Stable Matching Part II

Exams will be on
Fridays from 8-10 PM

2- Keep an array Next[1..n]
Next[m] points to the position of the next woman that m will be proposing to on his ranked list.

Preference list for men:
ManPref[1..n, 1..n]
ManPref[m, i] denotes the i^{th} woman on man m's preference list.

Man m will propose to
ManPref[m, Next[m]]

Steps involved in one iteration of Gale-Shapley

1- Identify a free man — O(1)

2- For a man $\underline{m}$, identify the highest ranked woman to whom he has not yet proposed. — O(1)

3- For a woman $\underline{w}$, decide if w is engaged, if so to whom — O(1)

4- For a woman $\underline{w}$ and two men $\underline{m}$ & $\underline{m}'$ decide which man is preferred by $\underline{w}$. — O(1)

5- Place a man back in the list of free men. — O(1)

3- Keep an array called current[1...n]
current[w] is Null if w is
not engaged, and set to m
if she is engaged to m.

4- $WomanPref_1$ = | 3 | 1 | 8 | 6 | 10 | - - .

Create a Ranking array where
Ranking[w,m] contains the
rank of man m based on
w's preference.

This construction takes $O(n^2)$

Then step 4 can will only
take $O(1)$

Overall complexity of Gale-Shapley

$$O(n^2) + O(n^2) = O(n^2)$$

preparation ; iterations

Basics about you

1. Your name:
2. Your e-mail address:
3. Your major and degree program:
4. Your areas of research interests (if applicable) — feel free to list multiple areas if you are undecided:
5. Titles of relevant classes you have taken before — this may include algorithms, complexity, languages & automata, graph theory, discrete mathematics, probability, linear algebra, mathematical programming, or others that you can think of:

Background Knowledge

This section tries to ascertain some basic knowledge we hope you acquired before. This is not a quiz, and your performance here will not affect your grade. However, if you have serious problems in this section, it may be in your own best interest to review the background material in order to do well in this class.

1- Which of these sorting algorithms have a worst-case running time of $\Omega(n^2)$ — mark all that apply: Bubble Sort, Heap Sort, Insertion Sort, Merge Sort, Quick Sort (with good median finding), Selection Sort.

2- Which of these sorting algorithms have a worst-case running time of $O(n \log n)$ — mark all that apply: Bubble Sort, Heap Sort, Insertion Sort, Merge Sort, Quick Sort (with good median finding), Selection Sort

3- Which of these functions are $O(n^2)$ — mark all that apply: 3, $(2n)^2$, $(\log n)^4$, 2^n, $1/100\ n^3$, log logn, $4n \log n$, $n^2 + 4n \log n$.

4- Which of these functions are $\Omega(n^2)$ — mark all that apply: 3, $(2n)^2$, $(\log n)^4$, 2^n, $1/100\ n^3$, log logn, $4n \log n$, $n^2 + 4n \log n$.

DEN students:

email your quizes to

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