Comparison of number of decisions in overlapping and non-overlapping sudokus using SAT-solvers.

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Overview

- Introduction & Hypothesis
- Method
- Results
- Discussion and conclusion

Introduction & Hypothesis

- Sat Solvers
- Conjunctive Normal Form (CNF)
- Overlapping sudokus

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

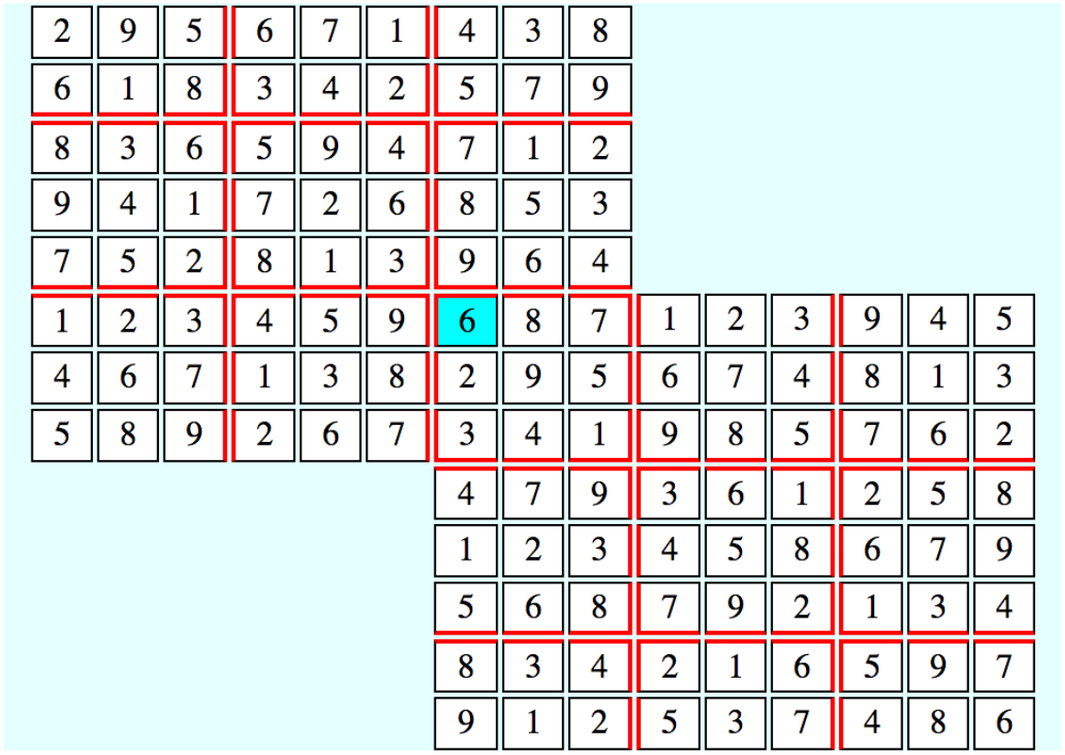
1	2	3	4	5	9	6	8	7	1	2	3	9	4	5
4	6	7	1	3	8	2	9	5	6	7	4	8	1	3
5	8	9	2	6	7	3	4	1	9	8	5	7	6	2
						4	7	9	3	6	1	2	5	8
						1	2	3	4	5	8	6	7	9
						5	6	8	7	9	2	1	3	4
						8	3	4	2	1	6	5	9	7
						9	1	2	5	3	7	4	8	6

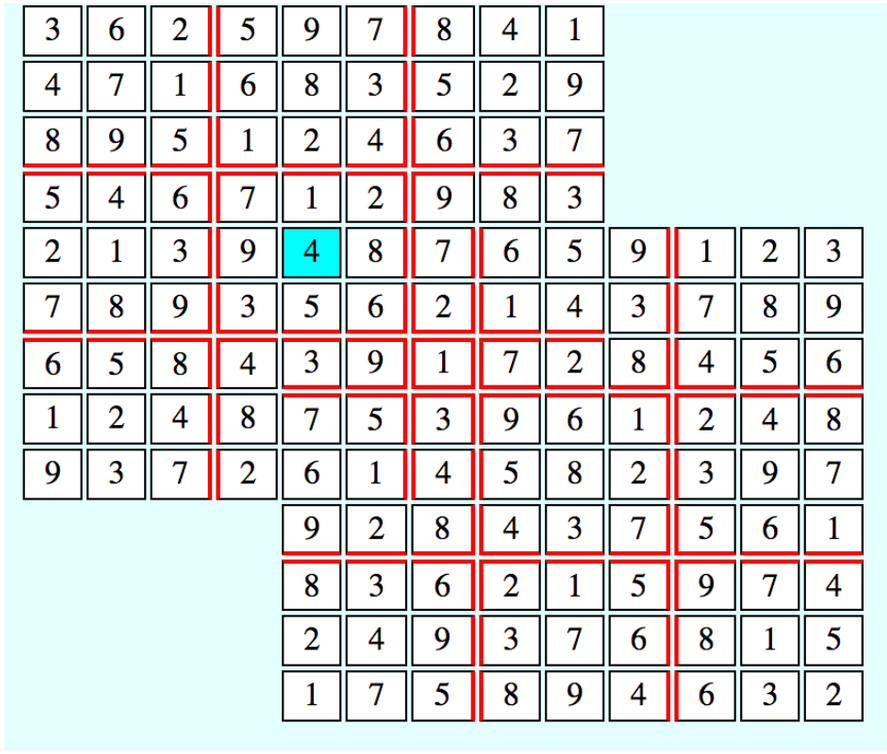
3	6	2	5	9	7	8	4	1
4	7	1	6	8	3	5	2	9
8	9	5	1	2	4	6	3	7
5	4	6	7	1	2	9	8	3

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

Introduction & **Hypothesis**

- The total number of decisions will be lower in one overlapping sudoku, compared to solving two non-overlapping sudokus.





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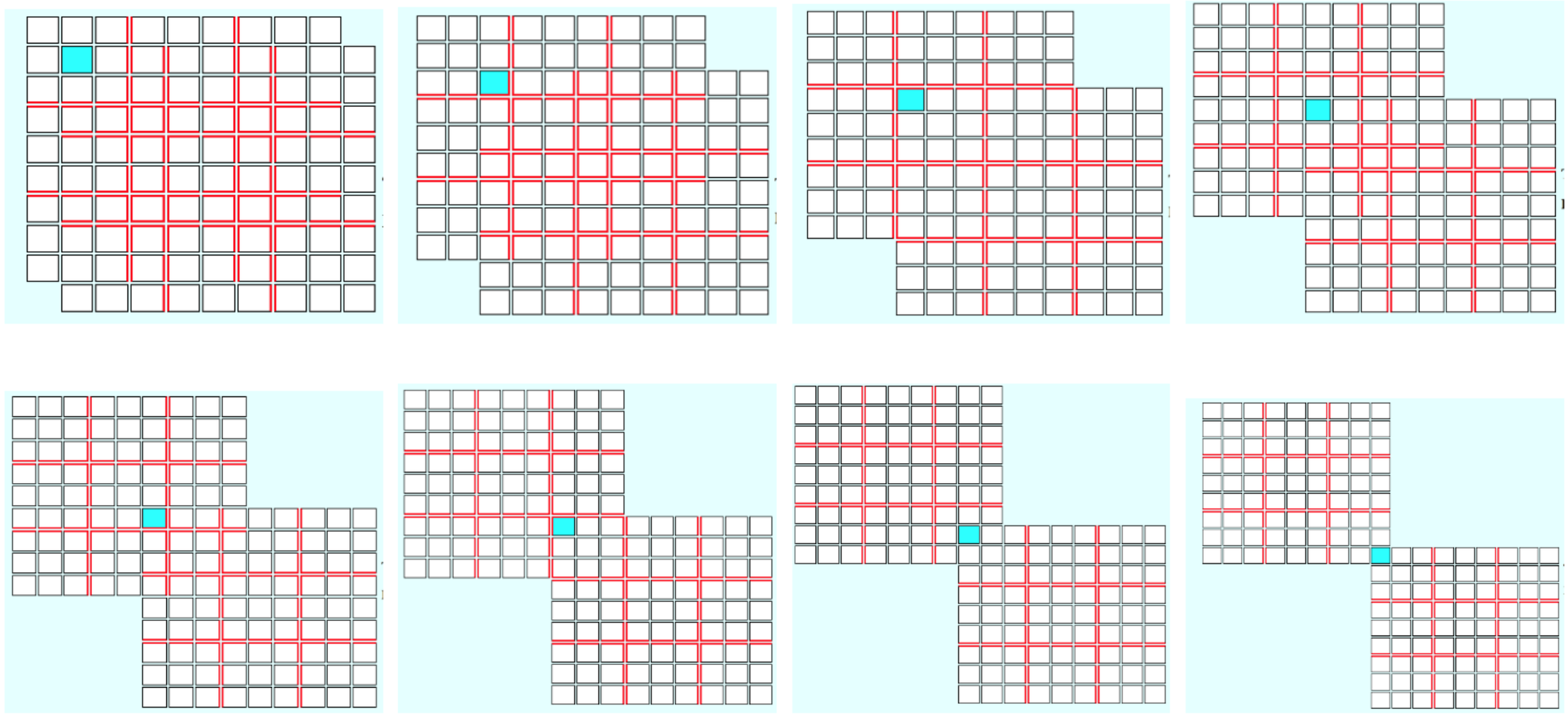
Method

- What types of overlapping sudokus?
- How do we encode our problem into CNF?
- Which SAT-solver?
- How do we generate data for the sudokus?

Method (cont)

What types of overlapping sudokus?



Method (cont)

How do we encode our problem into CNF?

- DIMACS een format

Method (cont)

Which Sat-solver?

- Zchaff for stastics.

- Pycosat for decoding the sudoku.

Method (cont)

How do we generate data for the sudokus?

- http://www.midoku.nl/
- Tweaked the javascript to generate all the desierd shapes.
- Random number assigment
- Punched out method

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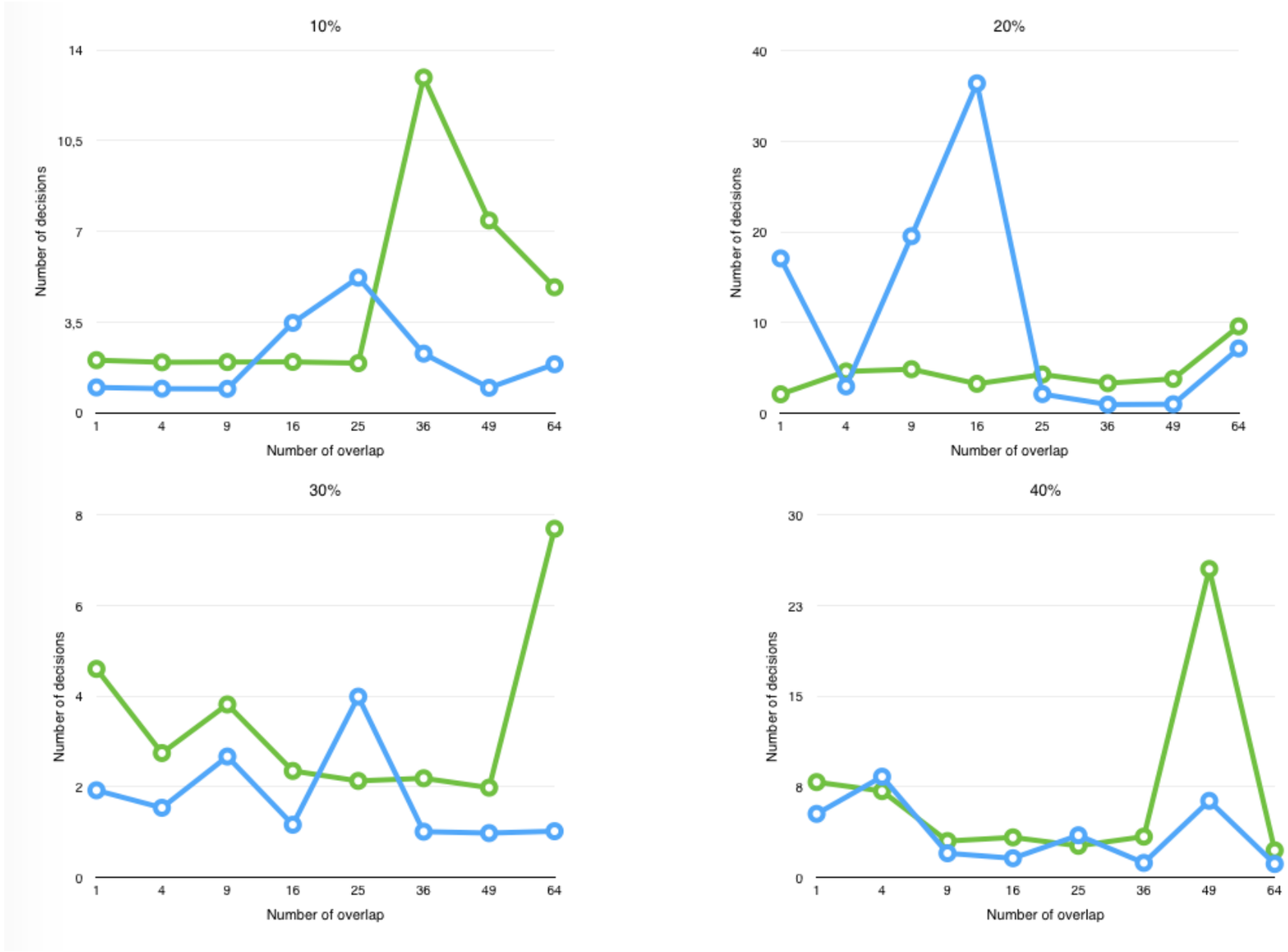
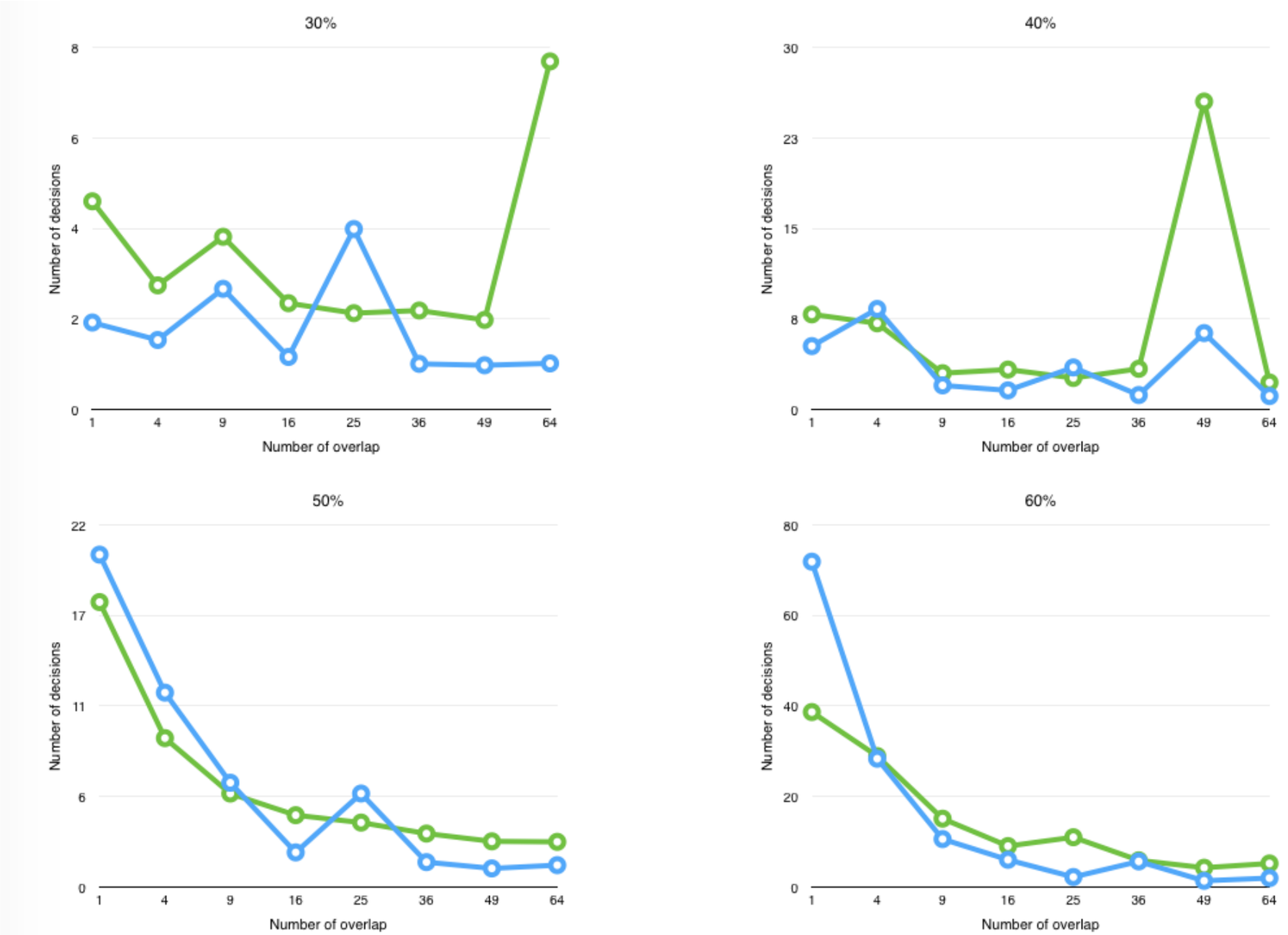
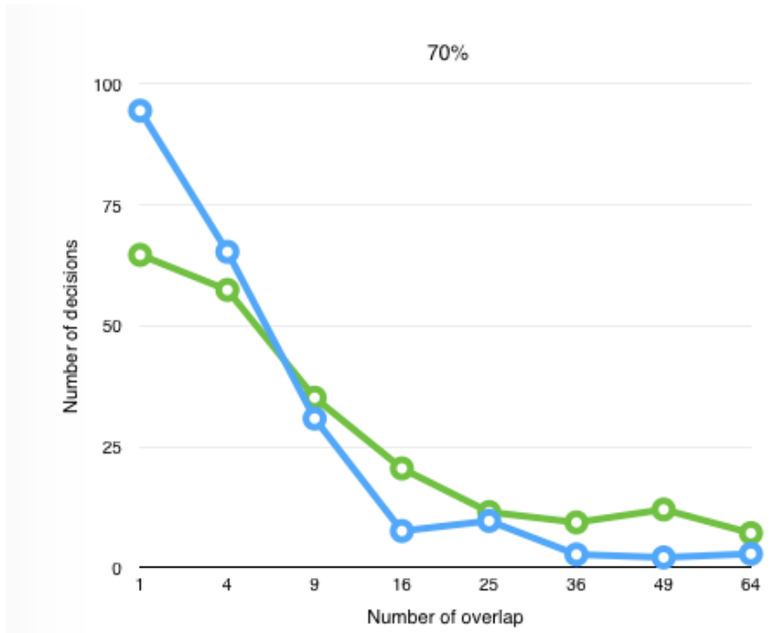
Results
Punched Out Percentage

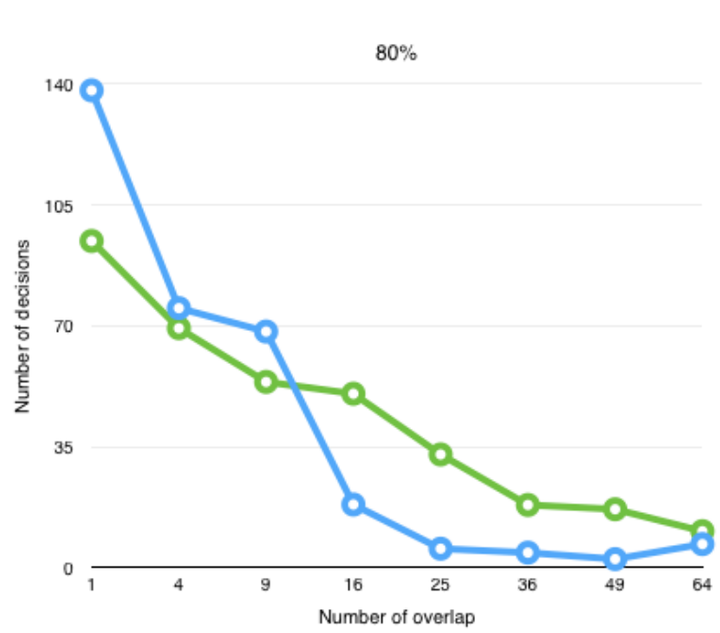


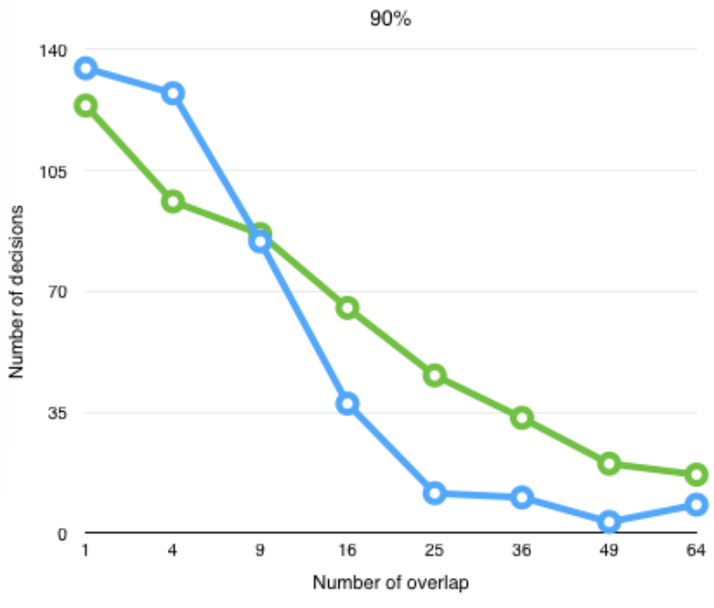
Results (cont)
Punched Out Percentage



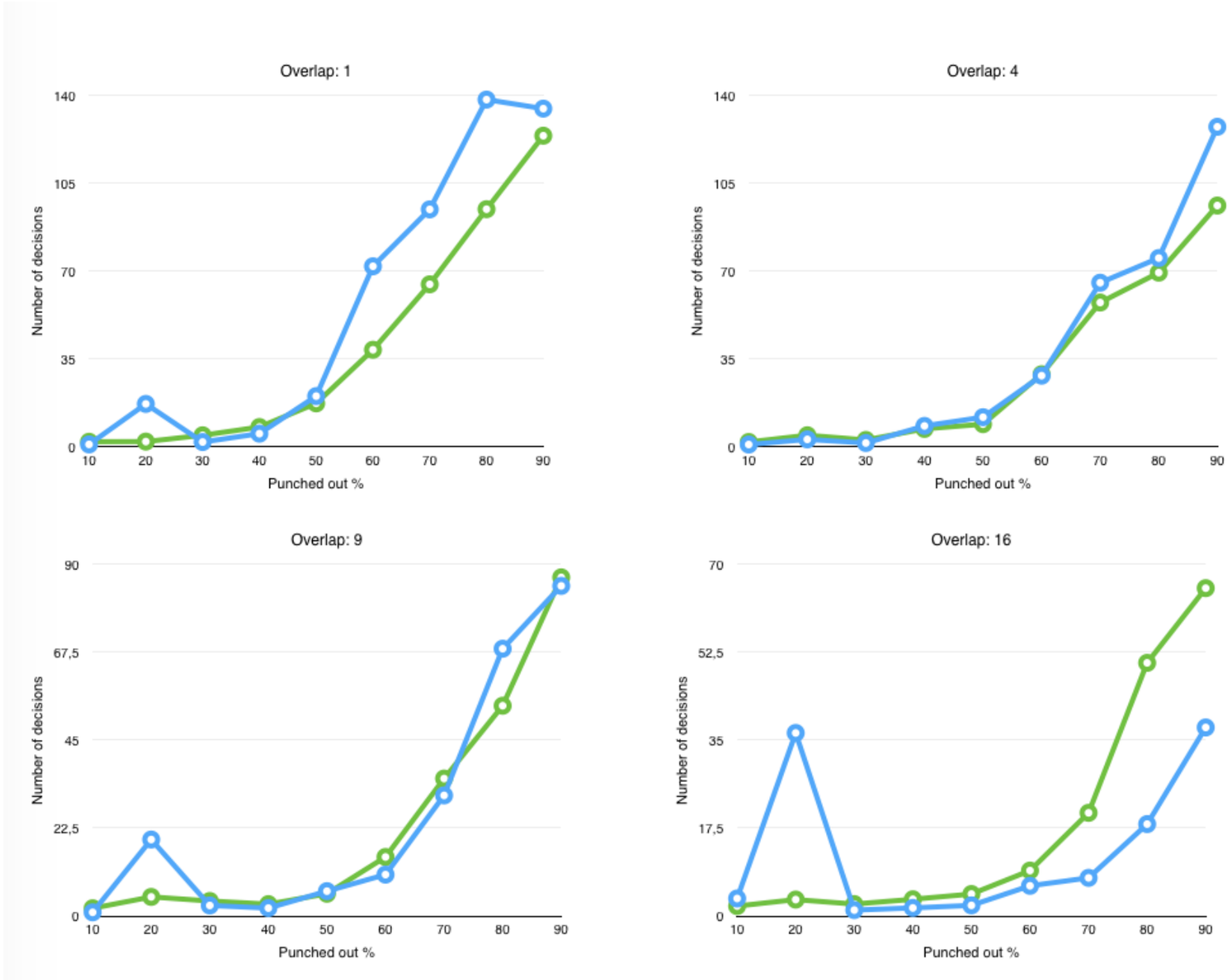
Results (cont)
Punched Out Percentage



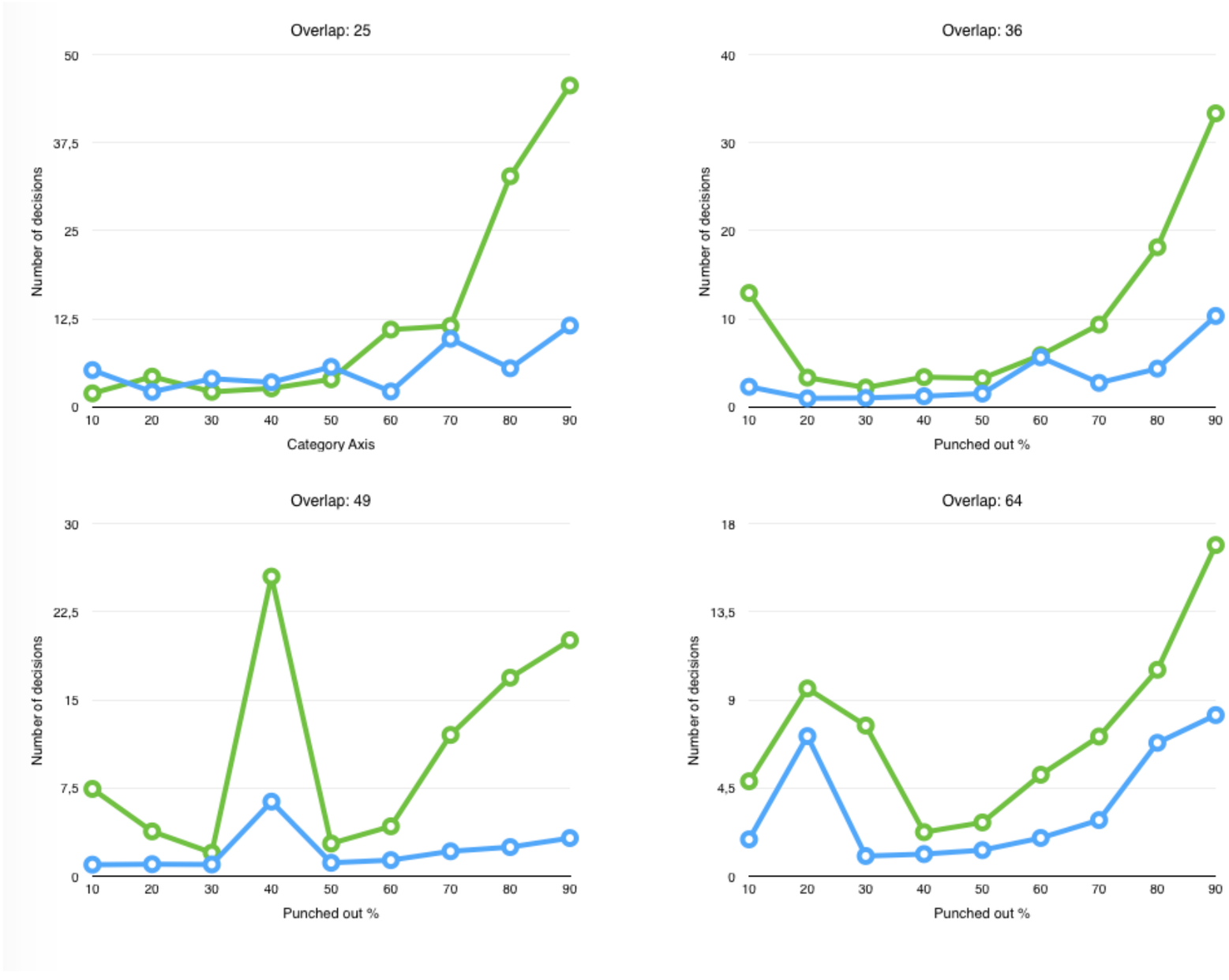




Results (cont)
Overlap



Results (cont)
Overlap



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Discussion and Conclussion

- Different shapes

- Multiple sudokus

Discussion and **Conclusion**

- Hypothesis is partially true