Vienna University of Technology

105.625 PR Advanced Economics Project

Double Sided Matching

9702170, Karin Leithner
0725439, Florin Bogdan Balint
1025735, Clemens Proyer
1027143, Mattias Haberbusch
1027433, Thomas Solich

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1 Introduction

In this project we investigated the double sided matching problem (also known as the stable matching problem) along with its application in economics. At the beginning a theoretical overview in algorithmic game theory is provided. Afterwards we implemented a functional prototype in NetLogo[1]. This prototype was evaluated based on two matching problems: matching of students seeking an university place and universities offering those places in Austria and the matching of the labor supply and labor demand in the European Union.

2 Theory

2.1 The Double Sided Matching Problem

The double sided matching problem...

The stable matching problem refers to the problem of finding a matching between two sets of elements which may be equally sized. In [2, p. 9] this problem is firstly described based on an example of college admission: a college is considering a set of n applicants of which it can admin only a quota of q.

The assignment of students and colleges is not allowed to be unstable, i.e. there are two applicants α and β who are assigned to colleges A and B although β prefers A to B and A prefers α to β. If this does not occur, the assignment is called *stable*. In case there is more than one stable solution the *optimal* one is of particular interest. In the previously mentioned college example a stable assignment is called *optimal* if every applicant is at least well off as it would be under any other stable assignment [2, p. 10]. In Economics this is also known as pareto efficiency [3, p. 46].

2.2 Gale and Shapley Algorithm

Text...

2.3 Relevance to Game Theory

Text...

3 Prototype

3.1 Subsection

Text...

4 Prototype Evaluation: College Applications in Austria

4.1 Subsection

Text...

5 Prototype Evaluation: Labor Market in the European Union

5.1 Subsection

Text...

6 Summary and Future Work

6.1 Subsection

Text...

7 Example

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$$\begin{aligned}(x+y)^3 &= (x+y)^2(x+y)\\ &= (x^2+2xy+y^2)(x+y)\\ &= (x^3+2x^2y+xy^2)+(x^2y+2xy^2+y^3)\\ &= x^3+3x^2y+3xy^2+y^3\end{aligned} \tag{7.1}$$

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Figure 7.1: One angry bird.

7.1 Heading on level 2 (subsection)

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$$A = \begin{bmatrix} A_{11} & A_{21} \\ A_{21} & A_{22} \end{bmatrix} \tag{7.2}$$

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7.1.1 Heading on level 3 (subsubsection)

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7.2 Example for list (3*itemize)

- First item in a list
    - First item in a list
        - First item in a list
        - Second item in a list
    - Second item in a list
- Second item in a list

7.3 Example for list (enumerate)

1. First item in a list
2. Second item in a list
3. Third item in a list

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References

[1] Uri Wilensky. *NetLogo*, 2016, Accessed March 16, 2016. https://ccl.northwestern.edu/netlogo/.

[2] D. Gale and L. S. Shapley. College admissions and the stability of marriage. *The American Mathematical Monthly*, 69(1):9–15, 1962.

[3] Nicholas Barr. *Economics of the Welfare State*. Oxford University Press, 2012.