

CS404 - Artificial Intelligence

Homework 4 - Fall 2024 - Prolog

1 Objective

Gain a deeper understanding of logic programming, with a specific focus on Prolog basics.

2 Problem Definition

You will solve a puzzle involving the kidnapping of a parrot. You've analyzed camera recordings and found a plate number that led to an address. There are six people living in this house who are all suspects now. Six bags with different colors are found in this house; you don't know who owns which bag and what food item was carried with the bag, but you know that each bag and food was associated (owned, carried) by a different person.

These are the people and items at the house:

Men: Gencer, Can, Rasim.

Women: Beyza, Canan, Meryem.

Bags: blue, orange red, purple, green and yellow bags.

Food: avocado, onion, nuts, chocolate, garlic, cookies.

After a criminal analysis, you have obtained these clues:

Clue1 : Onion was not carried with the red bag.

Clue2 : The man who owns the red bag did not carry cookies, chocolate, or avocado.

Clue3 : Beyza owns either the yellow bag or the blue bag and Meryem owns the other.

Clue4 : The person who carried the avocado, who was not Beyza nor Gencer, does not own the blue or orange bags.

Clue5 : The woman who carried the cookies owns the yellow bag.

Clue6 : The food item carried with the purple bag belongs to either Can or Gencer.

Clue7 : Chocolate was not carried with the orange bag.

Clue8 : Meryem did not carry a food item with the yellow or green bag.

Clue9 : Onion is carried by Gencer.

Clue10: Nuts were carried with the green bag and that person was guilty!

3 Assignment

Write a Prolog program that solves this problem on the SWI-SH website (link to SWI-SH).

- Your program should define predicates for the given facts and clues (e.g. `man(...)`, `woman(...)`, `person(...)`, `clue1(...)`), and any other predicates (e.g. to indicate that the bags belong to different people).
- Use these appropriate and readable names (specifically, `OwnsYellowbag`, `CarriedCookies` etc.).
- Write a rule for each clue separately. Keep the clue numbers (e.g. `clue1`, `clue2`, ...) and use only the needed variables in clues.
- Write a predicate `guilty(X)` that will return the substitution for the kidnapper and also print all the relations (who owns which bag and which food item is carried by using which bag etc.), together with who the kidnapper is. Use the *order* given in Table 1 to write your answers.
- Include author name, date, clues and any other comments in your code.

3.1 What to Submit

- Upload your solutions (`hw4-fullname.pl`) to SUcourse.
- Fill-in the requested answers in Homework 4 - Quiz tab, to facilitate with grading.

Table 1: Answers

| List | Your Answer |
|-------------------------|-------------|
| Bluebag is owned by | |
| Greenbag is owned by | |
| Orangebag is owned by | |
| Purplebag is owned by | |
| Redbag is owned by | |
| Yellowbag is owned by | |
| Avocado is carried by | |
| Chocolate is carried by | |
| Cookies is carried by | |
| Garlic is carried by | |
| Nuts is carried by | |
| Onion is carried by | |
| Kidnapper is | |