

COMP 610 Project 1: Stable Matching Equity

Due: Friday October 7 at 2355

Points: 30 points possible

Overview: Your program will be given an instance of STABLEMARRIAGE. You will check use the Propose-Dispose algorithm to find a stable matching. Then you will use the Propose-Dispose-Women (SadieHawkins version) algorithm to find a (often different) matching. Recall that Propose-Dispose-Women is a tiny modification to Propose-Dispose where the women propose (instead of the men) and the men Dispose instead of the women.

Since Propose-Dispose yields a “unfair” matching (ie male-optimal) and Propose-Dispose-Women yields an “unfair” matching, you will then attempt to determine how different these solutions are. An individual (man or woman) will be assigned a partner in both solutions. The difference for an individual is the difference between his/her 2 partners in his/her preference list (eg if a man gets his 6th choice with P-D and 11th choice with P-D-W then his difference is $11-6 = 5$). The difference for a matching is the sum of these $2n$ differences.

Details: The input will come from a file called input.txt which will be placed in the same directory as your java file. The first line of the file will have a single integer value N which will be the number of men (or women since the number of men equals the number of women). The next N lines will be the whitespace separated preference lists of the N men (ie each of the next lines will be a permutation of 1, 2, ..., N). The next N lines will be the whitespace separated preference lists of the N women. See the sample input below for examples.

Run P-D and P-D-W to get 2 stable matchings output these matchings and then output the difference between the matchings.

You can discuss ideas for the algorithm to be used with anyone and consult any source (books, internet, etc). However, for this project, you are expected to write the code on your own with limited or no assistance from the professor, no assistance from others, and limited or no assistance from other sources (books, internet, etc). To clarify, you can seek assistance in understanding the task and how it can be solved, but “your code” should be written by you: not written by others, not copied from others, not copied from books/internet.

Picky, but required specifications: Your project must:

- be submitted via canvas.
- consist of 1 or more dot-java files (no class files, zip files, input files or other files should be submitted). Each file must have your name and which project you are submitting as comments on the first 2 lines.
- not be placed into any package (for the java pedants, it must be in the default package).
- have one file called Project1.java.
- compile using the command ‘javac Project1.java’.
- run using the command ‘java Project1’.
- accept input from a file called input.txt in the same directory as the java file(s) formatted precisely as described above.
- be submitted on time (early and multiple times is fine).

If your project fails any of the above, you will receive a zero (recall that each of you may replace 1 and only 1 project that receives a zero this semester). If your project meets the requirements above then it will be graded on whether it:

- is designed and formatted reasonably (correct indentation, no excessively long lines, no excessively long methods, has useful method/variable names, etc) and
- accomplishes the goal of the project. In other words, the output should be the correct answer, computed in a valid way, formatted correctly.

Sample execution: If input.txt contains

```
3
1 3 2
2 1 3
3 2 1
3 2 1
1 3 2
2 1 3
```

then the output should be

```
1 1
2 2
3 3
1 2
2 3
3 1
```

12

Note all 3 men get their first choice with P-D and their third choice with P-D-W and all 3 women get their third choice with P-D and their first choice with P-D-W. Total difference $2+2+2+2+2+2=12$

If input.txt contains

```
3
1 2 3
2 3 1
3 1 2
1 2 3
3 2 1
1 2 3
```

then the output should be

```
1 1
2 2
3 3
1 1
2 3
3 2
```

5

Total difference $0+1+2+0+1+1=5$.

Stray Thoughts:

I suggest you finish and submit your project at least several days in advance. This way you have time and opportunity to ask any last questions and verify that what you upload satisfies the requirements. There is nothing wrong with working on the project for a day and uploading your code, working for another day and uploading your improved code, ..., working for another day and uploading your final version. In fact there are advantages: you have a fairly reliable place that keeps your versions and even if you get busy at the last moment you have still uploaded your best version.

Your project should be written and understood by you. Helping or receiving help from others to figure out what is allowed/required is fine, but copying code is not. Significant shared source code indicates that you either did not write/understand what you submitted or you provided code to another (allowing them to submit code they did not write/understand). Both are academic dishonesty.