



# Search in Complex Environments

ARTIFICIAL INTELLIGENCE  
JUCHEOL MOON

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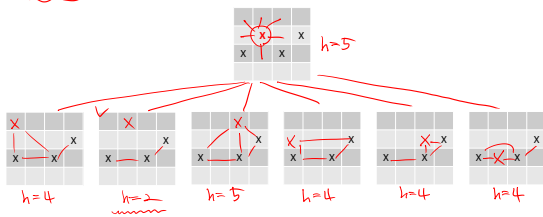
## Iterative improvement algorithms

- In many problems, path is irrelevant;
- the goal state itself is the solution
- In such cases, can use iterative improvement algorithms;
- keep a single “current” state, try to improve it

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## Local search space

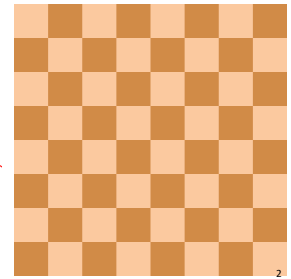
- To solve  $n$ -queens problem
- Move a queen to adjacent positions



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## $n$ -queens problem

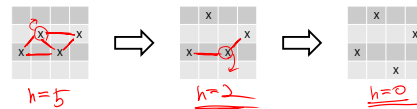
- Put  $n$  queens on an  $n \times n$  board with no two queens on the same row, column, or diagonal
- How we can solve this?



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## Hill-climbing

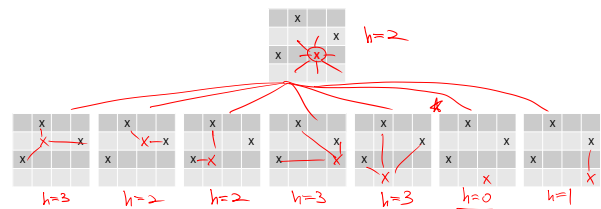
- Strategy; Move a queen to reduce number of conflicts
- Cost function  $h$ ; is the number of pairs of queens that are attacking each other



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## Local search space

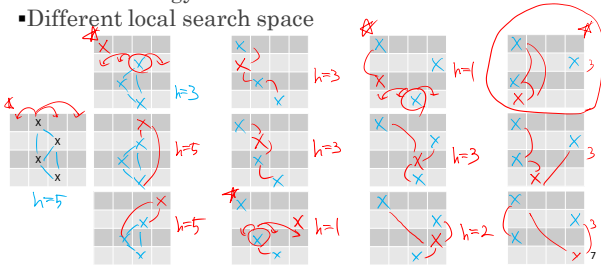
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## Local search space

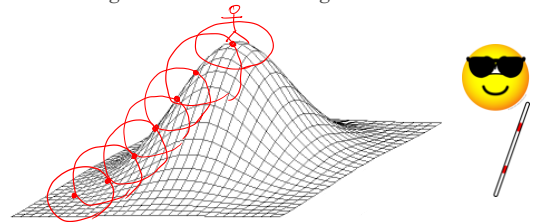
- Another strategy
- Different local search space



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## Hill-climbing

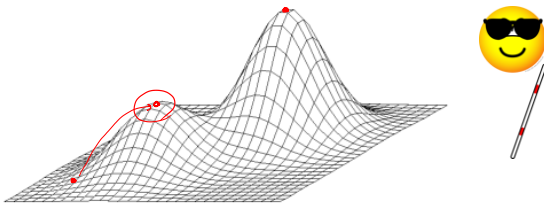
- Like climbing Everest in thick fog with amnesia



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## Hill-climbing

- Goal
- Finding a global maximum



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