

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 Habermusch
1027433, Thomas Solich

March 17, 2016

Contents

1	Introduction	2
1.1	The Stable Matching Problem	2
2	Example	3
2.1	Heading on level 2 (subsection)	4
2.1.1	Heading on level 3 (subsubsection)	4
2.2	Example for list (3*itemize)	4
2.3	Example for list (enumerate)	5
	List of Figures	6
	List of Tables	7
	References	8

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, 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 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, p. 10]. In Economics this is also known as pareto efficiency [3, p. 46].

2 Example

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. In enim justo, rhoncus ut, imperdiet a, venenatis vitae, justo. Nullam dictum felis eu pede mollis pretium. Integer tincidunt. Cras dapibus. Vivamus elementum semper nisi. Aliquam lorem ante, dapibus in, viverra quis, feugiat a, tellus:

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

Phasellus viverra nulla ut metus varius laoreet. Quisque rutrum. Aenean imperdiet. Etiam ultricies nisi vel augue. Curabitur ullamcorper ultricies

Figure 2.1: One angry bird.



2.1 Heading on level 2 (subsection)

Lorem ipsum dolor sit amet, consectetur adipiscing elit.

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

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.

2.1.1 Heading on level 3 (subsubsection)

Nulla consequat massa quis enim. Donec pede justo, fringilla vel, aliquet nec, vulputate eget, arcu. In enim justo, rhoncus ut, imperdiet a, venenatis vitae, justo. Nullam dictum felis eu pede mollis pretium. Integer tincidunt. Cras dapibus. Vivamus elementum semper nisi. Aenean vulputate eleifend tellus. Aenean leo ligula, porttitor eu, consequat vitae, eleifend ac, enim.

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

List of Figures

2.1 One angry bird. 3

List of Tables

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.