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PROGRAM FOR PRACTICAL STUDYING OF GRAPHS

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This paper describes a program that was written to help students better learn the material on the graph theory. The article also contains a summary of the graphs, some algorithms and graph theory.

In mathematics and computer science, graph theory is the study of graphs which are mathematical structures used to model pairwise relations between objects. A "graph" in this context is made up of "vertices" or "nodes" and lines called edges that connect them. A graph may be undirected, meaning that there is no distinction between the two vertices associated with each edge, or its edges may be directed from one vertex to another. Graphs are one of the prime objects of study in discrete mathematics [1].

Discrete mathematics is the study of mathematical structures that are fundamentally discrete rather than continuous. In contrast to real numbers that have the property of varying "smoothly", the objects studied in discrete mathematics – such as integers, graphs, and statements in logic – do not vary smoothly in this way, but have distinct, separated values [3]. Discrete mathematics therefore excludes topics in "continuous mathematics" such as calculus and analysis. Discrete objects can often be enumerated by integers. More formally, discrete mathematics has been characterized as the branch of mathematics dealing with countable sets [3] (sets that have the same cardinality as subsets of the natural numbers, including rational numbers but not real numbers). However, there is no exact definition of the term "discrete mathematics" [4]. Indeed, discrete mathematics is described less by what is included than by what is excluded: continuously varying quantities and related notions.

The set of objects studied in discrete mathematics can be finite or infinite. The term finite mathematics is sometimes applied to the parts of the field of discrete mathematics that deals with finite sets, particularly those areas relevant to business.

Graphs can be used to model many types of relations and processes in physical, biological, social and information systems. Many practical problems can be represented by graphs [2].

In computer science, graphs are used to represent networks of communication, data organization, computational devices, the flow of computation, etc. For instance, the link structure of a website can be represented by a directed graph, in which the vertices represent web pages and directed edges represent links from one page to another. A similar approach can be taken to problems in travel, biology, computer chip design, and many other fields. The development of algorithms to handle graphs is therefore of major interest in computer science. The transformation of graphs is often formalized and represented by graph rewrite systems. Complementary to graph transformation systems focusing on rule-based in-memory manipulation of graphs are graph databases geared towards transaction-safe, persistent storing and querying of graph-structured data [2].

There are some algorithms for working with graphs. They are:

1) Dijksta's algorithm;
2) Floyd-Warshall algorithm;
3) Kruskal's algorithm;
4) Prim's algorithm;
5) Depth-first search;
6) Nearest neighbor algorithm.

The essence of our program lies in the practical study of algorithms working with graphs. The algorithm for study is selected in the program, and after the generation of a graph, the program gives the tips that the user

needs to solve the task by having chosen earlier algorithm. Also in the program, there is a test mode with disabled tips, but there is a time limit for the solution of the task, and by the end of solving the task the number of errors and the full course of solutions are shown.

In the program includes both the generation of a task with a certain level of complexity and the loading of a previously created task.

The screenshot of the program is shown in Figure.

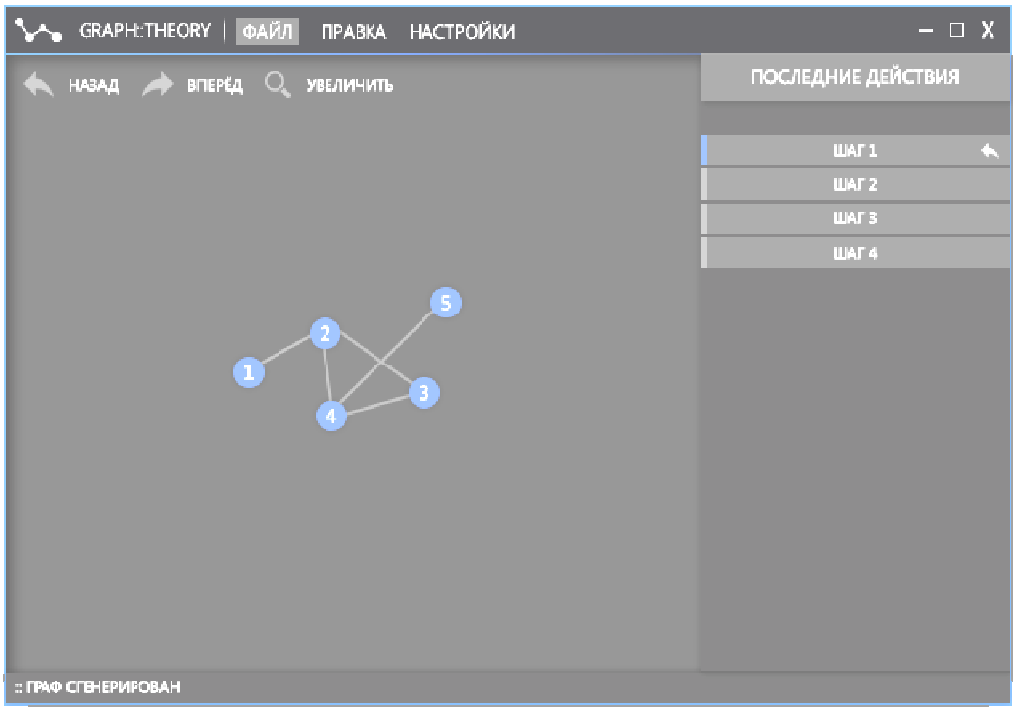

Fig. Screenshot of program

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IMITATION OF THE BREATHING APPARATUS OPERATION ON CHEMICALLY BONDED OXYGEN AFTER THE CHANGES IN ITS OPERATION MODE

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Recordkeeping of the initial clogging of the regenerative cartridge [1, 2] is necessary to imitate real situations that arise at the exploitation of the mine rebreather. Among them are the following items: the change of the air filtration rate at the variation of work load, reverse of the air flow if there are pendulum or combined junctions of the airway, and so on.

In this paper we will consider the operation of the breathing apparatus after the change in its operation mode due to the decrease in the filtration rate of the air recovered. Since in the problems considered a new