ABSTRACT

Explanatory note size – 147 pages, contains 48 illustrations, 22 tables, 4 applications, 31 references.

Topicality. The task of scheduling classes in higher education institutions has been the subject of numerous studies over many years. In general, this problem is NP-complete, and in some cases, it is NP-hard; hence, the complexity of an exact algorithm is practically equivalent to exhaustive search. That's why all the methods practically used for solving the task of scheduling classes in higher education institutions are approximate or heuristic. Consequently, the issue of improving the efficiency of the methods and their software implementations is relevant.

The aim of the study. Improving the efficiency of scheduling classes in higher education institutions through the formulation of a task corresponding to an efficient schedule; creating a method and software for its solution; as well as simplifying the integration of developed software tools into the overall information system of the higher education institution.

The object of research: methods and software tools for scheduling classes in higher education institutions.

The subject of research: the process of designing and developing a cross-platform software library that efficiently implements a modified genetic algorithm for solving the new formulation of the task of scheduling classes in higher education institutions.

Tasks addressed in the work.

To achieve the goal of the study, the following tasks need to be addressed:

– analysis of existing methods and software tools for scheduling classes in higher education institutions;

– development of a new formulation of the task of scheduling classes and a corresponding formal model;

–   modification of a genetic algorithm for solving the formulated task and its software implementation;

–   design, development, and implementation of a cross-platform software library for scheduling classes in higher education institutions. This library should be invariant to the specific formulation of the scheduling task and the method of its solution. It should also include the implementation of the modified genetic algorithm for scheduling classes in higher education institutions.

The scientific novelty.

For the first time, an architecture for a cross-platform software library and its universal programming interface is proposed to automate the solution of scheduling classes in higher education institutions. This architecture allows for easier integration into the overall information system of the higher education institution. It is based on the developed original formulation of the scheduling task, which corresponds to an efficient schedule, and the created modified version of the genetic algorithm for its solution.

The practical value. The developed cross-platform software library can be utilized as a ready-made component during the development of information systems for higher education institutions or for integration into existing systems. Additionally, it becomes possible to create custom implementations of the library's general interface, allowing the open-source community to generate diverse implementations and share them. The developed cross-platform software library is invariant to the specific formulation of the scheduling task and the method of its solution.

Relationship with working with scientific programs, plans, topics. Work was performed at the Department of Informatics and Software Engineering of the National Technical University of Ukraine «Kyiv Polytechnic Institute. Igor Sikorsky».

Approbation. The scientific provisions of the dissertation were tested at the following conferences:

–   V International Scientific and Practical Conference of Young Scientists and Students «Software Engineering and Advanced Information Technologies

(SoftTech-2023)» dedicated to the 125th anniversary of Igor Sikorsky Kyiv Polytechnic Institute. Section of the Department of Informatics and Software Engineering. December 19-21, 2023. Kyiv: 2023;

– IV All-Ukrainian Student Scientific Conference «Scientific Space: Analysis, Current State, Trends, and Perspectives» Section: Computer and Software Engineering. December 15, 2023. Ivano-Frankivsk, Ukraine.

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– Pavlov O.A., Kemarskyi M.O. Architectural Solution for Scheduling Classes in Higher Education Institutions. Materials of the IV All-Ukrainian Student Scientific Conference «Scientific Space: Analysis, Current State, Trends, and Perspectives» Section: Computer and Software Engineering. December 15, 2023. Ivano-Frankivsk, Ukraine.

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