

Experimental Practice Stable Matching

1. Objective

This practice aims to experimentally verify the asymptotic behavior of the Gale and Shapley algorithm that finds the stable pairing of two sets of men and women whose cardinality of both is N. That is, to solve the SMP (Stable Matching Problem) in its basic version.

2. Activities

To meet the objective, you must:

- 1. Implement the algorithm in a programming language.
- 2. Generate M files that will be used as input data for the algorithm.
 - a. Each file will have data on the men and women who want to be paired with their respective preference lists.
 - b. The value of M must be found experimentally to show the form of the temporal behavior. Suggestion for choosing M: Make a choice based on the expected complexity, so if a quadratic complexity is expected, grow the data at the same rate. The idea is that the number of values obtained will allow the shape of the temporal behavior to be shown, and it is recommended that they be no less than 25.

c. Creating a program or script that automatically generates the M files is recommended.

- 3. The Gale and Shapley algorithm will be executed for each input file and its execution time will be measured.
- 4. The times will be stored for later analysis.
 - a. Take the times of different parts of the code to differentiate the impact of each section.
 - b. For example: the time to read the data from the file, the time to print the results (matching), and the time to find the match.

File	Ν	Execution Time HH:MM:SS:MS
1	2	00:00:00:10
2	4	00:00:00:11
3	8	00:00:00:12
4	16	00:00:00:10
M=25	33,554,432	00:23:12:04



Table 1.- Execution times.

3. Report

At the end of the practice, graph Table 1, choosing the appropriate scale for the data axis (N). A linear scale is not recommended, and experiment with a logarithmic scale or show both graphs.

Every scientific report must have:

- 1. Title
- 2. Introduction
- 3. Objective(s)
- 4. Description of activities (including at least)
 - a. Methodology.
 - b. Tools.
- 5. Results
- 6. Analysis of results
- 7. Conclusions
- 8. Bibliography (only if necessary)

Use the IEEE scientific paper template. The final document is not expected to be more than five pages.

4. Submission

Create a zip file containing the following:

- 1. The original report document (e.g., in Microsoft Word) and its PDF version.
- 2. An SRC folder with the programs and/or scripts used.
- 3. A DAT folder with the generated input and output files and the generated auxiliary files, such as the time file.