Readme about SudokuSolver16

**Enter a puzzle**

1. Select a file. The program brings up a file selection menu. Click on TestFiles, then AutomaticBulk Tests. Click on one of the files ending in .sdk or choose a directory for more choices. .sdk files are a format for storing Sudoku puzzle data (<http://www.sadmansoftware.com/sudoku/faq19.php>). What I like about it is that there is a way to store pencil marks and also meta data about the puzzle.
2. Enter your own puzzle using the number pad. Click on the number, then click on the square where you want it to go. If you make an error, replace the value with a 0, then put the correct number there. When you have all the values placed, click on Initialize to get started. The program will show all the valid pencil marks.

**Step through the solution process**

Click on the **Step** button. The solver will attempt to find either put a cell to its final value, or eliminate one or more candidates from the pencil marks. Commentary on the reason for the step are provided in the text box to the right, with candidates and chains highlighted on the Sudoku puzzle display.

Continue with the **Step** button until the puzzle is solved, or the solver gives up, or finds an error with the puzzle.

**Solving Techniques Currently Implemented**

1. Single digit
   1. Single value in a cell
   2. Single value in a row, column, or area
2. Naked and hidden pairs, triples, and pointing nodes
3. Locked Sets
   1. Locked sets is when for a selection of cells, you have the same number of different candidate values as the number of cells/
   2. X-Wings and Fish – Computationally speaking, cells, rows, and columns are equivalent, so Xwings and fish are shown next.
4. Chains
   1. I use a different plan than most solvers, based on an article “The Mathematics of Sudoku” ( [www.geometer.org/**math**circles/**sudoku**.pdf](http://www.geometer.org/mathcircles/sudoku.pdf) )
5. Chain interactions
   1. Also from “The Mathematics of Sudoku”. Chains and chain interactions provides a more robust and simpler solving technique than other chain techniques such as 3D Medusa and AICs (Alternate Inference Chains)
6. Forcing Chains
   1. Single digit (Nishio)
   2. Cell, row, Column and Unit Forcing Chains

These techniques are very powerful, especially when combined with Almost Locked Sets (ALS). Applied properly, among other techniques, they obviate the need for looking for finned and Franken X-wings and fish.

1. Almost Locked Sets
   1. An Almost Locked Set is a set of cells there the number of different candidate values exceeds the number of cells by just one.
   2. I have a novel, innovative elimination method that uses a single ALS interacting with a chain.
   3. ALS can be combined into chains for eliminations.

**Solving Techniques to be implemented**

The last constraint on a Sudoku puzzle is that there is just one solution for each puzzle. This can lead to opportunities to remove candidates. I have implemented some uniqueness algorithms in an older implementation of this solver, so I have some idea where to go. This is an area ripe for algorithm innovation.