Lecture 6

CSE 331

Feb 12, 2021

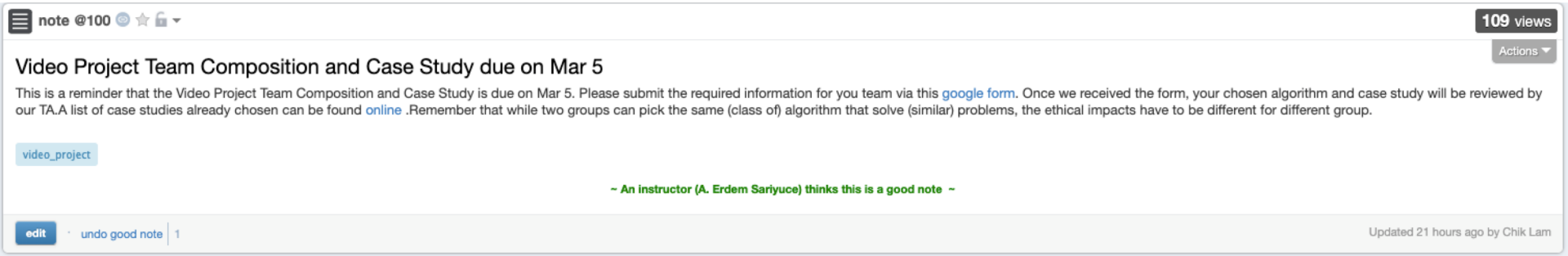
If you need it, ask for help.
Take advantage of OHs
(No one came on Wed!)

Reading Assignments and Preparation Videos

Date	Topic	Notes
Mon, Feb 1	Introduction S21 S20 F19	**HW 0 out** Week 1 recitation notes
Wed, Feb 3	Main Steps in Algorithm Design S21 S20 F19	
Fri, Feb 5	Stable Matching Problem S21 S20 F19	[KT, Sec 1.1]
Mon, Feb 8	Perfect Matchings S21 S20 F19 x²	**HW 0 due** [KT, Sec 1.1] Week 2 recitation notes
Wed, Feb 10	Stable Matching Problem S21 S20 F19 x²	[KT, Sec 1.1]
Fri, Feb 12	Gale Shapley algorithm S20 F19 x²	**HW 1 out** [KT, Sec 1.1]
Mon, Feb 15	Gale Shapley alg. outputs a stable matching S20 F19 x²	[KT, Sec 1.1] *Reading Assignment:* Pigeonhole principle *Reading Assignment:* Asymptotic notation care package *Reading Assignment:* Using a Progress Measure
Wed, Feb 17	Efficient algorithms and asymptotic analysis S20 F19 x²	[KT, Sec 1.1] *Reading Assignment:* Worst-case runtime analysis notes *Reading Assignment:* [KT, Sec 1.1, 2.1, 2.2, 2.4]

Sign-up for mini projects

Deadline: Friday, Mar 5, 8:00pm



Questions/Comments?

Stable Marriage problem

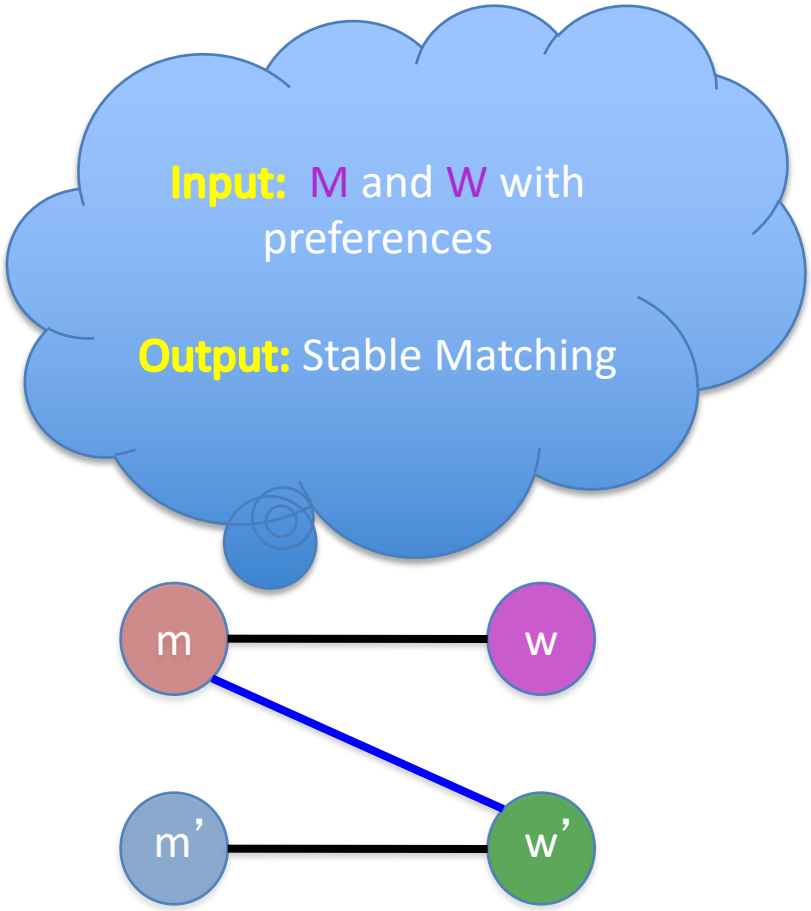
Set of men M and women W

Preferences (ranking of potential spouses)

Matching (no polyandry/gamy in M X W)

Perfect Matching (everyone gets married)

Instability



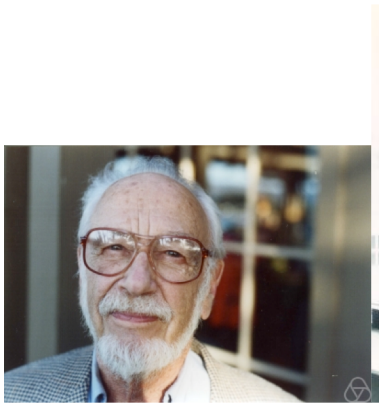
Stable matching = perfect matching+ no instablity

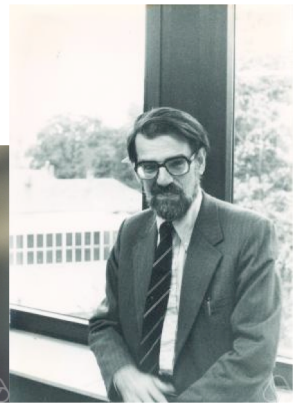
Remember Two Questions

Does a stable marriage always exist?

If one exists, how quickly can we compute one?

Moral of the story…





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Rest of today's agenda

GS algorithm

Run of GS algorithm on an instance

Prove correctness of the GS algorithm

Gale-Shapley Algorithm (cont.)

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: The Office Edition