

Islamic University of Technology



Report on Lab 03

(CSE 4618 Artificial Intelligence Lab)

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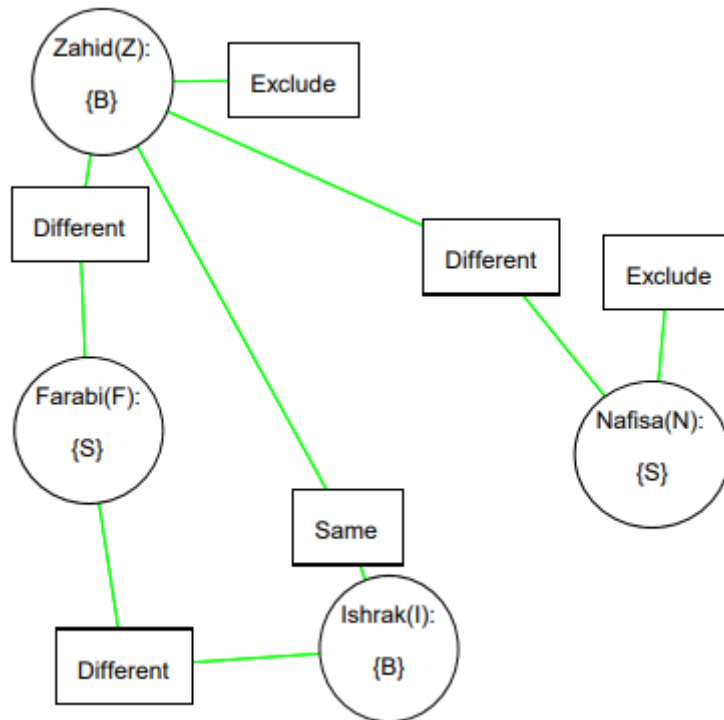
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1 Introduction

This lab was on the Constraint Satisfaction Problem (CSP). We were given some scenarios and asked to formulate CSP for them. We used applet (constraint.jar) developed by AISpace to build and solve the CSPs.

2 Problem 02: Eating Out

2.1 Solution



2.2 Explanation

2.2.1 Variables

- Z: Zahid
- I: Ishark
- F: Farabi
- N: Nafisa

2.2.2 Domains

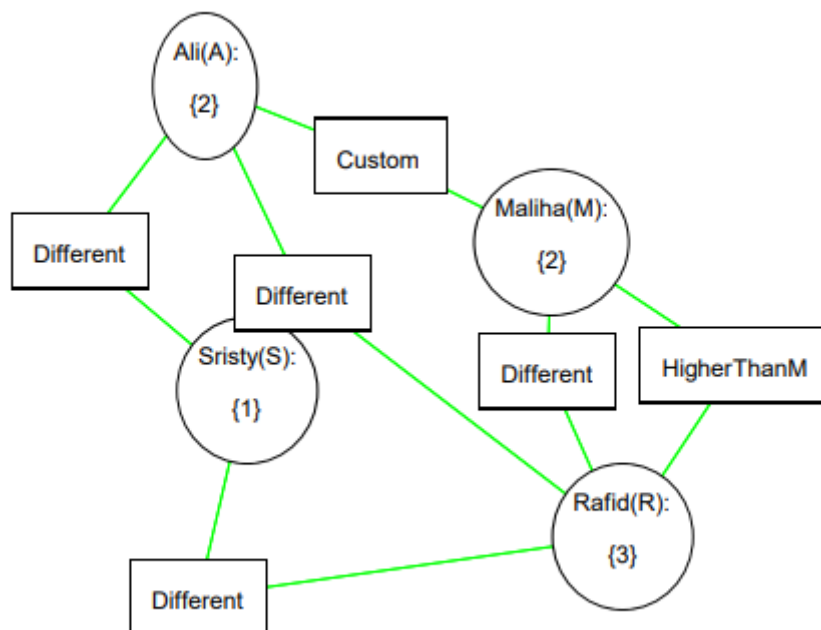
The domain of each variable is the set of dishes that can be assigned to the variable. The domain of each variable is: $\{S, B, K, P\}$ where, S is Special Rice, B is Biryani Rice, K is Kashmiri Naan, and P is Paratha

2.2.3 Constraints

- Exclude: Exclude any particular food.
- Different: Must have different foods.
- Same: Must have same food.

3 Problem 03: Finding Houses

3.1 Solution



3.2 Explanation

3.2.1 Variables

- A: Ali
- S: Sristy
- M: Maliha
- R: Rafid

3.2.2 Domains

Each variable's domain is the apartment's floor which can be assigned to the variable. The domain of each variable is: $\{1, 2, 3\}$

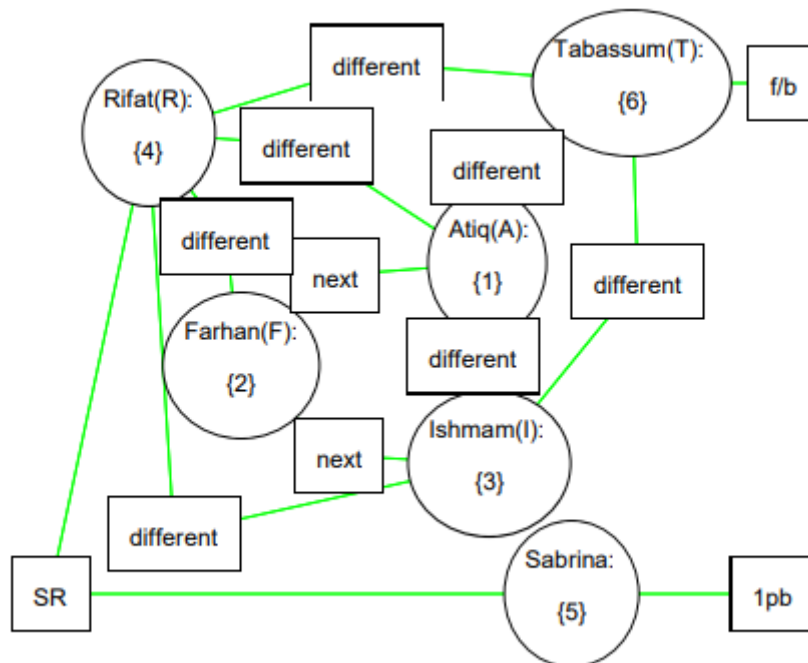
3.2.3 Constraints

- HigherThanM: Rafid must live in higher floor than Maliha.
- Different: Must live in different floors.

- Custom: If Ali and Maliha lives in same floor, it must be floor 2.

4 Problem 04: Spots

4.1 Solution



4.2 Explanation

4.2.1 Variables

- A: Atiq
- S: Sabrina
- F: Farhan
- R: Rifat
- I: Ishmam
- T: Tabassum

4.2.2 Domains

The domain of each variable is the spot that can be assigned to the variable. The domain of each variable is: $\{1, 2, 3, 4, 5, 6\}$

4.2.3 Constraints

- 1pb: Sabrina must have 1 person standing behind her.
- Different: Must stand in different positions.

- SR: Sabrina and Rifat must stand next to each other.
- Next: Farhan is in between Atiq and Ishmam, this is a ternary constraint. This would have us select from 216 combinations. That's why I divided this into two binary constraints. The constraint became – Farhan and Atiq adjacent, and Farhan and Ishmam adjacent. This made Farhan to be in the middle. So, the Next constraint was used for both of them

5 Challenges

While formulating the CSPs, the main challenges were:

- Selecting the correct variables and domains for each problem. Especially, for the scheduling tasks problem, it was a bit tricky to select the correct domain.
- Ensuring that all constraints were satisfied.
- Managing the constraints to ensure that they were enforced correctly.
- Dealing with complex constraints that required multiple variables to be considered.
- The UI of constraints.jar was unfriendly

6 Conclusion

In this lab report, we have outlined the constraints and requirements for solving various Constraint Satisfaction Problems (CSPs) including map coloring, eating out, finding houses, assigning spots, and scheduling tasks among faculty members. Each problem required careful consideration of variables, domains, and constraints to ensure a valid solution. We observed that CSPs are a powerful tool for solving complex problems by breaking them down into manageable parts. The challenges faced during the process included ensuring that all constraints were satisfied. By adhering to the constraints, we were able to find solutions that met all the requirements. This lab has provided valuable insights into the importance of proper problem formulation and constraint management in solving real-world problems.

7 GitHub Repository

I will be uploading the lab tasks in the following repository: [CSE 4618: Artificial Intelligence](#)