

***E-LEARNING SUPPORT FOR SOLVING
OF SELECTED PROBLEMS OF GRAPH THEORY***

Petr Zach, Josef Holoubek, Pavel Kolman

Abstract

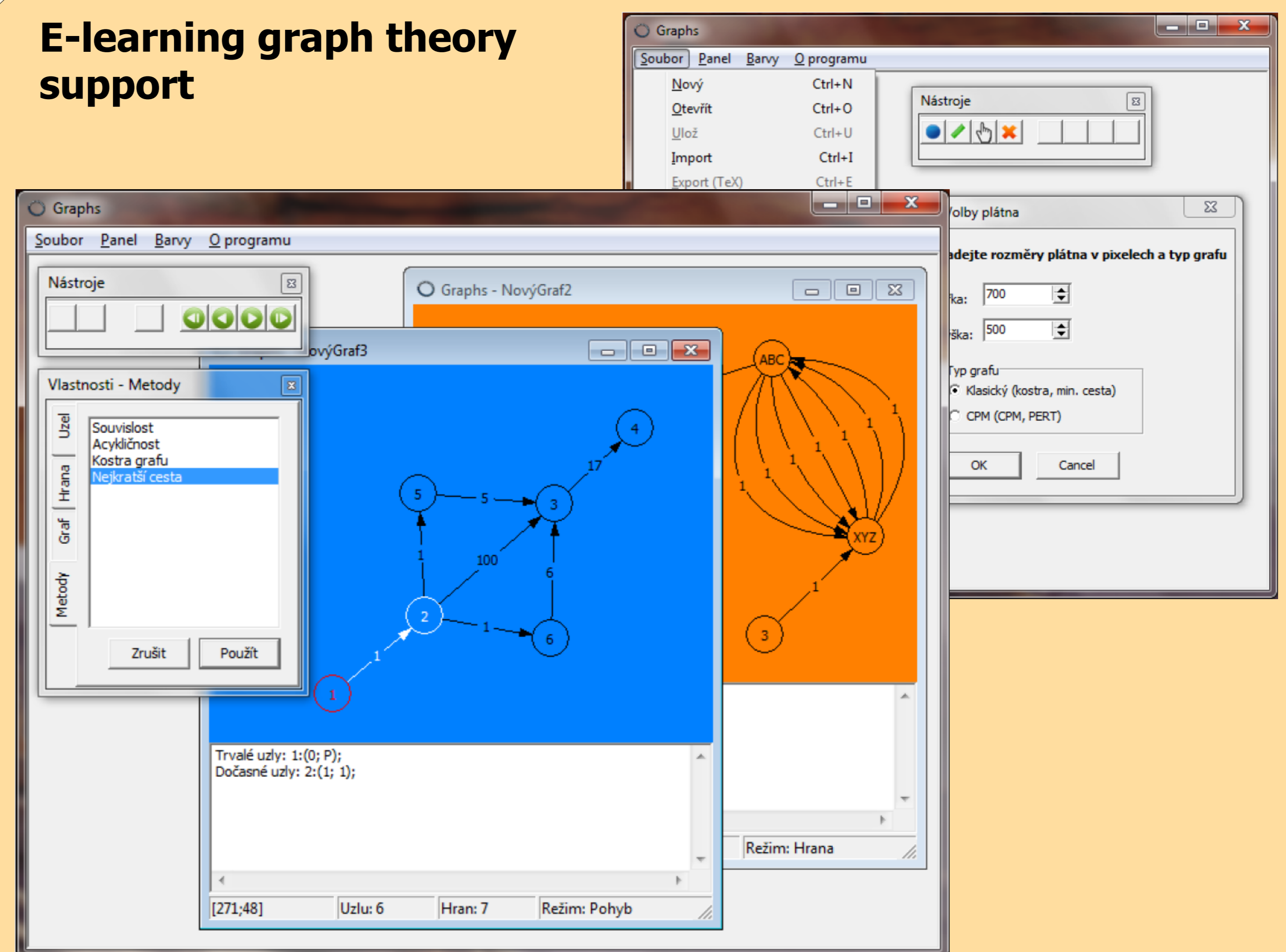
This paper provides current information about particular results authors have achieved during a few years of supporting students of the course of Economic and Mathematical Methods (EMM). The authors reflect existing mainly positive experience from the students who have finished the EMM course and are trying to use their proposals to improve and extend offered e-learning support. According to responses of students it seems the e-learning support really improves effectiveness of students' work, gives them positive motivation to work and proves practical usage of obtained knowledge. From this point of view the results fulfill expectations of authors they had at the beginning of the project. One of particular parts of EMM course contains solving of various problems in graph theory. For those purposes authors have prepared 7 animated executable programs in Adobe Flash CS3. The authors were inspired by papers of Czech and foreign authors presented at conferences and published in papers. The main disadvantage of animated and commented e-learning support according to both the authors and students is the fact that they contain only one example. That is the reason why the authors decided to eliminate this disadvantage. The elimination will be realized within a newly obtained FRVŠ grant. The goal of the authors is to enable for students to make their own graph describing a concrete problem and then to use this program to find an optimal solution of the problem.

Introduction

The application, which is the topic of this paper, should allow students to verify solving of any graph theory problem within the scope taught at FBE Mendelu Brno. This tool allows users to make any graphs, make changes in this graph, save it for next work or load a graph from a file. The tool will further enable a set of algorithms usable in this type of graph and also will show to user, step by step, individual iterations of a chosen algorithm in the graph.

In public domain on internet there exist some online projects, which in a manner fulfill incoming application requirements, but program that fully satisfies requirements of Department of Statistics and Operation Analysis, is not known. The main problem of available applications is, that they describe graph theory from mathematical point of view, but EMM applications should explain graph theory as a tool for economic problems analysis.

E-learning graph theory support



Results

Described tool offers effective creation, modification and saving any graph structure (with maximal number of nodes limitation in amount of thousands nodes), manually (i.e. with computed mouse) or by loading incidence matrix from input file. On this graph is able to solve step by step given problem while using chosen algorithm. In each step is user informed about actual algorithm status. If a students decide to terminate step-by-step calculation of this algorithm, they can return to modification of the graph or they can make a new window with the canvas and work with a new graph. This is the big advantage of the program, because it allows working with different algorithms at the same time. It is possible to easily increase a number of available algorithms in the future. If needed, application is able to generate output of this problem in portable file format.

Elaborated with support of FRVŠ 2646/2012 grant.

Conclusion

This paper is dealing with present FRVŠ grant output, where the solvers are trying to make a tool which would increase study effectiveness of EMM course at FBE Mendelu in Brno. The prepared application will be accessible to all students of the mentioned course. They can use the application for their graph theory study. The application allows students to make any graph and apply on it any possible algorithm that is available, furthermore solve it step by step from the first to the last step. The authors expect that the application will help (mainly to the part-time form of study students) understand graph theory algorithms. Following semesters will show whether this application increases their study effectiveness. The goal of this paper is to acquaint interested persons with actual results of FRVŠ grant 2646/2012.