CAB320 – CSP Prac - SOLUTIONS

Ex 1 [non programming]

First let simplify momentarily the problem by considering the one dimensional version of the problem. That is, let's replace the 2D rectangles with 1D intervals.

Each small interval has a given length L_i. The CSP integer variable X_i is the left endpoint of the interval. Let L be the integer length of the large interval.

The constraints are

$$\forall i \ \ 0 \leq X_i \ \text{ and } \ X_i + L_i \leq L$$

$$\forall i,j \ \ X_j + L_j < X_i \ \text{ or } \ X_i + L_i < X_j$$

For the rectangle version of the problem, we consider a second set of variables Y_i for the second dimension with similar constraints. We now have the constraints

$$\forall i \ \ 0 \leq X_i \ \text{ and } \ X_i + L_i \leq L \ \text{ and } \ 0 \leq Y_i \ \text{ and } \ Y_i + W_i \leq W$$

$$\forall i,j \ \ X_j + L_j < X_i \ \text{ or } \ X_i + L_i < X_j \ \text{ or } \ Y_j + W_j < Y_i \ \text{ or } \ Y_i + W_i < Y_j$$

Exercise 2 (DFS for CSP)

- In the class CSP, how are state represented? What is the data structure used?

  As can been seen in 'csp.result' method, a state is a tuple of tuples of the form (var,val)

- What is an 'action' in the context of the CSP class? How is an action represented?

  An action is a pair (var,val)

- What are the 'neighbors' of a variable in 'csp_vars' ?

  The variables that are involved in a constraint with this variable

- How do you translate the 'goal_test' function in plain English?

  All variables have been assigned a value and no variable is conflicted

- Complete the function 'actions' of the class CSP. Test your CSP class implementation with a DFS on the MapColoringCSP problems

  See the file 'solution_cab320_csp.py'

Exercise 3 (Stochastic hill climbing)

See the 'min_conflicts' function in the file 'solution_cab320_csp.py'