Analysis of the Phase Transition in the Complexity of Solving Latin Squares

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1 Objectives

Describe the objective(s) of the project and how these will be accomplished. You must give the necessary context to make the document self-contained, i.e., explain the problem or domain of application considered, the algorithm(s) that will be analyzed, which particular algorithmic issue(s) will be subject to scrutiny, etc.

2 Experimental Setup

Describe the configuration used in the experiments. This implies the following: (1) indicate what kind of experiments will be conducted (i.e., indicate in which way the algorithm will be run and what will be measured) and what will be the particular parameters that will be used in those experiments (i.e., their numerical values); (2) provide a description of the computational environment in which the experiments are run (see Table 1).

Table 1: Computational environment considered.

CPU	Write here your Processor specs, RAM
OS	Write here your Operating system name and version
Java	Write here your Java version

3 Empirical Results

A summary of the experimental results is provided in Table 2 in the Appendix.

Describe the results in Figure 1 and Figure 2.

```
## Warning in scan(file = file, what = what, sep = sep, quote = quote, dec = dec,
## : número de items leídos no es múltiplo del número de columnas
```

```
## Warning: Removed 1 row containing missing values or values outside the scale range
## (`geom_line()`).
```

```
## Warning: Removed 1 row containing missing values or values outside the scale range
## (`geom_point()`).
```

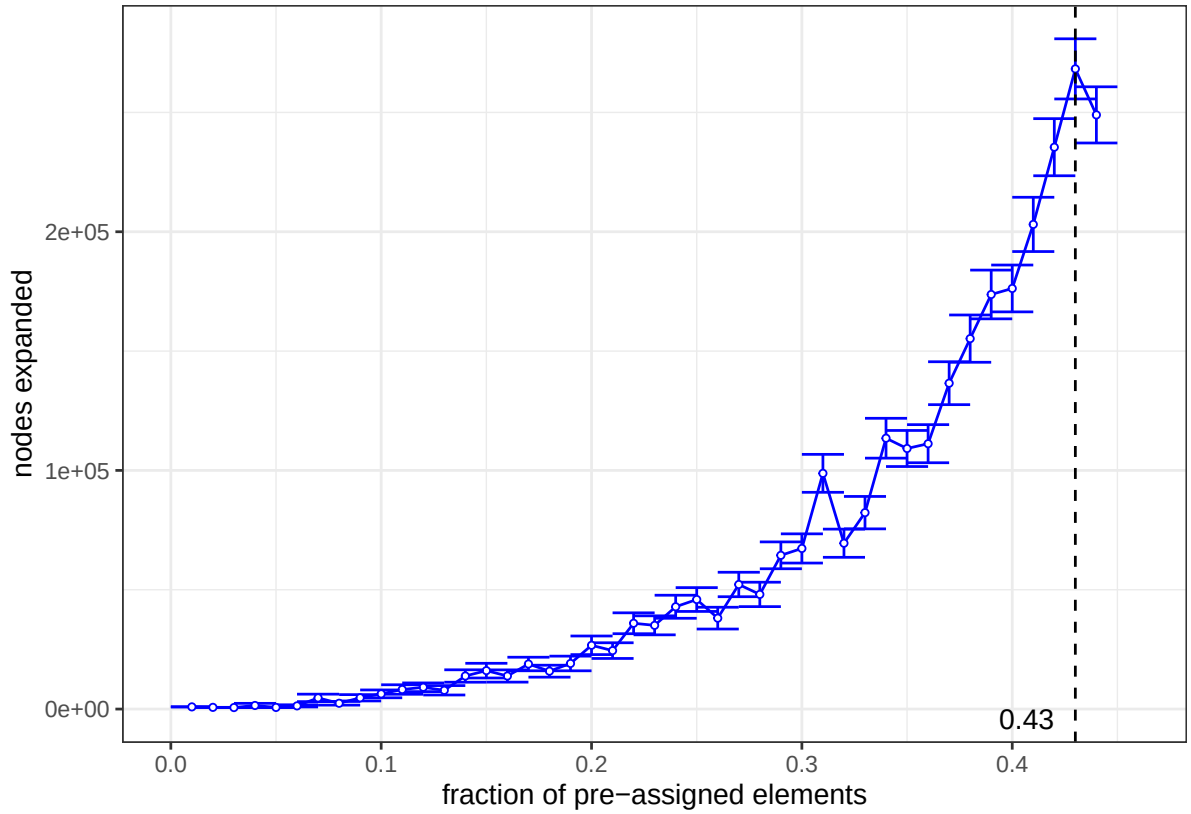

Figure 1: Number of nodes in the search tree for increasing proportion of clues (expressed relative to the size of the board).

```
## Warning: Removed 1 row containing missing values or values outside the scale range
## (‘geom_line()‘).
```

```
## Warning: Removed 1 row containing missing values or values outside the scale range
## (‘geom_point()‘).
```

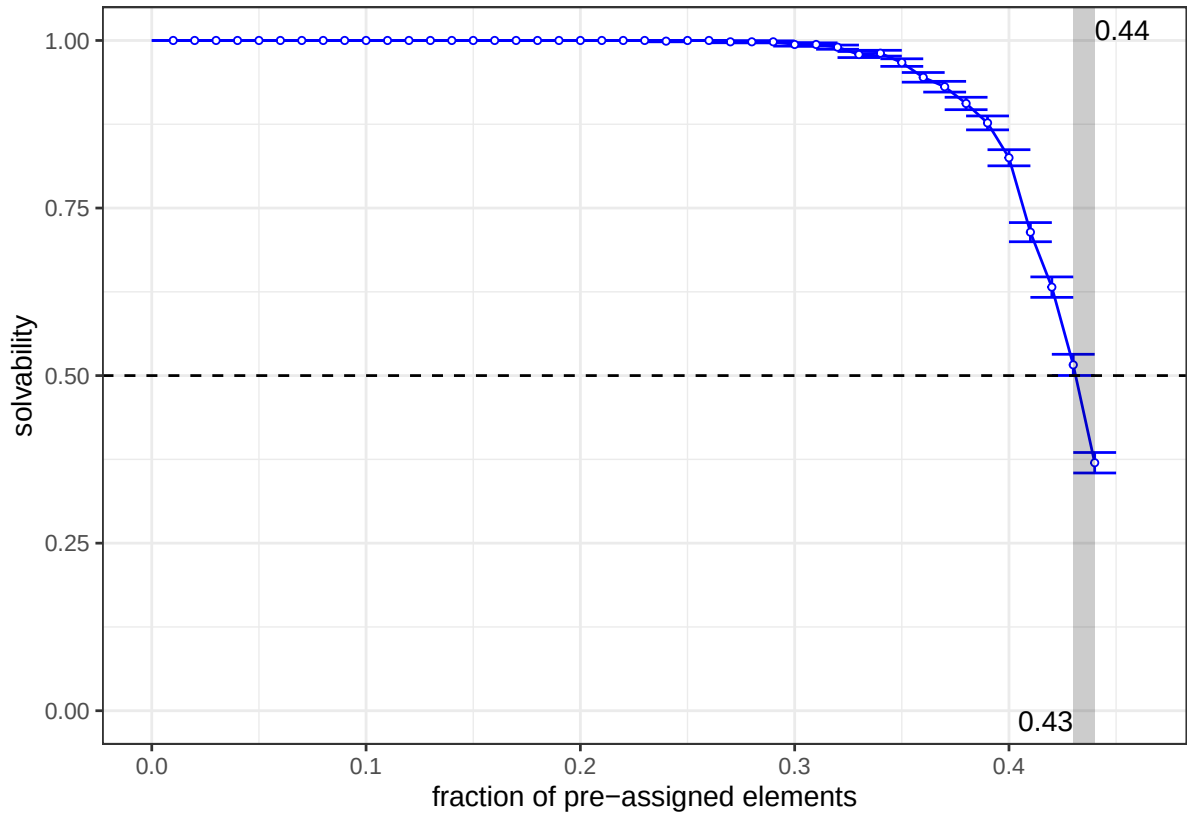

Figure 2: Fraction of solvable instances for increasing proportion of clues (expressed relative to the size of the board).

4 Discussion

Provide your interpretation of the results: discuss whether the results match the theoretical predictions, whether some algorithm is better in practice than others, etc.

A Appendix

A.1 Data Summary

Table 2: Summary of the experimental results for different proportion of clues. The mean and standard error are provided for the number of nodes explored and the fraction of solvable instances.

clues	nodes (mean)	nodes (stderr)	solv. (mean)	solv. (stderr)
0.01	913	11	1.00	0.0000
0.02	715	10	1.00	0.0000
0.03	632	9	1.00	0.0000
0.04	1504	889	1.00	0.0000
0.05	687	59	1.00	0.0000
0.06	1338	449	1.00	0.0000
0.07	4682	1563	1.00	0.0000
0.08	2425	779	1.00	0.0000
0.09	4720	1326	1.00	0.0000
0.10	6366	1643	1.00	0.0000
0.11	8187	1987	1.00	0.0000
0.12	9132	1826	1.00	0.0000
0.13	7861	1968	1.00	0.0000
0.14	13853	2597	1.00	0.0000
0.15	16102	3077	1.00	0.0000
0.16	13853	2566	1.00	0.0000
0.17	18879	2841	1.00	0.0000
0.18	15876	2504	1.00	0.0000
0.19	19103	3068	1.00	0.0000
0.20	26722	3898	1.00	0.0000
0.21	24494	3290	1.00	0.0000
0.22	35950	4381	1.00	0.0000
0.23	35081	3982	1.00	0.0000
0.24	42871	4826	1.00	0.0010
0.25	45898	4990	1.00	0.0000
0.26	38098	4563	1.00	0.0000
0.27	52196	5125	1.00	0.0014
0.28	48042	5118	1.00	0.0014
0.29	64419	5624	1.00	0.0014
0.30	67303	6119	0.99	0.0024
0.31	98773	7949	0.99	0.0024
0.32	69497	5905	0.99	0.0031
0.33	82302	6792	0.98	0.0045
0.34	113493	8347	0.98	0.0043
0.35	109185	7558	0.97	0.0057
0.36	111192	7983	0.94	0.0072
0.37	136546	8991	0.93	0.0080
0.38	155221	9905	0.91	0.0092
0.39	173721	10213	0.88	0.0104
0.40	176247	9811	0.82	0.0120
0.41	203083	11369	0.71	0.0143
0.42	235435	11966	0.63	0.0153
0.43	268258	12600	0.52	0.0158
0.44	248966	11772	0.37	0.0153
0.45	NA	NA	NA	NA