

Lab 0 - Stable Matching

Sep 4, 2025

Lab 0 instructions

In this lab you will:

1. Formalize an algorithm for deciding if a matching is stable
 - a. Writeup in latex
2. Give a proof for termination and correctness
3. Discuss time analysis
 - a. Worst case

Reference the algorithm writeup guidelines:

https://bmc-cs-340.github.io/algorithm_guidelines.pdf

Part 1: Formalize an algorithm for deciding if a matching is **stable**

- Input

- A set of employers: E
- A set of applicants: A
- $|E| = |A| = n$
- $2n$ preference lists, each of size n
- How are the preference lists stored?
 - linked lists? arrays? hash maps? why?
- M , a list/set of n pairs (the matching)

- Output: yes/no

Employer-Applicant Matching Example

Employers			Applicants		
Google(G)	Intel(I)	Apple(A)	Kate(K)	Clara(C)	Lisa(L)
K	K	L	A	A	G
C	L	K	G	I	I
L	C	C	I	G	A

Matching 1: (G, C), (I, L), (A, K)

Q:Is this stable?

A: Yes

Employer-Applicant Matching Example

Employers			Applicants		
Google(G)	Intel(I)	Apple(A)	Kate(K)	Clara(C)	Lisa(L)
K	K	L	A	A	G
C	L	K	G	I	I
L	C	C	I	G	A

Matching 2: (G, L), (I, K), (A, C)

Q:Is this stable?

A: No

Employer-Applicant Matching Example

Employers			Applicants		
Google(G)	Intel(I)	Apple(A)	Kate(K)	Clara(C)	Lisa(L)
K	K	L	A	A	G
C	L	K	G	I	I
L	C	C	I	G	A

Matching 3: (G, L), (I, C), (A, K)

Q:Is this stable?

A: Yes

Part 2: Termination and Correctness

Include an argument that your algorithm will terminate and that it will output the correct value (YES/NO)

Part 3: Runtime complexity

Discuss the runtime complexity of your algorithm in terms of the size of your input (n)

Signing Out

Complete your writeup in latex and submit your lab on gradescope

Due before next Lab (Sep 11)