Lecture 7

CSE 331

Sep 13, 2023

Register your project groups

Deadline: Friday, Sep 29, 11:59pm

Forming groups

You form groups of size **exactly three (3)** for the project. Below are the various logis...

- You have two choices in forming your group:
  1. You can form your group on your own: i.e. you can submit the list of EXACTLY three (3) groups members in your group.

  > **</> Note**
  >
  > Note that if you pick this option, your group needs to have **exactly THREE (3)** members. In particular, if your group has only two members you cannot submit as a group of size two. If you do not know many people in class, feel free to use piazza to look for the third group member.
  >
  > Also, if you form a group of size three, please make only **one submission per group**.

  2. You can submit *just your* name, and you will be assigned a random group *among all students who take this second option.* However, **note that if you pick this option you could end up in a group of size** 2. There will be at most two groups of size 2.

  > **</> Potential risk**
  >
  > Note that if you pick the option of being assigned a random group, you take on the risk that a assigned group might not "pull their weight." We unfortunately cannot help with such aspects of group dynamics. (Of course if a group member is being abusive, please do let Atri know.) Please note that a group member who does not do much work will get penalized on the individual component of the project grade.

- **Submitting your group composition**

  Use this Google form ↗ to submit your group composition (the form will allow you to pick one of the two options above).

- You need to fill in the form for group composition by **11:59pm on Friday, September 30**.

  > **</> Deadline is strict!**
  >
  > ...the form for group composition by the deadline, then you get a **zero for the entire project**.

HW 1 is out!

Homework 1

Due by **11:30pm, Tuesday, September 19, 2023**.

Make sure you follow all the homework policies.

All submissions should be done via Autolab.

Some Questions on Stable Matching

Sample Problem

The Problem

Decide whether the following statement is true or false:

In every Stable Marriage problem instance where a man m and woman w have each other as their least preferred partner, the following is true. There is no stable matching for the instance where (m, w) are matched.

If you state true then you will have to formally argue why the statement is correct. If you state false, then you have to give a counter-example.

Click here for the Solution

Working in groups

Working in groups

Given that HW 1 will be out today **(by 11:45pm** tonight), I figured I should re-post an entry from FA 21's piazza, which might be useful for y'all. Without further ado, below is the post from last time (copied verbatim).

During my office hour today some of you mentioned that students are feeling scared to form groups. Assuming this is not an isolated event, I wanted to state emphatically that **y'all are STRONGLY encouraged to work in groups for the homeworks** (you do not have a choice for the project since there is only one submission per group for the project).

As a practical reason why y'all should be working as a group, please note that Q2 on the HWs are supposed to hard *for a group*! So if you are working alone, then you are setting yourself up for a lot of extra work that you do not need to. (If you do have a lot of free time in your schedule then working alone *might* be doable but for a typical schedule not working in groups is setting yourself up with a completely *avoidable* handicap.)

I was told the issue was fear of breaching academic integrity if you work on your HW as a group. So let me offer some clarifications/suggestions:

- It is true that you are only supposed to collaborate to the extent of proof/algorithm idea and not work on proof/algorithm details together. Also while taking notes during the discussion is fine, it is generally not a good idea to copy things down verbatim from the discussion. (But see next point.)
- A related worry is that even if y'all do the above, then the submissions within a group would still be similar that would lead to academic integrity violation. This is **simply incorrect!** We do understand that when collaborating together, the final submission would be similar (even if the submissions were written up individually) and this is perfectly acceptable! What we do not want is to receive essentially identical submissions-- as graders, we can pretty easily figure out the difference between similarity due to (proper) collaboration and similarity due to copying.

Just putting in time is not enough

You will be graded on *what you submit* and **not** how much time you spent

Be smart in how you spend your time

Please ask for help, get feedback if you get stuck!

Questions/Comments?

Read your reading assignment?

note @74 🔗 ★ 🔒 ▾

Actions ▾

Reading Assignment: Pigeonhole principle

Another reading assignment for this week (here is the other one: @73). Please go through this support page on **pigeonhole principle**--

http://www-student.cse.buffalo.edu/~atri/cse331/support/pigeon/index.html

It's actually a very simple result that turns out to be surprisingly powerful. We'll use this in the Mon/Wed lecture.

lectures

Edit   good note │ 0   Updated 2 days ago by Atri Rudra

Gale-Shapley Algorithm

Intially all men and women are free

While there exists a free woman who can propose

Let w be such a woman and m be the best man she has not proposed to

w proposes to m

If m is free

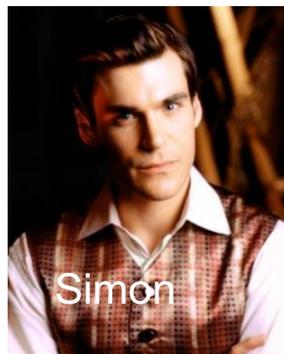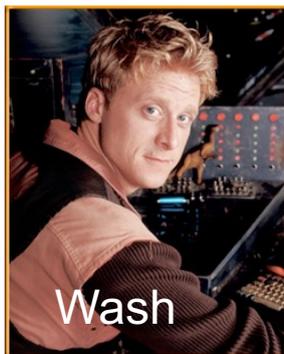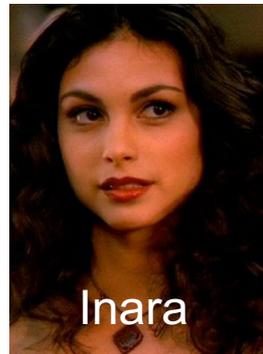(m,w) get engaged

Else (m,w') are engaged

If m prefers w' to w
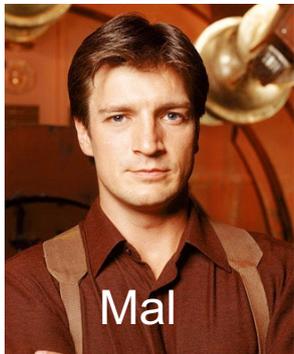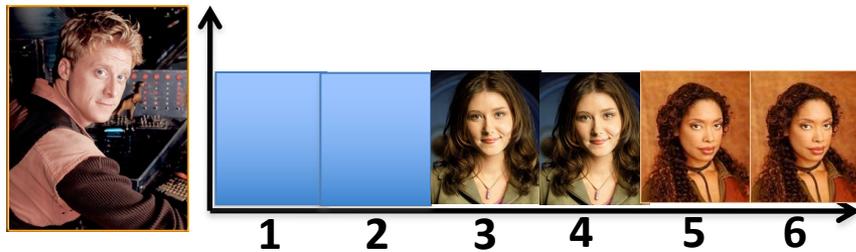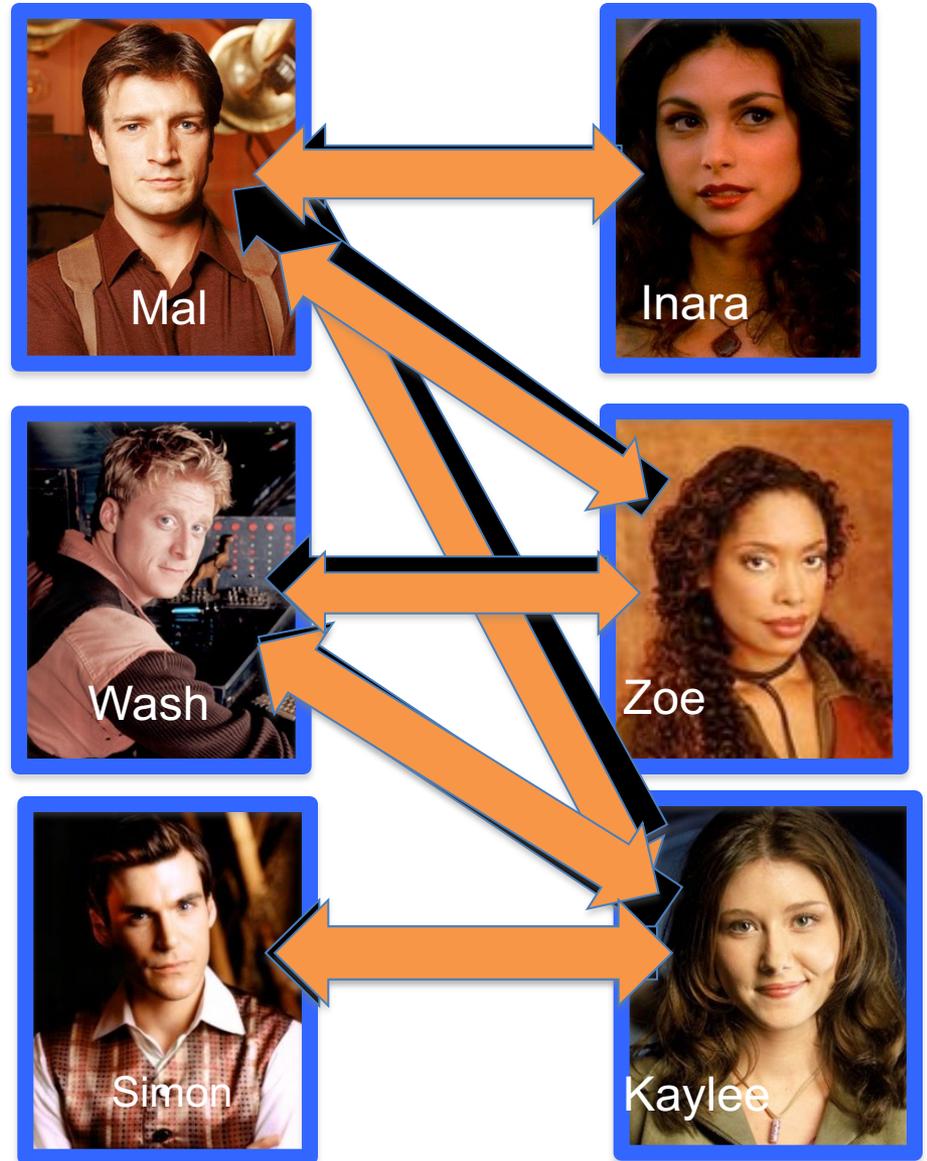
w remains free

Else

(m,w) get engaged and w' is free

Output the engaged pairs as the final output

Preferences

GS algorithm: Firefly Edition

Observation 1

Intially all men and women are free

While there exists a free woman who can propose

Let w be such a woman and m be the best man she has not proposed to

w proposes to m

If m is free

(m,w) get engaged

Else (m,w') are engaged

If m prefers w' to w

w remains free

Else

(m,w) get engaged and w' is free

Once a man gets engaged, he remains engaged (to "better" women)

Output the engaged pairs as the final output

Observation 2

Intially all men and women are free

While there exists a free woman who can propose

Let w be such a woman and m be the best man she has not proposed to

  w proposes to m

  If m is free

    (m,w) get engaged

  Else (m,w') are engaged

    If m prefers w' to w

      w remains free

    Else

      (m,w) get engaged and w' is free

If w proposes to m after m', then she prefers m' to m

Output the set S of engaged pairs as the final output
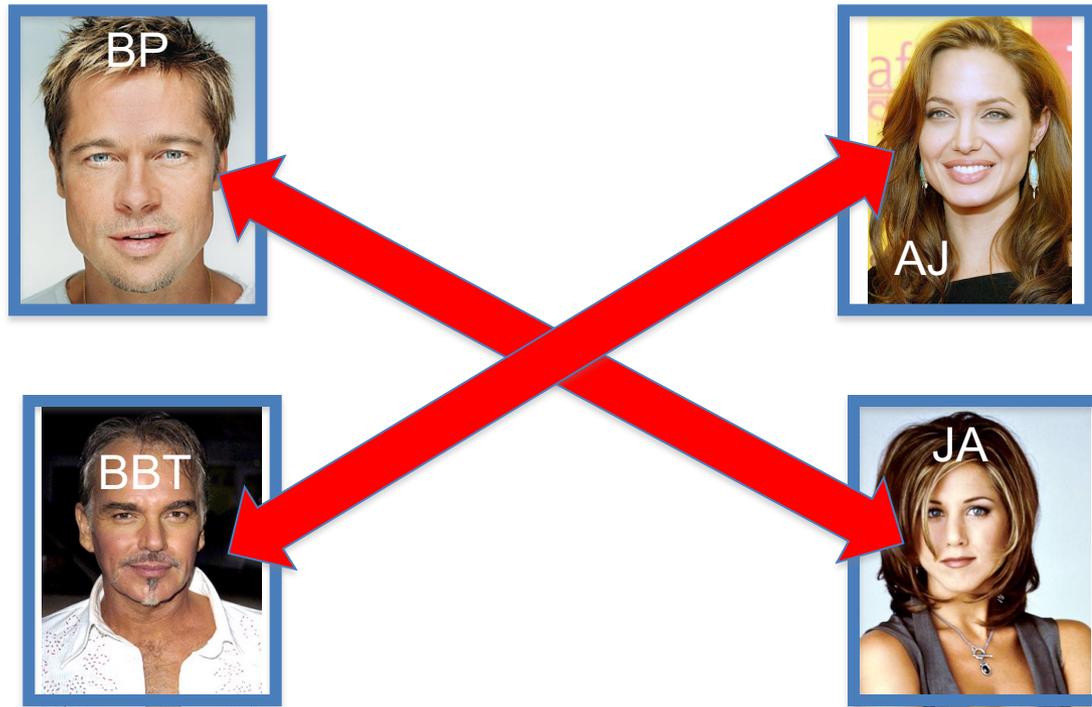
Questions/Comments?

Why bother proving correctness?

Consider a variant where any free man **or** free woman can propose

Is this variant any different? Can you prove it?

GS' does not output a stable marriage

Questions/Comments?

Observation 1

Intially all men and women are free

While there exists a free woman who can propose

Let w be such a woman and m be the best man she has not proposed to

   w proposes to m

   If m is free

      (m,w) get engaged

   Else (m,w') are engaged

      If m prefers w' to w

         w remains free

      Else

         (m,w) get engaged and w' is free

Once a man gets engaged, he remains engaged (to "better" women)

Output the engaged pairs as the final output

Observation 2

Intially all men and women are free

While there exists a free woman who can propose

Let w be such a woman and m be the best man she has not proposed to

    w proposes to m

    If m is free

        (m,w) get engaged

    Else (m,w') are engaged

        If m prefers w' to w

            w remains free

        Else

            (m,w) get engaged and w' is free

If w proposes to m after m', then she prefers m' to m

Output the set S of engaged pairs as the final output

Questions/Comments?

Today's lecture

GS algorithms always outputs a stable marriage

On to the board…