Literature Survey

University Admit Eligibility Predictor

Domain	Applied Data Science
Batch	B5-5M1E
Team ID	PNT2022TMID50648
Team Members	1)Ramya Devi P 2)Pushpa Ragavi D 3)Jenisha J 4)Malarvizhi A 5)Kamala Jothi Lingam M J

Paper 1: College admission problem for university dual education.

Publication Year : 2015

Author : Rita Fleiner, András Ferkai, Péter Biró

This Paper deals with the Dual form of higher education training exists in Hungary since 2015. Students in a dual university programme complete their theoretical study at the university and participate in practical trainings at designated companies. In this paper we analyse the current recruitment process of the dual training, its relation to the classical and generalised stable matching problems. Possible alternatives for the current procedure are explored and a web application supporting the dual college admission procedure is presented.

Paper 2: Integer programming methods for special college admissions problems.

Publication Year : 2018

Author : K.Cs. Ágoston, P. Biró, and I. McBride.

This Paper deals with We develop Integer Programming (IP) solutions for some special college admission problems arising from the Hungarian higher education admission scheme. We focus on four special features, namely the solution concept of stable score-limits, the presence of lower and common quotas, and paired applications. We note that each of the latter three special feature makes the college admissions problem NP-hard to solve. Currently, a heuristic based on the Gale-Shapley algorithm is being used in the Hungarian application. The IP methods that we propose are not only interesting theoretically, but may also serve as an alternative solution concept for this practical application, and other similar applications. We finish the paper by presenting a simulation using the 2008 data of the Hungarian higher education admission scheme.

Paper 3: Stable project allocation under distrubutional constraints.

Publication Year : 2016

Author : K.Cs. Ágoston, P. Biró, and R. Szántó.

This Paper deals with in a two-sided matching market when agents on both sides have preferences the stability of the solution is typically the most important requirement. However, we may also face some distributional constraints with regard to the minimum number of assignees or the distribution of the assignees according to their types. These two requirements can be challenging to reconcile in practice. In this paper we describe two real applications, a project allocation problem and a workshop assignment problem, both involving some distributional constraints. We used integer programming techniques to find reasonably good solutions with regard to the stability and the distributional constraints. Our approach can be useful in a variety of different applications, such as resident allocation with lower quotas, controlled school choice or college admissions with affirmative action.

Paper 4: Applications of matching models under preferences.

Publication Year : 2017

Author : P. Biró.

This Paper deals with Matching problems under preferences have been studied widely in mathematics, computer science and economics, starting with the seminal paper by Gale and Shapley (1962). A comprehensive survey on this topic was published also in Chapter 14 of the Handbook of Computational Social Choice (Klaus et al., 2016), and for the interested reader we recommend consulting the following four comprehensive books on the computational (Gusfield and Irving, 1989; Manlove, 2013) and game-theoretical, market design aspects (Roth and Sotomayor, 1990; Roth, 2015) of this topic. In this chapter our goal is to give a general overview of the related applications.

Paper 5: University Admission Practices.

Publication Year : 2022

Author : P. Biró

This Paper deals with Admission to universities is organised in a centralised scheme in Hungary. In this paper we investigate two major specialities of this application: ties and common quotas. A tie occur when some students have the same score at a programme. If not enough seats are available for the last tied group of applicants at a programme then there are three reasonable policies used in practice: 1) all must be rejected, as in Hungary 2) all can be accepted, as in Chile 3) a lottery decides which students are accepted from this group, as in Ireland. Even though student-optimal stable matchings can be computed efficiently for each of the above three cases, we developed (mixed) integer programming (IP) formulations for solving these problems, and compared the solutions obtained by the three policies for a real instance of the Hungarian application from 2008. In the case of Hungary common quotas arise from the faculty quotas imposed on their programmes and from the national quotas set for state-financed students in each subject. The overlapping structure of common quotas makes the computational problem of finding a stable solution NP-hard, even for strict rankings. In the case of ties and common quotas we propose two reasonable stable solution concepts for the Hungarian and Chilean policies. We

developed (mixed) IP formulations for solving these stable matching problems and tested their performance on the large scale real instance from 2008 and also for one from 2009 under two different assumptions. We demonstrate that the most general case is also solvable in practice by IP technique.