# Double Sided Matching

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# Contents

# 1 Introduction

This paper deals with the investigation of the double sided matching along with its application in economics.

Add more introduction text

## 1.1 The problem

In many daily live expierences there is an hidden double sided matching. For example But we don't have the time or energy to find the perfect or optimal solution. Whereas in some field this could be done more easily or because this is mandatory, like in the universities in germany. They have an admission restriction for the students. Only the students with the best grandes in high school can go on the best universities in germany. But these universitites can only take a limited amount of students.

Find a good example

Is this true?

Define the problem a bit better

## 1.2 The aim

The aim of the paper is to develop a prototype, which could solve the previous discussed problem and similar ones. With this software we could solve questions like: What would be an optimal solution for the german students and universities?

Add more questions

## 1.3 Structure

The seconds chapter deals with the theory overview and background of the double sided matching problem. We will take a closer look at the Gale and Shapley Algorithm and what this has to do with game theory.

The third chapter descripes our prototype, which implements the previous discussed theory into practice.

In the fourth chapter we use data from Austria with our prototype to make an statment over the college applications.

rework shortly before we are finished, because structure changes most time

add dynamic linking to chapters

Chaper five deals deals with the labor market in the european union. Our prototype will get this data and we will discuss the results of it.

In the summary we will sum up the important findings and compare the outputs of our prototype.

# 2 Theory

## 2.1 The Double Sided Matching Problem

Clemens & Flo will be here!

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 [1, 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 $\alpha$ and $\beta$ who are assigned to colleges $A$ and $B$ although $\beta$ prefers $A$ to $B$ and $A$ prefers $\alpha$ to $\beta$. 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 [1, p. 10]. In Economics this is also known as pareto efficiency [2, p. 46].

## 2.2 Gale and Shapley Algorithm

Clemens & Flo will be here!

## 2.3 Relevance to Game Theory

Mattias & Thomas will be here!

# 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

## 6.1 Subsection

Text...

# 7  Example

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

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

Figure 7.1: One angry bird.

## 7.1 Heading on level 2 (subsection)

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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

# List of Figures

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# References

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

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