

50.021 Artificial Intelligence

Theory Homework 8

Due: every Monday, 4PM before class starts

[Q1]. You are looking for a group of friends for your start-up company, that does some kind of web-development. You are well versed in Javascript. You need 2 Javascript Programmers, 2 Flash Designers, 1 Photoshop Expert, 1 Database Admin, and 1 Systems Engineer. You have the following friends who have faith in you and are willing to bet their career and work in your company,

Name	Abilities
Daisy	Javascript and Flash
Phil	Photoshop and Flash
Jemma	Flash and Systems
Al	Javascript and Database
Lincoln	Photoshop and Flash
Melinda	Systems and Javascript
Leo	Photoshop and Flash

The constraints are as follows:

1. One person can fill *two different* assignments at once, e.g. Daisy can be a Javascript Programmer and also a Flash designer, but she cannot do both Javascript assignments
2. You only have enough money to hire 3 employees for your company

Answer the following questions,

1. Let the variables be: Javascript_1, Javascript_2, Flash_1, Flash _2, Photoshop, Database, Systems. Write down the appropriate domains.

Solution:

Javascript1	You
Javascript2	Daisy, Al, Melinda
Flash1	Daisy, Phil, Lincoln, Leo, Jemma
Flash2	Daisy, Phil, Lincoln, Leo, Jemma
Photoshop	Phil, Lincoln, Leo
Database	Al
Systems	Melinda, Jemma

2. Run vanilla backtrack up to 10 steps. Choose variables alphabetically, and if there's multiple values in the variable's domain, assign the earlier alphabet first. Show your steps.

Note: We know this question might be ambiguous. 10 steps can be interpreted as either until you meet 10 backtracks or simply 10 variable assignments. Both answers are accepted.

Solution:

In this case, we choose Database: Al first.

Database : Al, Flash1 : Daisy, Flash2 : Daisy **backtrack**
Database : Al, Flash1 : Daisy, Flash2 : Jemma, Javascript2 : Al,
Photoshop : Leo, **backtrack**
Database : Al, Flash1 : Daisy, Flash2 : Jemma, Javascript2 : Al,
Photoshop : Lincoln, **backtrack**
Database : Al, Flash1 : Daisy, Flash2 : Jemma, Javascript2 : Al,
Photoshop : Phil, **backtrack**
Database : Al, Flash1 : Daisy, Flash2 : Jemma, Javascript2 : Daisy,
Photoshop : Leo, **backtrack**
Database : Al, Flash1 : Daisy, Flash2 : Jemma, Javascript2 : Daisy,
Photoshop : Lincoln **backtrack**
Database : Al, Flash1 : Daisy, Flash2 : Jemma, Javascript2 : Daisy,
Photoshop : Phil, **backtrack**
Database : Al, Flash1 : Daisy, Flash2 : Jemma, Javascript2 : Melinda, **backtrack**
Database : Al, Flash1 : Daisy, Flash2 : Leo, Javascript2 : Al,
Photoshop : Leo, Systems : Jemma **backtrack**
Database : Al, Flash1 : Daisy, Flash2 : Leo, Javascript2 : Al,
Photoshop : Leo, Systems : Melinda **backtrack**

3. Assign Al to database and perform forward checking. Write down your results for forward checking after this variable is assigned. After assigning Al to database and performing forward checking, nothing has changed.

Solution:

Javascript1	You
Javascript2	Daisy, Al, Melinda
Flash1	Daisy, Phil, Lincoln, Leo, Jemma
Flash2	Daisy, Phil, Lincoln, Leo, Jemma
Photoshop	Phil, Lincoln, Leo
Database	Al
Systems	Melinda, Jemma

4. Suppose you want to hire Jemma because she is your childhood friend, to tackle Systems and Flash1. You also just discovered that all engineers only want to work in their own OS,

Name	OS
You	MacOS
Daisy	MacOS
Phil	MacOS
Jemma	Windows
Al	Windows
Lincoln	Linux
Melinda	Linux
Leo	MacOS

And that you only have money to install 2 OS in your company. What are the domains for the two remaining positions after constraint propagation (Arc consistency)? You need the assume that one's own constraint on OS should have priority.

Solution:

You prefer to work with MacOS, and that you want to hire Jemma who prefers to use

Windows. That means we cannot hire Lincoln and Melinda. We need to hire Al to satisfy database requirement, that means we only have 1 position left to fill, so we cant hire Daisy for Javascript2. We must either hire Phil or Leo to satisfy both Flash and Photoshop.

Javascript1	You
Javascript2	Al
Flash1	Jemma
Flash2	Phil, Leo
Photoshop	Phil, Leo
Database	Al
Systems	Jemma