

Time: 0.6969s

Nodes/Iterations: 4,209

Conflicts: -

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

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

Constraint Prop. on Easy Board

Time: 4.6479s

Easy Initial Board

Nodes/Iterations: 1,806

Easy Solved (Constraint Prop.)

Conflicts: -

[illegible]

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

Dancing Links on Easy Board

Time: 0.0020s

Easy Initial Board

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

Nodes/Iterations: 2

Conflicts: -

Easy Solved (Dancing Links)

[illegible]

Sim. Annealing on Easy Board

Time: 6.5728s

Easy Initial Board

Nodes/Iterations: 27,695

Easy Solved (Sim. Annealing)

Conflicts: 21

Success Rate: 0.00%

[illegible]

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

Genetic Alg. on Easy Board

Time: 27.4549s

Easy Initial Board

Nodes/Iterations: 2,000

Easy Solved (Genetic Alg.)

Sudoku										Correct
Success										Score
5	3			7						
6			1	9	5					
	9	8					6			
8				6					3	
4			8		3				1	
7				2					6	
	6					2	8			
			4	1	9				5	
				8			7	9		

Conflicts: 13

Success Rate: 0.00%

[illegible]

Backtracking on Medium Board

Time: 0.4050s

Medium Initial Board

[illegible]

Nodes/Iterations: 2,251

Medium Solved (Backtracking)

Conflicts: -

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

Constraint Prop. on Medium Board

Time: 2.2180s

Medium Initial Board

Nodes/Iterations: 969

Medium Solved (Constraint Prop.)

Conflicts: -

[illegible]

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

Dancing Links on Medium Board

Time: 0.0010s

Medium Initial Board

[illegible]

Nodes/Iterations: 2

Conflicts: -

Medium Solved (Dancing Links)

[illegible]

Sim. Annealing on Medium Board

Time: 5.0001s

Medium Initial Board

Nodes/Iterations: 20.429 Medium Solved (Sim. Annealing)

Conflicts: 21

Success Rate: 0.00%

Sudoku										Completed
		2		6		8				Correct
5	8					9	7			Success
					4					
3	7						5			
6									4	
			8					1	3	
					2					
			9	8				3	6	
				3		6		9		

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

Genetic Alg. on Medium Board

Time: 28.7614s

Medium Initial Board

Nodes/Iterations: 2,000

Medium Solved (Genetic Alg.)

Conflicts: 15

Success Rate: 0.00%

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

[illegible]

Backtracking on Advanced Board

Time: 9.7990s

Advanced Initial Board

Nodes/Iterations: 49,559

Advanced Solved (Backtracking)

Conflicts: -

[illegible]

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

Constraint Prop. on Advanced Board

Time: 70.5868s

Advanced Initial Board

Nodes/Iterations: 44,545

Advanced Solved (Constraint Prop.)

Conflicts: -

[illegible]

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

Dancing Links on Advanced Board

Time: 0.0010s

Advanced Initial Board

Nodes/Iterations: 2

Advanced Solved (Dancing Links)

Conflicts: -

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

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

Sim. Annealing on Advanced Board

Time: 10.0138s

Advanced Initial Board

Nodes/Iterations: 44 632 Advanced Solved (Sim. Annealing)

Conflicts: 22

Success Rate: 0.00%

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

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

Genetic Alg. on Advanced Board

Time: 27.7042s

Advanced Initial Board

Nodes/Iterations: 2,000

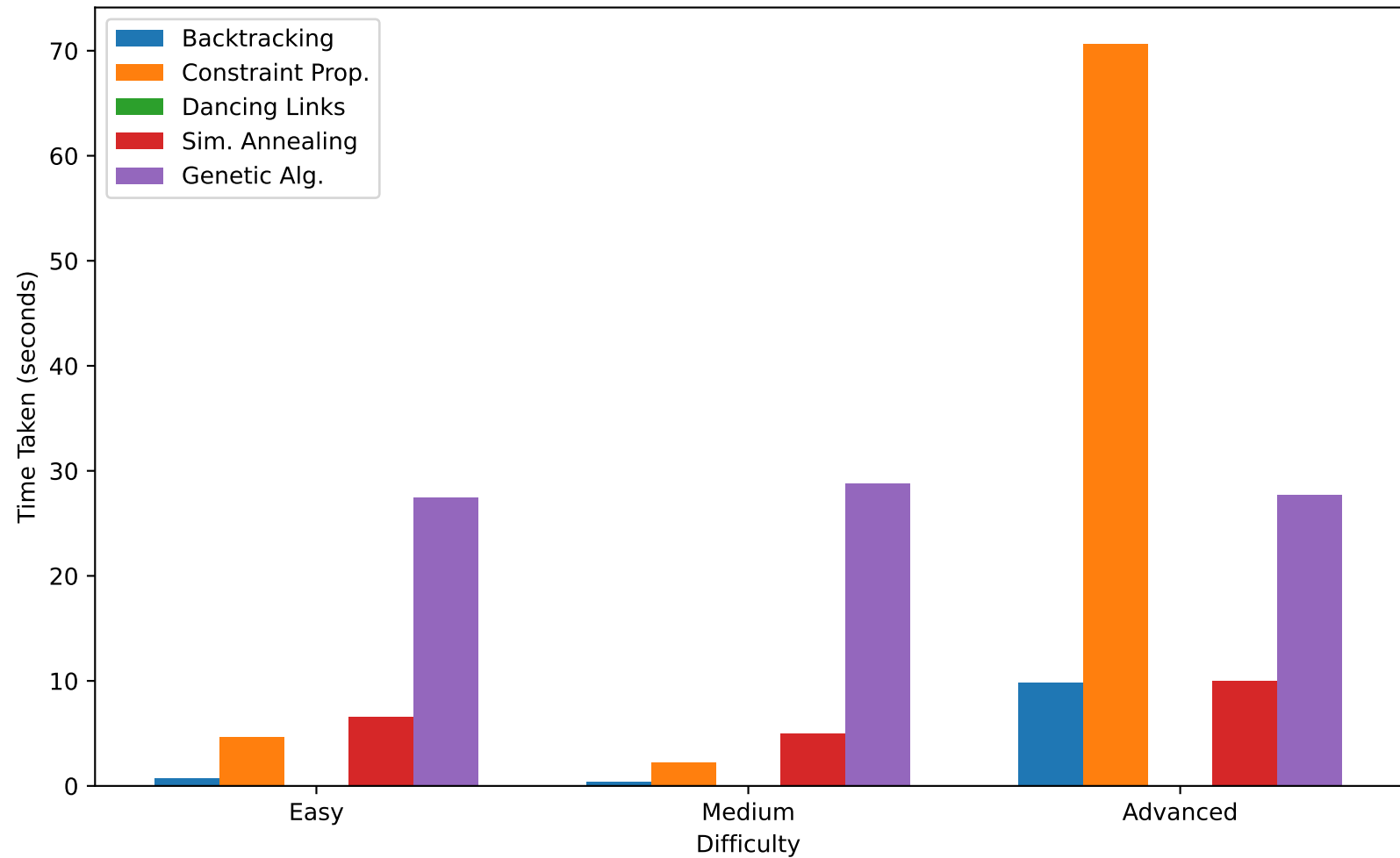
Advanced Solved (Genetic Alg.)

Conflicts: 16

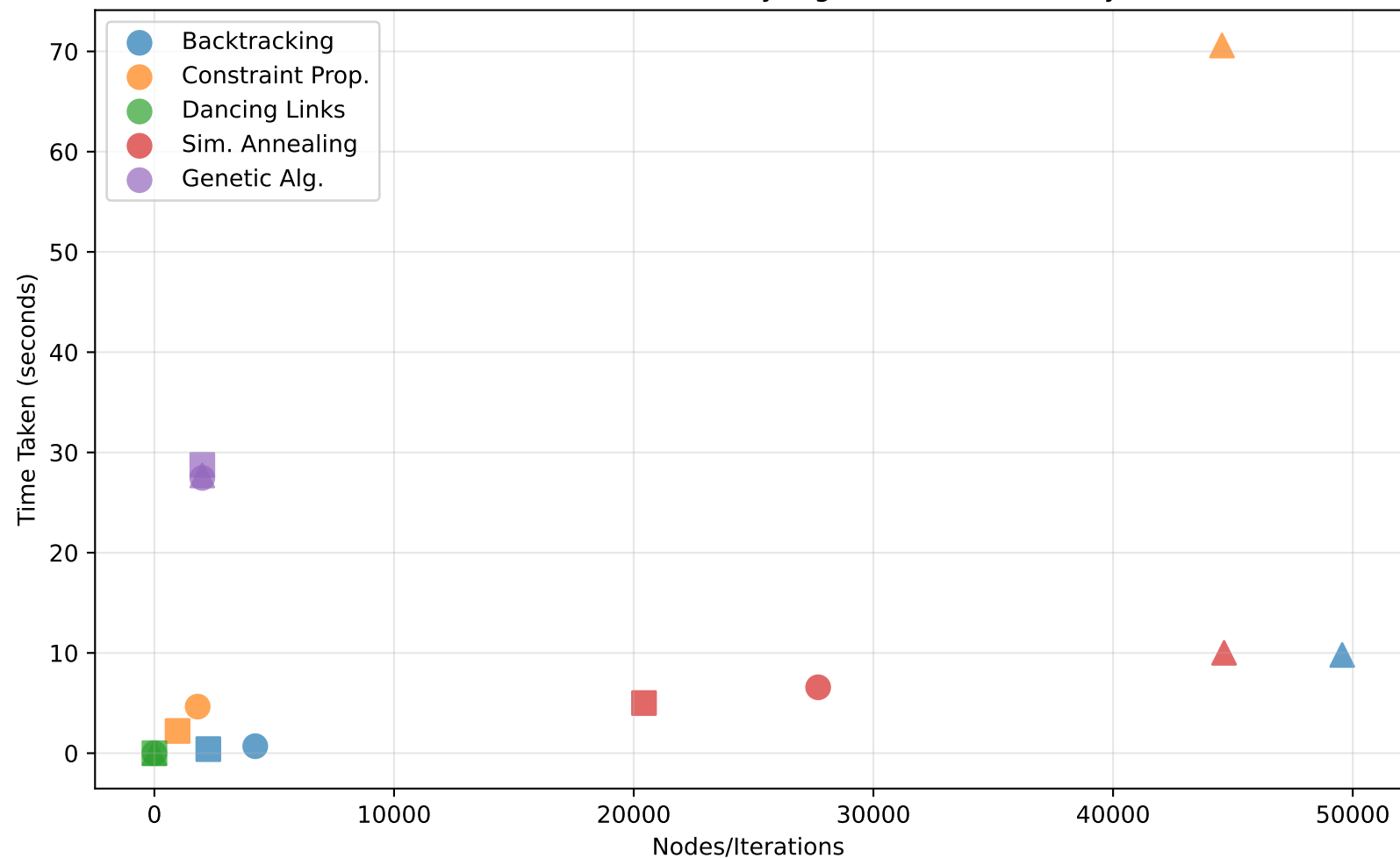
Success Rate: 0.00%

[illegible][illegible]

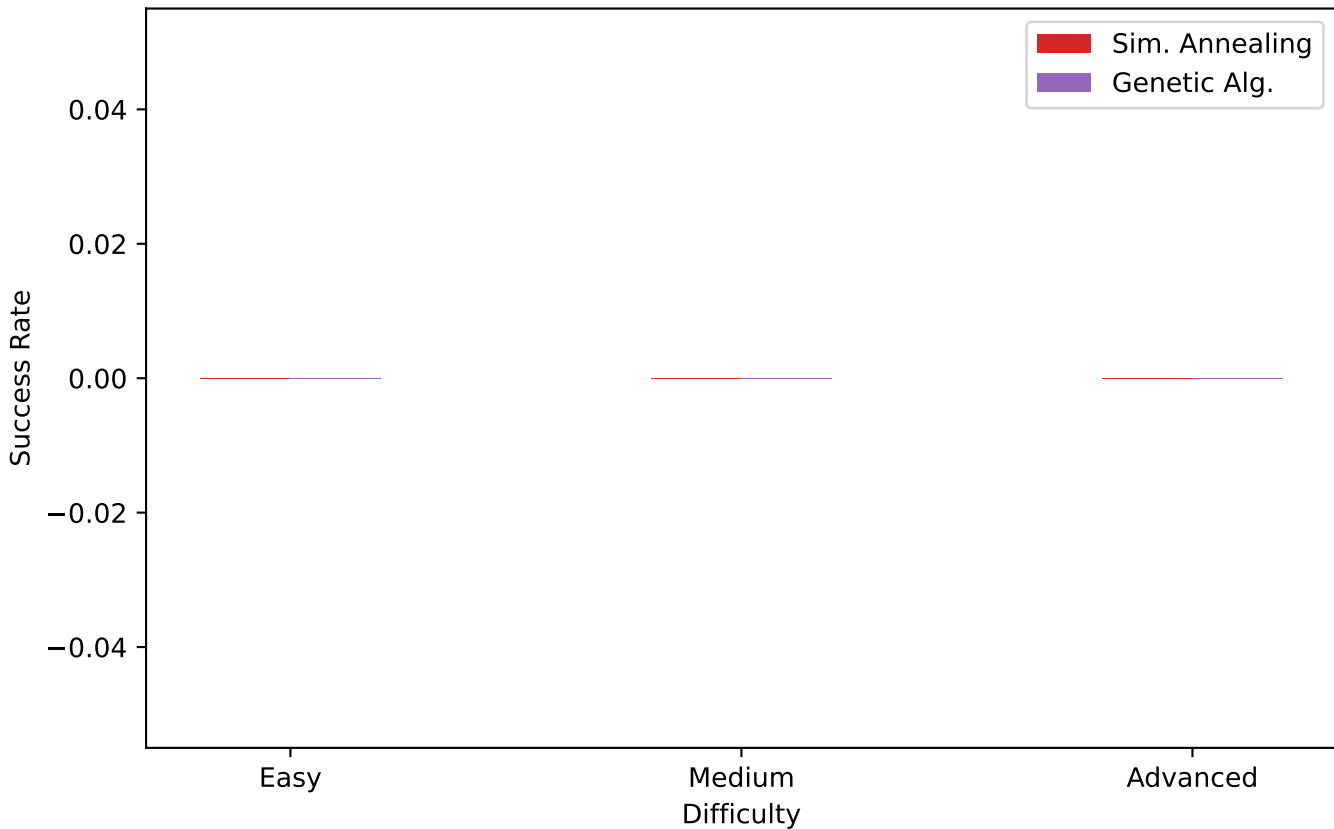
Algorithm Time Comparison



Time vs. Nodes/Iterations by Algorithm and Difficulty



Success Rate for Heuristic Algorithms



Algorithm Performance Summary

Algorithm	Difficulty	Solved	Time (s)	Nodes/Iter.	Success Rate	Conflicts
Backtracking	Easy	Yes	0.6969	4,209	-	-
Constraint Prop.	Easy	Yes	4.6479	1,806	-	-
Dancing Links	Easy	Yes	0.0020	2	-	-
Sim. Annealing	Easy	No	6.5728	27,695	0.00%	21
Genetic Alg.	Easy	No	27.4549	2,000	0.00%	13
Backtracking	Medium	Yes	0.4050	2,251	-	-
Constraint Prop.	Medium	Yes	2.2180	969	-	-
Dancing Links	Medium	Yes	0.0010	2	-	-
Sim. Annealing	Medium	No	5.0001	20,429	0.00%	21
Genetic Alg.	Medium	No	28.7614	2,000	0.00%	15
Backtracking	Advanced	Yes	9.7990	49,559	-	-
Constraint Prop.	Advanced	Yes	70.5868	44,545	-	-
Dancing Links	Advanced	Yes	0.0010	2	-	-
Sim. Annealing	Advanced	No	10.0138	44,632	0.00%	22
Genetic Alg.	Advanced	No	27.7042	2,000	0.00%	16