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hw2_csps_q3_four_queens

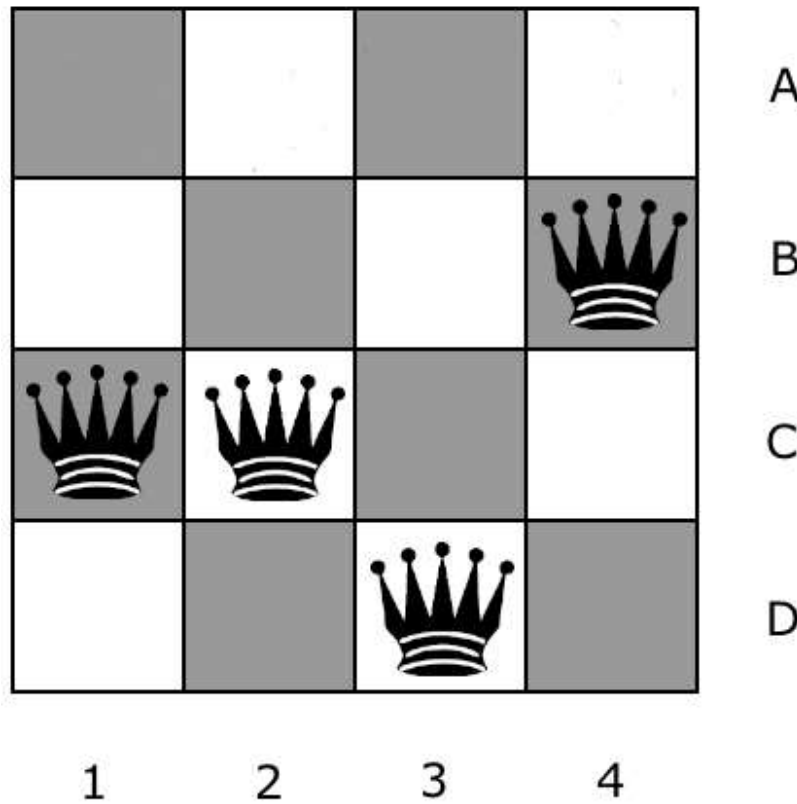
Question 3: 4-Queens

0.0/4.0 points (graded)

The min-conflicts algorithm attempts to solve CSPs iteratively. It starts by assigning some value to each of the variables, ignoring the constraints when doing so. Then, while at least one constraint is violated, it repeats the following: (1) randomly choose a variable that is currently violating a constraint, (2) assign to it the value in its domain such that after the assignment the total number of constraints violated is minimized (among all possible selections of values in its domain).

In this question, you are asked to execute the min-conflicts algorithm on a simple problem: the 4-queens problem in the figure shown below. Each queen is dedicated to its own column (i.e. we have variables Q_1 , Q_2 , Q_3 , and Q_4 and the domain for each one of them is {A, B, C, D}). In the configuration shown below, we have $Q_1 = C$, $Q_2 = C$, $Q_3 = D$, $Q_4 = B$. Two queens are in conflict if they share the same row, diagonal, or column (though in this setting, they can never share the same column).

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You will execute min-conflicts for this problem three times, starting with the state shown in the figure above. When selecting a variable to reassign, min-conflicts chooses a conflicted variable at random. **For this problem, assume that your random number generator always chooses the leftmost conflicted queen.** When moving a queen, move it to the square in its column that leads to the fewest conflicts with other queens. **If there are ties, choose the topmost square among them.**

We recommend you work out the solutions to the following questions on a sheet of scratch paper, and then enter your results below.

Part 1

Starting with the queens in the configuration shown in the above figure, which queen will be moved, and where will it be moved to?

Queen

☒ 1 ✓

☐ 2

☐ 3

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Position

☒ A ✓

☐ B

☐ C

☐ 4☐ D

Queens 1, 2, and 3 are conflicted, so according to the specification, the leftmost queen is selected: Queen 1. It is moved to position A, because there are no conflicts with position A.

i Answers are displayed within the problem

problem

0.0/4.0 points (graded)

Part 2

Continuing off of Part 1, which queen will be moved, and where will it be moved to?

Queen

☐ 1☒ 2 ✓☐ 3☐ 4

Position

☒ A ✓☐ B☐ C☐ D

Queens 2 and 3 are conflicted, so Queen 2 is selected. Positions A, C, and D all have one conflict, so the topmost is selected: position A.

i Answers are displayed within the problem

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problem

0.0/4.0 points (graded)

Part 3

Continuing off of Part 2, which queen will be moved, and where will it be moved to?

Queen	Position
<input checked="" type="radio"/> 1 ✓	<input type="radio"/> A
<input type="radio"/> 2	<input type="radio"/> B
<input type="radio"/> 3	<input checked="" type="radio"/> C ✓
<input type="radio"/> 4	<input type="radio"/> D

Now Queens 1 and 2 are conflicted, so Queen 1 is chosen again. This time position C has no conflicts, so it is moved back to position C.

Submit

i Answers are displayed within the problem

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