

VIENNA UNIVERSITY OF TECHNOLOGY

105.625 PR ADVANCED ECONOMICS PROJECT

Double Sided Matching

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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.

1.1 The Stable 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] 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 admit 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]. In Economics this is also known as pareto efficiency [3, p. 46].

2 Example

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$$\begin{aligned}(x+y)^3 &= (x+y)^2(x+y) \\ &= (x^2 + 2xy + y^2)(x+y) \\ &= (x^3 + 2x^2y + xy^2) + (x^2y + 2xy^2 + y^3) \\ &= x^3 + 3x^2y + 3xy^2 + y^3\end{aligned}\tag{2.1}$$

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Figure 2.1: One angry bird.



2.1 Heading on level 2 (subsection)

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$$A = \begin{bmatrix} A_{11} & A_{21} \\ A_{21} & A_{22} \end{bmatrix} \quad (2.2)$$

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2.1.1 Heading on level 3 (subsubsection)

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Heading on level 4 (paragraph) Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aenean commodo ligula eget dolor. Aenean massa. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Donec quam felis, ultricies nec, pellentesque eu, pretium quis, sem. Nulla consequat massa quis enim.

2.2 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

2.3 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.