Project 1: Sudoku Challenges

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Description

This project is aimed to solve the 9x9 Sudoku problem with optimization methods.

There are four data sets. Each has two columns: quizzes and solutions. Entries are strings and each one has 81-character array. “0” represents the empty slots. For two small data sets, we use all of them to train and test the model. For two large ones, we make a uniformly discrete distribution with seed 42 and choose 1000 data each to train and test the model.

The optimization method is the constraint linear optimization, LP, which is a programming method to achieve the best outcome for a problem whose requirements have linear relationships. The target is to solve the linear problem $\min_X ||X||_L$, subject to the equality constraint AX = b. In this problem, A is the quizzes matrix with n rows and 81 columns. B is the solutions matrix.

Run the code

Use the function *solver(data)* to solve a Sudoku problem.

Results

The results of each data set:

A(small1): 24/24, 100%

B(small2): 325/1011, 32.15%

C(large1): 792/1000, 79.2%

D(large2): 1000/1000, 100%

The results above are in the *sudoku_solver.ipynb*, showed as comments below the function *solve()*.