

PROJECT 1: SOLVING SUDOKU WITH AI

QUESTION: HOW DO WE APPLY CONSTRAINT PROPAGATION TO SOLVE THE NAKED TWINS PROBLEM?

Solving the naked twins problem involves enforcing the constraint that if any pair of boxes in a unit have the same two digits as choices, then those two digits cannot be choices for the remaining boxes in that unit. To implement this constraint the following steps are followed in the method *naked_twins()* in *solutions.py*.

1. For each unit in the Sudoku board (e.g. rows, columns, squares, and diagonals).
2. Identify all boxes with only two digit choices.
3. Find pairs of boxes with the same two digit choices as these form a naked twin pair.
4. For each naked twin pair, remove their two digits from the choices of other unit boxes.

Note that this implementation is general and allows for the possibility of a unit having more than one pair of naked twins (e.g. a row may have two boxes with choices '23' and two other boxes with choice '45').

QUESTION: HOW DO WE APPLY CONSTRAINT PROPAGATION TO SOLVE THE DIAGONAL SUDOKU PROBLEM?

To solve the diagonal Sudoku problem, we simply need to add two new units to the rows, columns, and three-by-three square units of the standard Sudoku puzzle. One of the units corresponds to the left-to-right main diagonal and the other corresponds to the right-to-left main diagonal. Now, the methods *naked_twins()*, *eliminate()*, and *only_choice()* will ensure that all units (including the newly added diagonal units) satisfy the game rules. In *solutions.py*, the variables *LEFT_TO_RIGHT_DIAG_UNIT* and *RIGHT_TO_LEFT_DIAG_UNIT* define the main diagonal units that are added to the list of all units *UNITLIST*.

Answer: