Grundlagen der künstlichen Intelligenz
Practical 2 11th November 2016

Problem 2: Constraint Satisfaction

It is the night before Christmas and you are in the only shop in Munich still open. You still need to buy presents for your Mum, your Brother, your Grandma, your Grandpa, your Cousin, your Aunt, your Uncle and your Significant Other. In the shop there are:

- 2 Dave Brubeck CDs, costing €10
- several (> 7) luxury christmas socks, costing €7
- 4 boxes of chocolates, costing €4
- 1 coffee mill, costing €12

Consider the following constraints

1. each person must get exactly one present,
2. you have a total budget of €52,
3. Your mum, brother and significant other must get different presents
4. Your uncle and cousin must get different presents
5. Your grandparents must get different presents
6. Your mum and uncle must get different presents
7. You cannot get chocolates for your mum, brother, significant other or grandpa
8. Your cousin must not get socks
9. There is only one coffee mill
10. There are no more than 2 CDs
11. There are no more than 4 boxes of chocolates
12. your brother must get a CD
13. nobody gets chocolates

Model the constraint satisfaction problem in Savile Row. For each of the following subsets of constraints, find the solution, if it exists:

Problem 2.1: { 1 – 12 }

Problem 2.2: { 1 – 3, 6 – 13 }

Problem 2.3: { 1, 8 – 13 }

Problem 2.4: { 1, 3 – 9, 11 – 13}

Problem 2.5: { 1, 3 – 12 }

Please upload the following files:

- `csp1.eprime` – your `.eprime` file for problem 2.1
- (`csp1.param` – your `.param` file for problem 2.1, if used)
- `csp2.eprime` – your `.eprime` file for problem 2.2
- (`csp2.param` – your `.param` file for problem 2.2, if used)
- `csp3.eprime` – your `.eprime` file for problem 2.3
- (`csp3.param` – your `.param` file for problem 2.3, if used)
- `csp4.eprime` – your `.eprime` file for problem 2.4
- (`csp4.param` – your `.param` file for problem 2.4, if used)
- `csp5.eprime` – your `.eprime` file for problem 2.5
- (`csp5.param` – your `.param` file for problem 2.5, if used)
- `readme.txt` – a text file explaining:
  - Your choice of variables,
  - Your solutions to each problem (if a solution exists) i.e. who gets what. If multiple solutions exist for some problem, you need only give one solution here.

The `.param` files are optional. Therefore you will be uploading between 6 and 11 files.

A pass will be awarded only if:

- the solutions to the problems in `readme.txt` are correct,
- your `.eprime` files (and `.param` files, if used) work and generate a `solution` file if a solution exists, and the problem has been modelled correctly using your choice of variables,
- your submission is submitted in the correct format, as shown above.

Like the rest of the programming exercises, this is an individual project and work **must** be your own (We will use a plagiarism detection tool and any copied code will annul all bonus exercises from both the copier and the copied person!) Submission will close on **23rd December at 23:59**. I will then mark all the solutions using a shell script (so it is very important to follow the instructions exactly) and will return them with automated feedback. If the error is minor, e.g. a formatting error or a conceptual error producing a wrong solution, you will then have a week to correct your solution and reupload if necessary.