

sudoku

November 2, 2018

```
In [4]: %matplotlib inline
```

```
import matplotlib.pyplot as plot
plot.rcParams['figure.figsize'] = [8, 8]

import solver_w_search
from board_io import string_to_board, board_to_string
from board_plot import plot_board, plot_solve
```

```
In [2]: board_template = """
```

```
8 . . | . . . | . . .
. . 3 | 6 . . | . . .
. 7 . | . 9 . | 2 . .
-----+-----+-----
. 5 . | . . 7 | . . .
. . . | . 4 5 | 7 . .
. . . | 1 . . | . 3 .
-----+-----+-----
. . 1 | . . . | . 6 8
. . 8 | 5 . . | . 1 .
. 9 . | . . . | 4 . .
```

```
"""
```

```
board = string_to_board(board_template)
print board_to_string(board)
```

```
8...36...7..9.2...5...7...457...1...3...1...68..85...1..9...4..
```

```
In [6]: solver_w_search.eliminate_plus(board)
plot_board(board, True, True)
```

8	1 2 4 6	2 4 5 6 9	2 3 4 7	1 2 3 5 7	1 2 3 4	1 3 5 6 9	4 5 7 9	1 3 4 5 6 7 9
1 2 3 4 5 9	1 2 4	3	6	1 2 3 5 7 8	1 2 4 8	1 5 8 9	4 5 7 8 9	1 4 5 7 9
1 4 5 6	7	4 5 6	4 3 8	9	1 3 4 8	2	4 5 8	1 3 4 5 6
1 2 3 4 6 9	5	4 2 6 9	2 3 8 9	2 3 6 8	7	1 6 8 9	4 2 8 9	1 2 4 6 9
1 2 3 6 9	1 2 3 6 8	2 6 9	2 3 8 9	4	5	7	2 8 9	1 2 6 9
4 2 6 9 7	4 2 6 8	4 2 6 9 7	1	2 6 8	2 6 8 9	5 6 8 9	3	4 2 5 6 9
2 3 4 5 7	2 3 4	1	2 3 4 7 9	2 3 7	2 3 4 9	3 5 9	6	8
2 3 4 6 7	2 3 4 6	8	5	2 3 6 7	2 3 4 6 9	3 9	1	2 3 7 9
2 3 5 6 7	9	2 5 6 7	2 3 7 8	1 2 3 6 7 8	1 2 3 6 8	4	2 5 7	2 3 5 7

```
In [7]: solver_w_search.solve = plot_solve
```

```
board = string_to_board('..36.49.....5.....9.....72.....6.4.....5.8.....11.....5')
board = solver_w_search.solve(board)
print board_to_string(board)
```

```
753614982628957134914382567275193846341268759869475321136849275487521693592736418
```

		3	6		4	9		
				5				
9								7
2								6
	4						5	
8								1
1								5
	9	2	7	3	6	4	1	

7	1 2 5 7 8	3	6	1 2 7 8	4	9	2 8	2
4 6 7	1 2 7 8	1 4 6 7 8	1 2 3 8 9	5	1 2 3 7 8 9	1 2 3 6 8	2 3 4 6 8	2 3 4
9	1 2 5 6 8	1 4 5 6 8	1 2 3 8	1 2 8	1 2 3 8	5	2 3 4 6 8	7
2	1 3 5 7	1 5 7 9	1 3 4 5 8 9	1 4 7 8 9	1 3 5 7 8 9	3 7 8	3 4 6 7 8 9	6
3 6 7	4	1 6 7 9	1 2 3 8 9	1 2 6 7 8 9	1 2 3 7 8 9	2 3 7 8	5	2 3 9
8	3 5 6 7	5 6 7 9	2 3 4 5 9	2 4 6 7 9	2 3 5 7 9	2 3 7	2 3 4 6 7 9	1
1	3 6 7 8	4 6 7 8	2 4 8 9	2 4 8 9	2 8 9	2 3 6 7	2 3 6 7 9	5
4 3 6 7	3 6 7 8	4 6 7 8	1 2 4 5 8 9	1 2 4 8 9	1 2 5 8 9	2 3 6 7	2 3 6 7 9	2 3 9
5	9	2	7	3	6	4	1	8

7	5	3	6	1	4	9	8	2
6	² ₈ ⁶	⁶ ₈	^{2 3} _{8 9}	5	7	1	³ ₆	4
9	^{1 2} ₈ ⁶	4	^{2 3} ₈	² ₈	^{2 3} ₈	5	³ ₆	7
2	¹ ₇ ³	¹ ₇ ⁵ ₉	¹ ₄ ³ _{5 8 9}	⁴ _{7 8 9}	¹ _{5 8 9} ³	³ _{7 8}	⁴ ₇ ³ ₉	6
³ ₆	4	¹ ₇ ⁶ ₉	^{1 2 3} _{8 9}	² _{7 8 9} ⁶	^{1 2 3} _{8 9}	^{2 3} _{7 8}	5	³ ₉
8	³ ₇ ⁶	^{5 6} _{7 9}	^{2 3} _{4 5 9}	² _{4 7 9} ⁶	^{2 3} _{5 9}	^{2 3} ₇	^{2 3} _{4 7 9}	1
1	³ _{7 8} ⁶	⁴ _{7 8} ⁶	² _{4 8 9}	² _{4 8 9}	² _{8 9}	^{2 3} ₇ ⁶	^{2 3} ₇ ⁶ ₉	5
4	³ _{7 8} ⁶	⁴ _{7 8} ⁶	^{1 2} _{4 8 9} ⁵	² _{4 8 9}	^{1 2} _{5 8 9} ⁵	^{2 3} ₇ ⁶	^{2 3} ₇ ⁶ ₉	³ ₉
5	9	2	7	3	6	4	1	8

7	5	3	6	1	4	9	8	2
6	2	8	9	5	7	1	3	4
9	1	4	2 3 8	2 8	2 3 8	5	6	7
2	7	5 9	1 3 5 8	8 9	1 3 5 8 9	3 8	4	6
3	4	1	2 8	2 6 7 8	2 8	2 7 8	5	9
8	6	5 9	2 3 4 5	2 4 7 9	2 3 5 9	2 3 7	2 7	1
1	3	6 7	2 4 8	2 4 8 9	2 8 9	2 6 7	2 7 9	5
4	8	6 7	1 2 5	2 9	1 2 5 9	2 6 7	2 7 9	3
5	9	2	7	3	6	4	1	8

7	5	3	6	1	4	9	8	2
6	2	8	9	5	7	1	3	4
9	1	4	^{2 3} 8	² 8	^{2 3} 8	5	6	7
2	7	⁵ 9	^{1 3} ⁵ 8	^{8 9}	^{1 3} ⁵ 8 9	³ 8	4	6
3	4	1	² 8	6	² 8	7	5	9
8	6	⁵ 9	4	7	³ ⁵ 9	3	2	1
1	3	⁶ 7	² ⁴ 8	4	² 8 9	² ⁶ 7	^{7 9}	5
4	8	⁶ 7	^{1 2} 5	² 9	^{1 2} 5 9	² ⁶ 7	^{7 9}	3
5	9	2	7	3	6	4	1	8

7	5	3	6	1	4	9	8	2
6	2	8	9	5	7	1	3	4
9	1	4	^{2 3}	8	^{2 3}	5	6	7
2	7	5	^{1 3}	9	3	8	4	6
3	4	1	2	6	² ₈	7	5	9
8	6	9	4	7	5	3	2	1
1	3	6	8	4	9	2	7	5
4	8	7	5	2	1	6	9	3
5	9	2	7	3	6	4	1	8

7	5	3	6	1	4	9	8	2
6	2	8	9	5	7	1	3	4
9	1	4	3	8	2	5	6	7
2	7	5	1	9	3	8	4	6
3	4	1	2	6	8	7	5	9
8	6	9	4	7	5	3	2	1
1	3	6	8	4	9	2	7	5
4	8	7	5	2	1	6	9	3
5	9	2	7	3	6	4	1	8