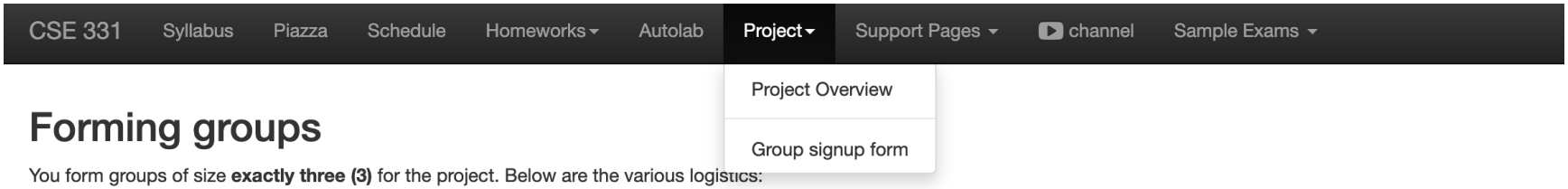
Lecture 7

CSE 331

Sep 11, 2024

Register your project groups

Deadline: Friday, Sep 20, 11:59pm



Forming groups

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

- 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) group members in your group.

> **</> Note**
>
> Note that if you pick th… …nnot submit as a group of size two. If …
>
> Also, if you form a gro…

If you miss this deadline then you will get a ZERO on the ENTIRE project

  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 20**.

HW 1 is out!

Homework 1

Due by **11:30pm, Tuesday, September 17, 2024**.

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

Submission requirements

Submission

! Submit part (a) and (b) separately

You need to submit **two (2) PDF** files to Autolab: one for part `(a)` and one for part `(b)`. While you can assume part `(a)` as a given for part `(b)`, to get credit for part `(a)` you have to submit your solution for part `(a)` separately from part `(b)`.

Make sure you submit the correct PDF to the correct submission link on Autolab. If you do not (e.g. if you submit Q1(a) PDF to Q1(b) or even Q2(a) or Q2(b)), then you will lose ALL points.

We recommend that you typeset your solution but we will accept scans of handwritten solution-- you have to make sure that the scan is legible.

! PDF only please

If Autolab cannot display your file, (irrespective of the reason) then you will get a zero (0) on the entire question.

Autolab might not be able to display files in formats other than PDF (e.g. Word cannot be displayed). **Note that Autolab will "accept" your submission even if you submit non-PDF file, so it is YOUR responsibility to make sure you submit in the correct format.**

Also the file size has to be **at most 3MB**.

Grading Guidelines

We will follow the usual grading guidelines for non-programming questions. Here is a high level grading rubric specific to part `(a)` of this problem:

1. `Proof idea`: `10` points.

and here is the high level grading rubric for part `(b)`:

1. `Proof/Algorithm idea`: `20` points for
   - *If your answer is yes*: the idea behind the algorithm that for any input, computes a pair of stable schedules.
   - *If your answer is no*: a counterexample idea explaining the insight behind why you think the property does not hold.
2. `Proof/Algorithm details`: `20` points for
   - *If your answer is yes*: details of the algorithm that for any input, computes a pair of stable schedules *and* an argument as to why your algorithm will always output a pair of stable schedules for every input.
   - *If your answer is no*: a complete description of a counterexample *and* a complete proof for why the given counter example does not have any stable schedule.

! Note

If you do not have separated out and labeled proof/algorithm idea and proof/algorithm details for part `(b)`, you will get a zero (0) irrespective of the technical correctness of your solution.

You need to confirm that you followed the requirements

Homework 1, Question 1(a)

Collaboration

You can collaborate on this question with up to two (2) more CSE 331 students. However, you cannot work with someone else outside of your group for the other questions on HW 1.

Submit part (a) and (b) separately for Q1

You need to submit **two (2) PDF** files for Q1 to Autolab: one for part `(a)` and one for part `(b)`. While you can assume part `(a)` as a given for part `(b)`, to get credit for part `(a)` you have to submit your solution for part `(a)` separately from part `(b)`.

Make sure you submit the correct PDF to the correct submission link on Autolab. If you do not (e.g. if you submit your Q1(a) PDF to Q1(b) or any of Q2(a) or Q2(b)), then you will lose ALL points.

We recommend that you typeset your solution but we will accept scans of handwritten solution-- you have to make sure that the scan is legible.

PDF only please

By clicking the check mark below, you confirm that you have read and understood the instructions in HW 1 (as well as the CSE 331 homework policies). **Note that not following the instructions could result you getting a ZERO (0) on the entire problem *even if your actual solution is technically correct*** (*After clicking this check-box you cannot later claim that you missed reading an instruction.*)

☐ You confirm that you have read and understood the instructions in HW 1 (as well as the CSE 331 homework policies)

Sources and Collaborators

By clicking the check mark below, you confirm that you have listed your source(s) in your submitted PDF. (If you did not use any sources say *none*. Not stating your source(s) explicitly will **result in loss of all points**.)

☐ You confirm that you have explicitly stated your source(s) in your submission

By clicking the check mark below, you confirm that you have listed your collaborator(s) in your submitted PDF. (If you did not collaborate with anyone say *none* for collaborators. Not stating your collaborator(s) explicitly will **result in loss of all points**.)

☐ You confirm that you have explicitly stated your collaborator(s) in your submission

Working in groups

note @62 stop following 0 views Actions

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 FA 21 (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.

Another worry raised was that students feel scared to talk to each other about the HWs. I would like to clarify something here:

- If the discussion is only to the extent of understanding the problem statement and *not* the solution, then y'all can talk with anyone else in class.
  BUT the moment the discussion veers towards *how* to solve the problem, then make sure these discussions are restricted to your group.

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 @58 stop following 1 view

Actions

Reading Assignment: Pigeonhole principle

Another reading assignment for this week (here is the other one: @57). 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 one of this week's (most likely the Wed) lecture.

lectures

Edit good note 0 Updated 24 seconds 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

(w,m) get engaged

Else (w',m) are engaged

If m prefers w' to w

w remains free

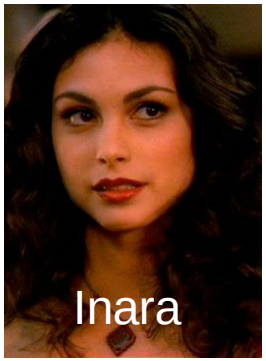
Else

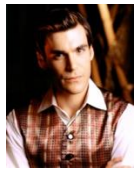
(w,m) get engaged and w' is free

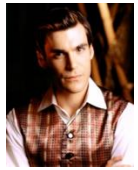
Output the engaged pairs as the final output

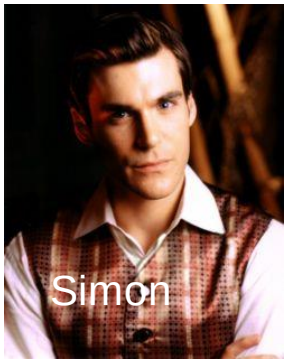
Questions/Comments?

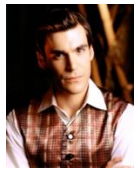
Preferences











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

(w,m) get engaged

Else (w',m) are engaged

If m prefers w' to w

w remains free

Else

(w,m) 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

(w,m) get engaged

Else (w',m) are engaged

If m prefers w' to w

w remains free

Else

(w,m) 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

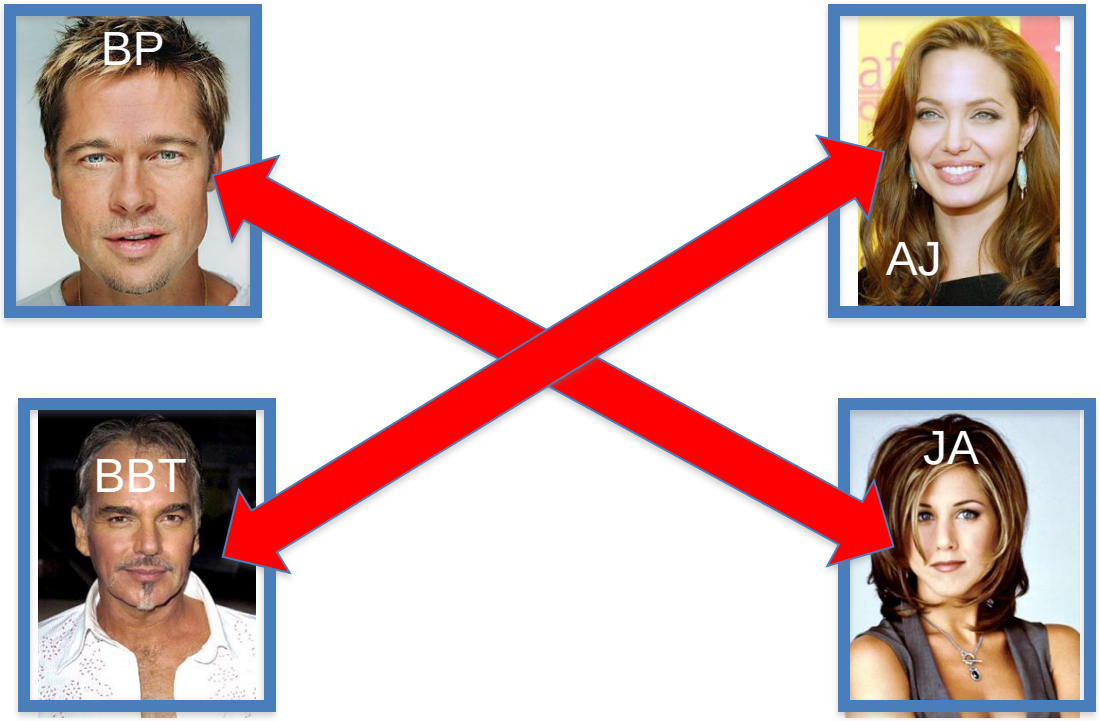
Questions/Comments?

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

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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

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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…