CS472 Assignment 5: Backtracking

CS472 - Analysis of Algorithms

March 27, 2017

1 Overview

Sudoku puzzles are a logic-based combinatorial number-placement puzzle. The objective is fill a 9x9 grid with digits so that each column, each row, and each of the nine 3x3 sub-grids that compose the puzzle contains all of the digits from 1 to 9. Completed puzzles must meet additional constraints on contents of individual regions. For example, the same integer cannot appear twice in the same row, column, or in any of nin3 3x3 squares in the grid. The author of the puzzle provides a partially completed grid, which assuming a well-posed puzzle, has a unique solution.

In lecture, we provided a backtracking algorithm for solving the Sudoku puzzles commonly found in newspapers:

Algorithm 1: Sudoku: A backtracking algorithm for 9x9 puzzles

```
Input: A 9x9 array grid with known values and a position
Output: The array grid with solution
if endOfGrid?() then
    return true;
for $x \in$ [1..9] do
    grid[position] $\leftarrow$ x;
    if gridisValid?() then
        if Sodoku(nextPosition()) then
            return (true);
gridPosition[position] = NULL;
return false;
```

2 Problem

Implement a Sudoku solver in your favorite programming language. Puzzles should be read from a text file that has one puzzle row per line in the file. Use a value of 0 to indicate an empty entry in the puzzle grid. Solutions should be output to standard output and written to a text file.

3 Submission instructions

You will need to attach a PDF file containing source code to your solution, any scripts and data used to test your program, and sample runs of your program.