



CSE 4618
Artificial Intelligence Lab
Lab 3

Introduction

In this lab, we create simple CSPs and solve them.

Question 1

We are to formulate CSP for a given scenario.

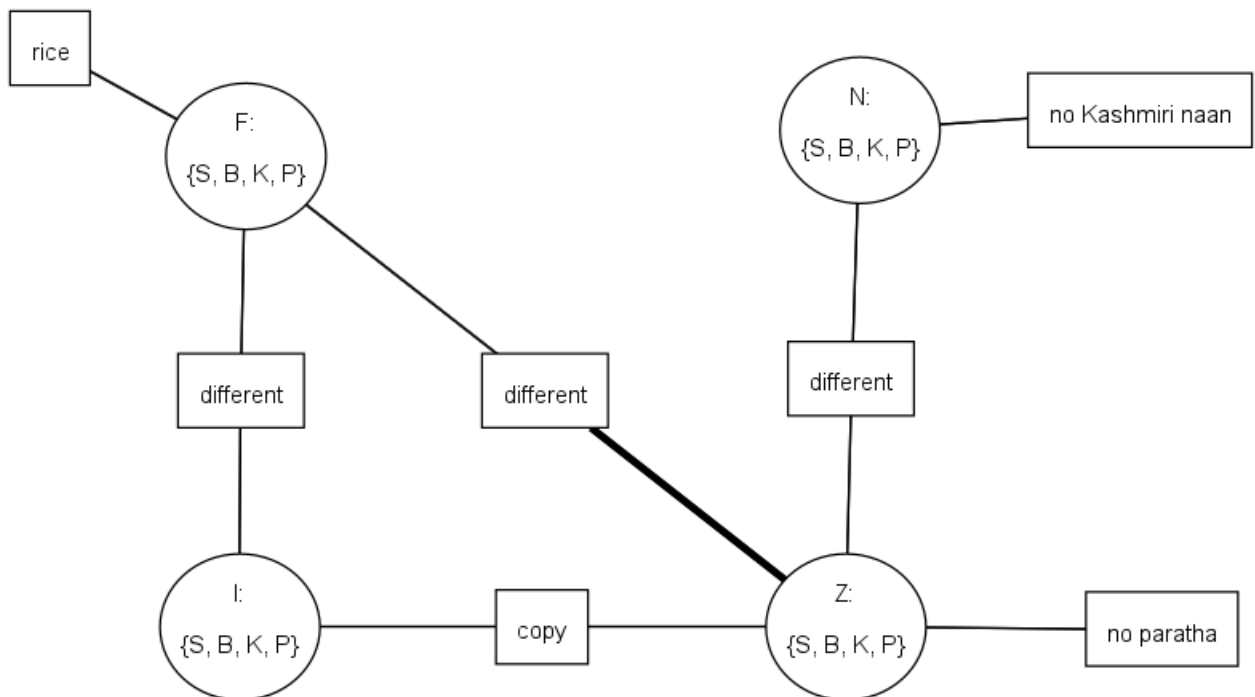


Figure 1: CSP for Task 1

Analysis of the problem

We need to identify the variables and domains for each of the given scenario and formulate them as a graph on CSP Applet.

Explanation of the solution

In this solution, the unary and binary constraints are formulated. Since Z chooses different items over everyone else except I, we can see the constraints are given accordingly. The constraints are reflected accurately on solution when CSP autosolve is applied to our formulation.

Interesting findings

After applying arc consistency and autosolve, a solution without Kashmiri naan is also a valid solution.

Question 2

We are to formulate CSP for a given scenario.

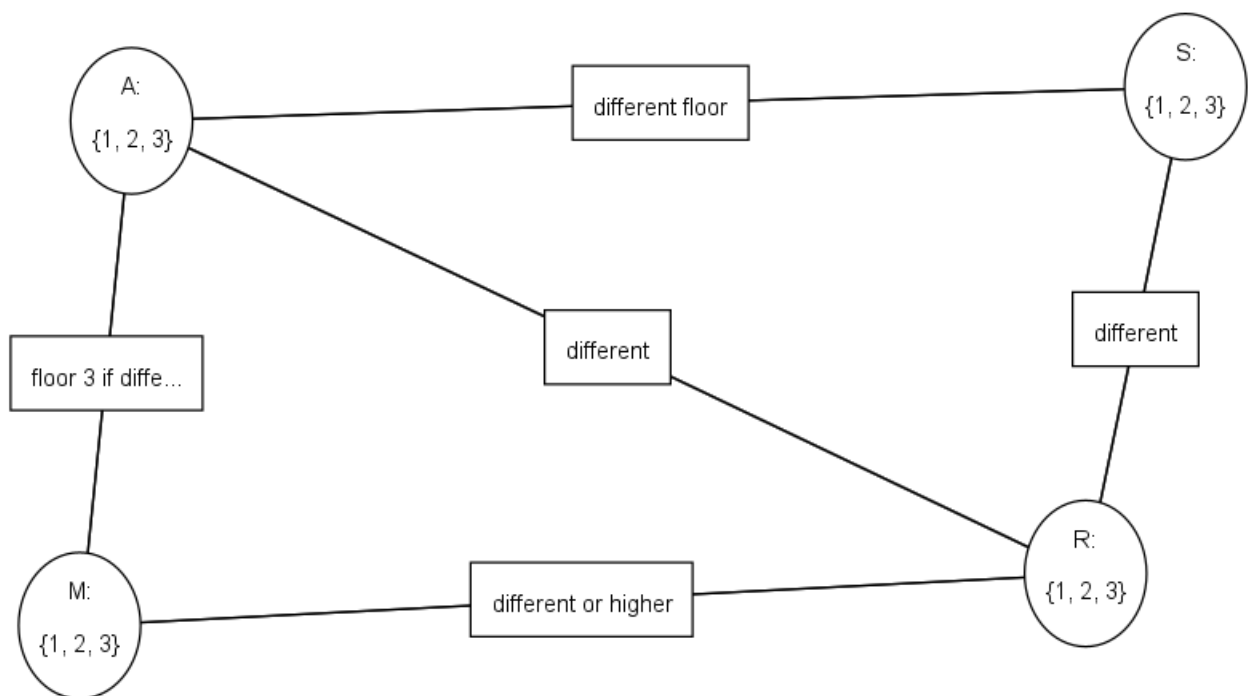


Figure 2: CSP for Task 2

Analysis of the problem

We need to identify the variables and domains for each of the given scenario and formulate them as a graph on CSP Applet.

Explanation of the solution

Since R lives on a different floor than everyone else there exists a constraint between R and all the others. A and M lives on floor 2 if they live on same floor and if different one of them lives on floor 3. A and S are also different floors. R lives on a higher floor them M. The CSP is then solved using Applet.

Interesting Findings

When we apply arc consistency, we will see that A has a domain of $\{2,3\}$, S has a domain of $\{1, 2,3\}$, M has a domain of $\{1,2\}$ and R has a domain of $\{2,3\}$.

Question 3

We are to formulate CSP for a given scenario.

Analysis of the problem

We need to identify the variables and domains for each of the given scenario and formulate them as a graph on CSP Applet.

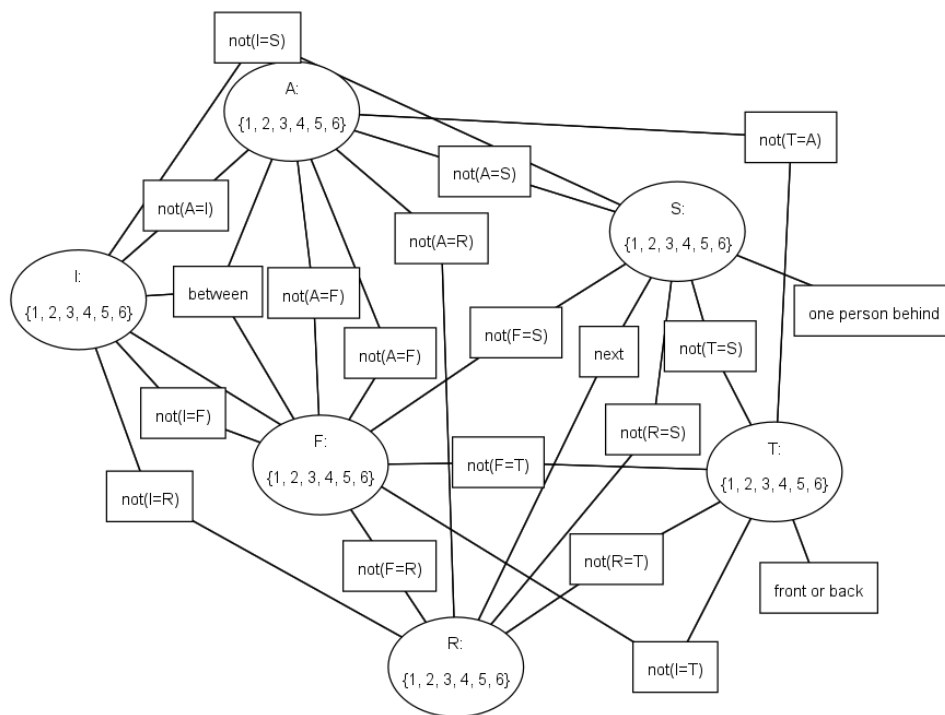


Figure 3: CSP for Task 3

Explanation of the solution

There exists a three variable constraint between F, A and I as F has to be in between A and I. S and R also has a constraint as they have to stand next to each other. As we can see in the graph, two way constraint of inequality exists in between every two of the variables to express the fact that they are all different.

Problems faced and solutions

I found no way to apply a single function to denote that all the variables should choose different domains so I had to apply binary constraint of inequality on every two variable present.

Question 4

We are to formulate CSP for a given scenario.

Analysis of the problem

We need to identify the variables and domains for each of the given scenario and formulate them as a graph on CSP Applet.

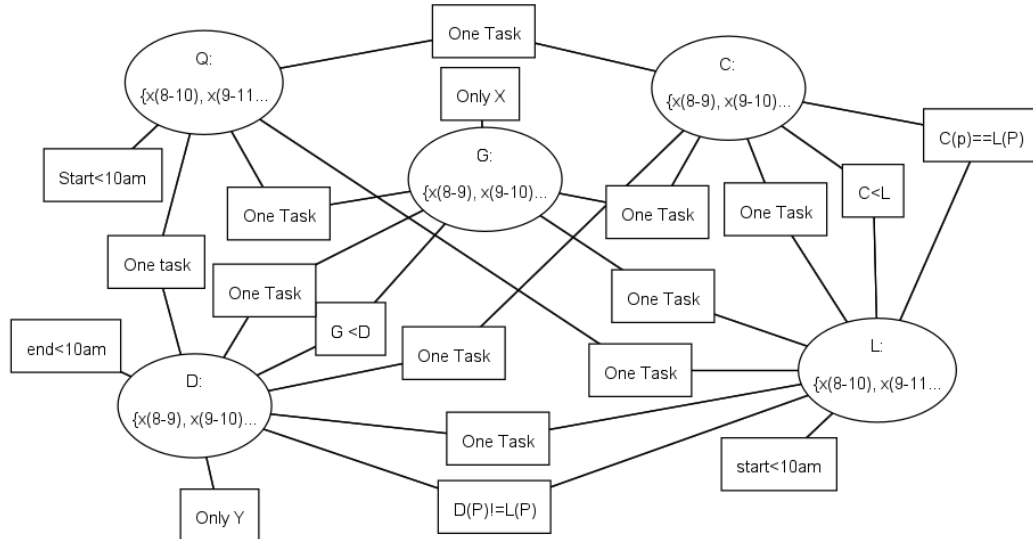


Figure 4: CSP for Task 4

Explanation of the solution

The tasks are identified as variables and domains are selected as time slot for each faculty. We will assign time slots for each faculty and their respective tasks accordingly. We have identified all the binary and unary constraint for every two of the tasks. For instance, C must happen before L so $C_i L$ is a constraint, G can only be done by X faculty so we have also identified a unary constraint there, etc. For identifying that each faculty can do one task at any given time slot, we have identified constraint between all of the tasks themselves.

Interesting findings

After applying arc consistency, only one domain is left for each of the variables $G = x(8-9)$, $C = x(9-10)$, $D = y(9-10)$, $L = x(10-12)$, $Q = y(10-12)$. From this we can assess that only one solution can be reached if these constraints are applied.