

Problema da N-Rainhas

Prof. Dr. Danilo Sipoli Sanches



Referências

THE N-QUEENS PROBLEM AND GENETIC ALGORITHMS

Abdollah Homaifar*

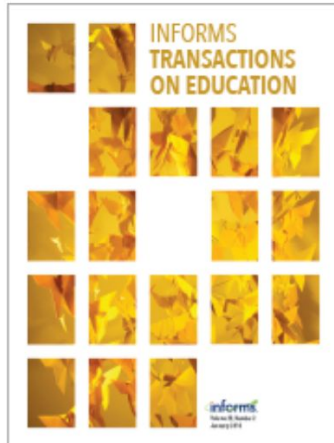
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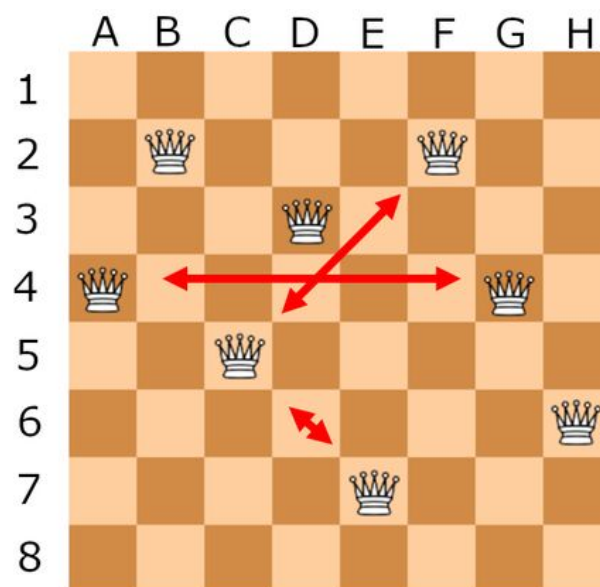
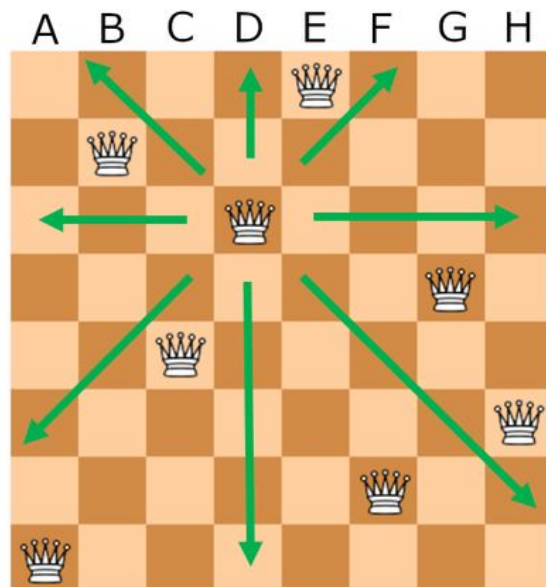
The n-Queens Problem

Craig Letavec, John Ruggiero,

Introdução

- O problema consiste em encontrar todas as combinações possíveis de N rainhas em um tabuleiro de dimensão N por N (linhas e colunas);
- O objetivo é posicionar as rainhas de tal forma que nenhuma das rainhas ataque qualquer outra;
- Duas rainhas atacam-se uma à outra quando estão na mesma linha, na mesma coluna ou na mesma diagonal do tabuleiro.

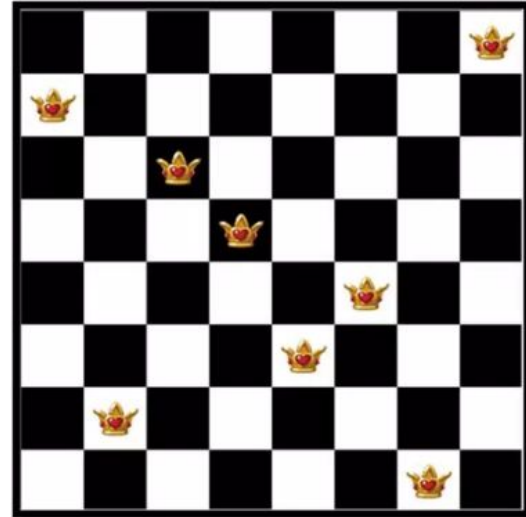
Introdução



Função Fitness

- Para cada par de rainhas:
 - Verifica a diferença entre as colunas e as linhas;
 - **Se a diferença for igual**, adicione 1 para a quantidade de ataques.

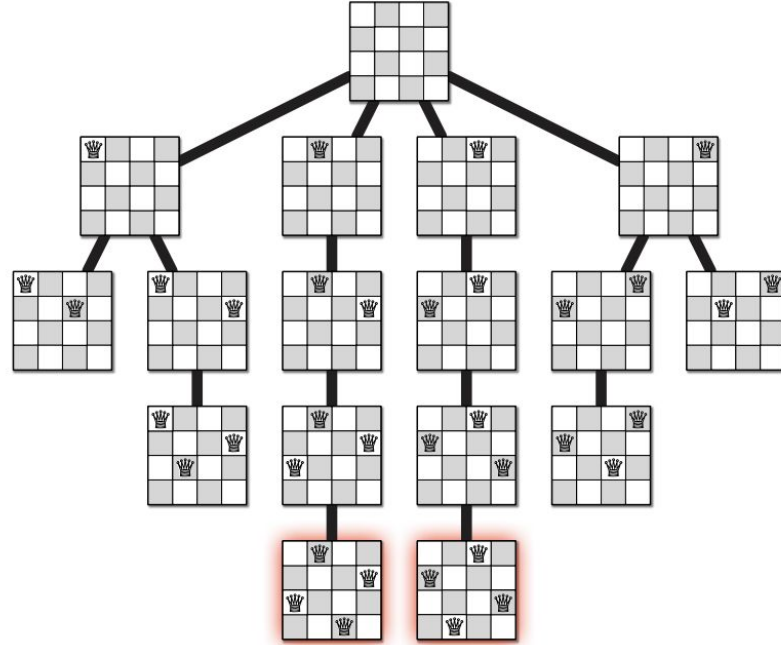
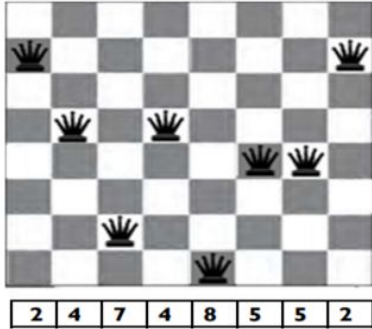
	1	2	3	4	5	6	7	8
<u>1</u>								
2	1							
3	1	1						
4	1	1	0					
5	0	1	1	1				
6	1	1	1	1	0			
7	0	1	1	1	0	1		
8	1	0	1	1	1	1	1	
	5	5	4	4	1	2	1	



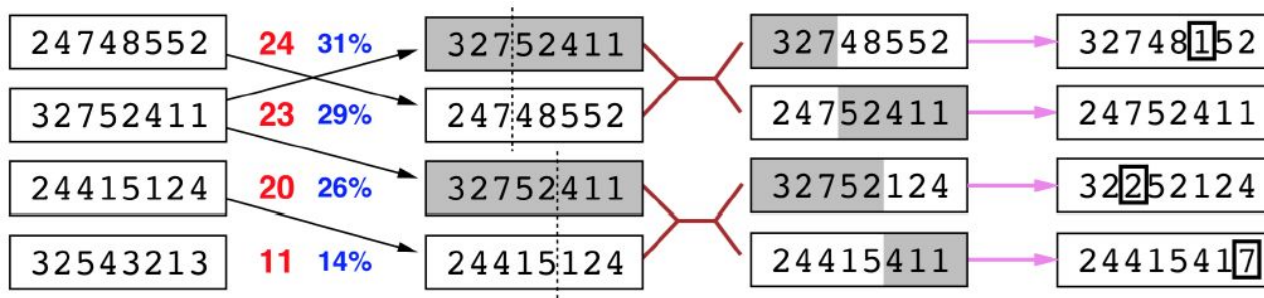
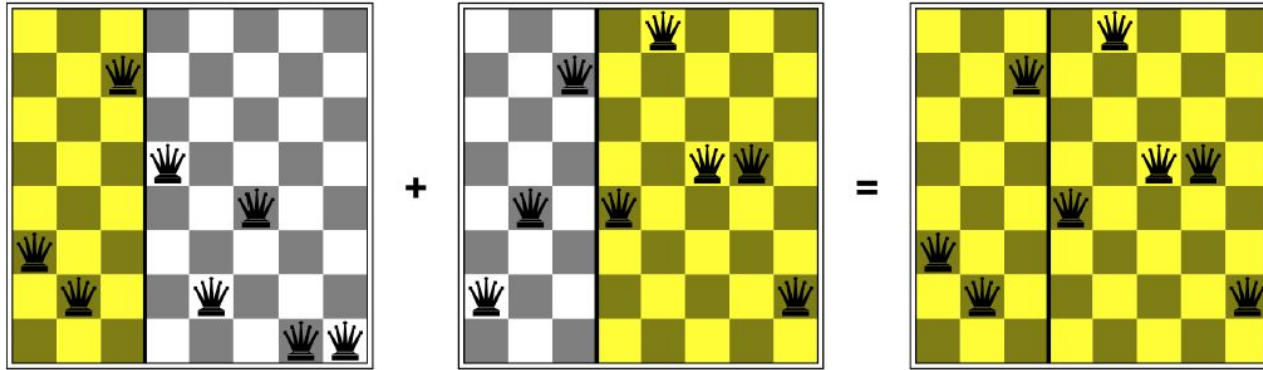
1	2	3	4	5	6	7	8
2	7	3	4	6	5	8	1

Fitness = 22

Representação com Algoritmo Genético



Operadores Genéticos



Fitness

Selection

Pairs

Cross-Over

Mutation

Aplicações reais

- Agendamento de tarefas;
- Gerenciamento de recursos de computador;
- Testes VLSI (*Very Large Scale Integration*);
- Controle de tráfego.



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An incremental approach to the n-queen
problem with polynomial time