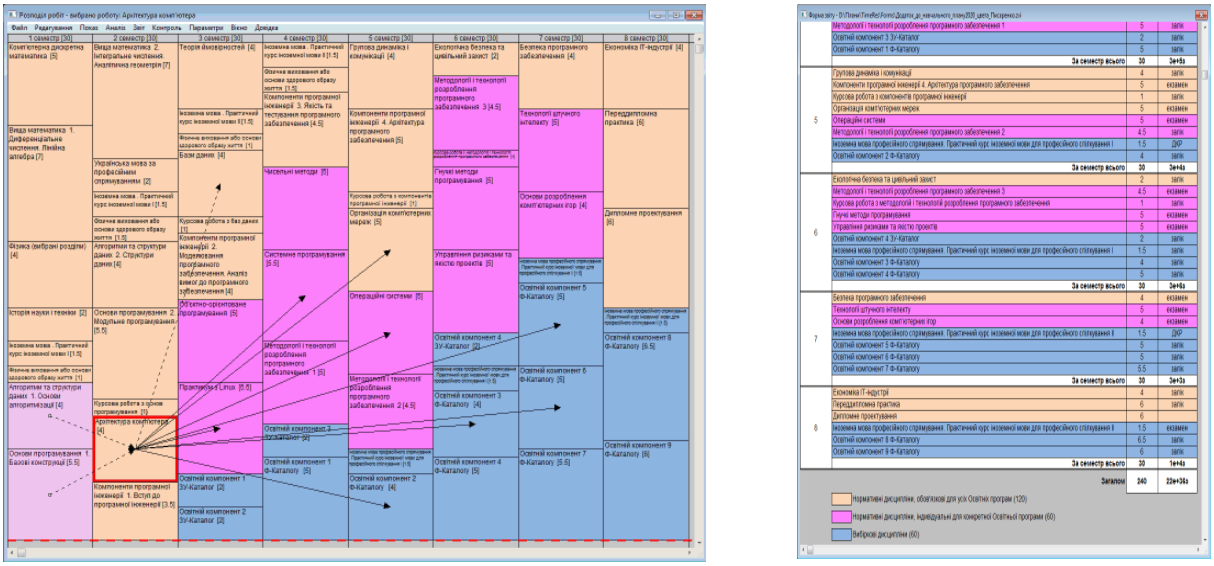

Fig.1. Diagram of interrelations of disciplines and disciplines list

In [5] the algorithm of the automated coordination of disciplines which was realized in the module of software system was resulted.

Appropriate software is used at each level of the hierarchy. Desktop systems are commonly used to develop curricula and educational programs. At the teacher level, the use of mobile systems is promising. They are very convenient for current control and can also be successfully used for initial data processing and analysis (Fig. 2).

The diagram below shows the teacher's workload under normal conditions and in COVID-19 quarantine conditions.

It is important to keep the time of each event, in particular, the time of each assessment. Storing such information makes it possible to use methods of time series analysis, including using neural networks. Convolutional neural networks are promising for solving such problems.

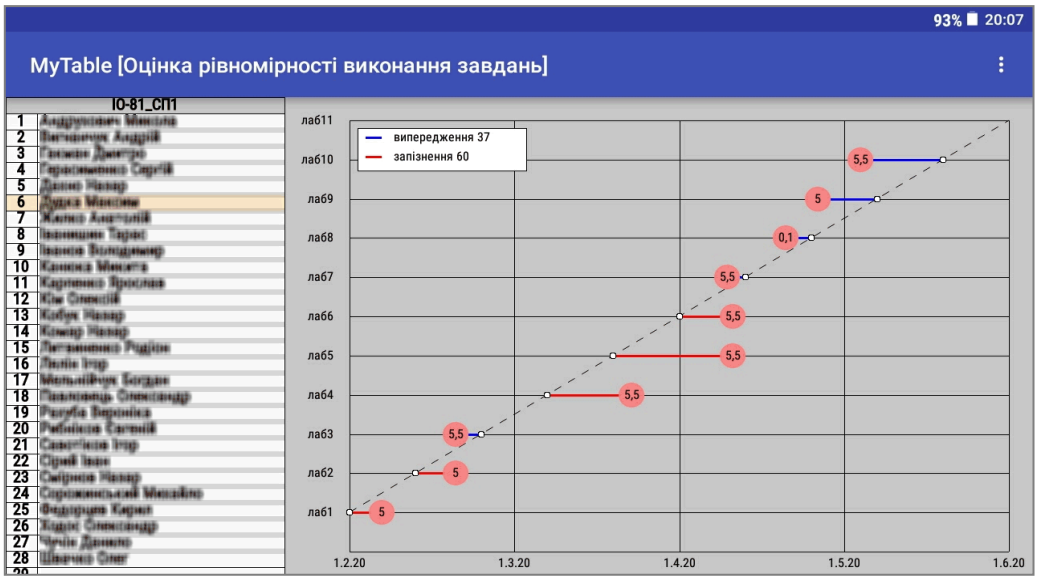

Fig. 2. Example of analysis of time series of student progress on a mobile platform

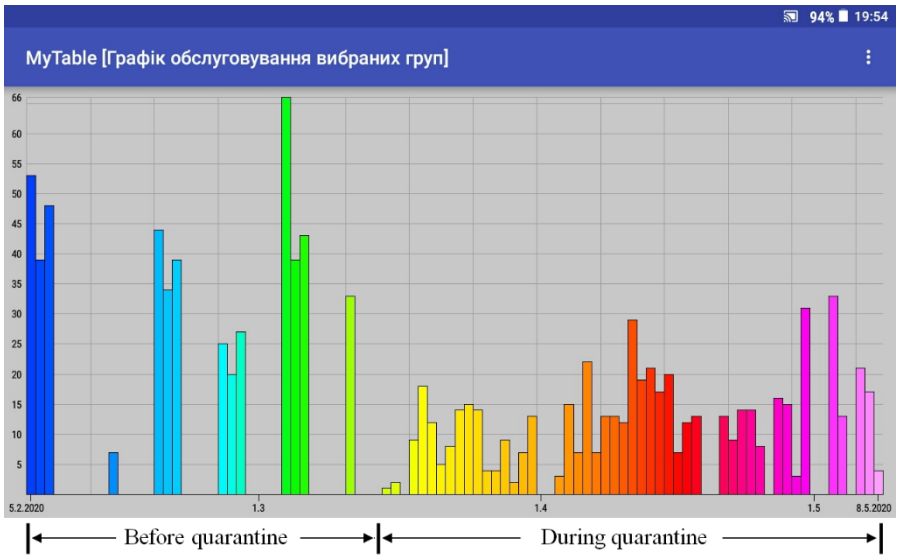

Fig. 3. Analysis of the teacher's workload by days

Conclusions. The main aspects of the organization of an intelligent information system to support the educational process are considered. A methodological basis for building elements of a computer intelligent information system is proposed. Examples of realization of separate functions of system of support of educational process are given.

References

1. АІС "Навчальні плани". КБІС НТУУ "КПІ". URL: http://kbis.kpi.ua/kbis /index.php?option=com_content&task=view& id=84&Itemid=91

2. ПОЛІТЕК СОФТ. Програмне забезпечення для вищих навчальних закладів. URL: http://www.politek-soft.kiev.ua/

3. Медовая Е.В. Автоматизация процесса создания учебного плана в ОНАПТ // Автоматизація технологічних і бізнес-процесів. _ 2014, Том. 6, С. 151-154, URL: http://www.journal-atbp.com/journals/atbp20.pdf

4. Казмина И.И., Нужнов Е.В.. Интеллектуальная поддержка образовательных процессов на уровне специальности (профиля) // Открытое образование. – 2013. – №6. – С.80-84.

5. Порєв В.М. Алгоритмічні аспекти автоматизованого проектування навчальних планів // Вісник НТУУ ”КПІ”. Сер. Інформатика, управління та обчислювальна техніка. – К.: ВЕК+, 2016. – № 64. – С.84-89.

6. Victor Poriev. Some aspects of building an intelligent software system to support educational process // Proc. of the International Conference ICSFTI2018, Kyiv, Ukraine, May 14–15, 2019. pp.15-22

AUTHORS

Victor Porev – associate professor, Department of Computer Engineering, National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”.

E-mail: v_porev@ukr.net