BACKTRACKING

CSE 511A: Introduction to Artificial Intelligence

1

BACKTRACKING

2

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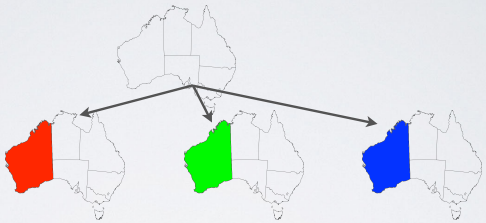
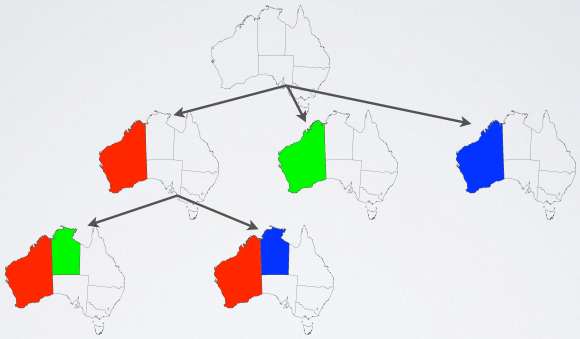


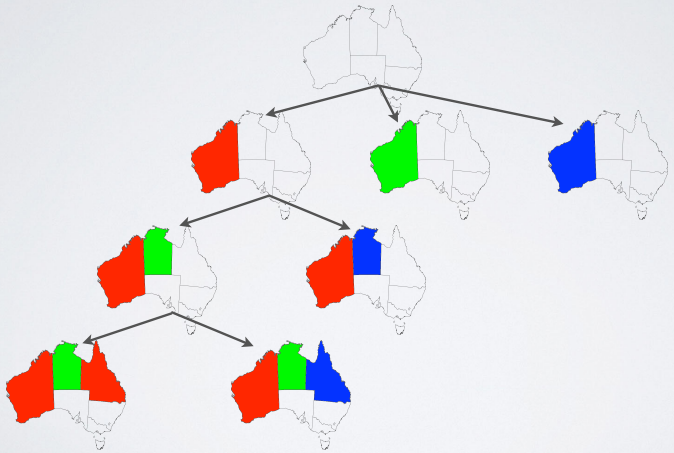
3

BACKTRACKING



4

BACKTRACKING



5

BACKTRACKING

6

BACKTRACKING

7

BACKTRACKING

8

BACKTRACKING

9

BACKTRACKING

10

BACKTRACKING

11

BACKTRACKING

12

BACKTRACKING

13

FORWARD CHECKING

- Backtracking (aka DFS). Optimizations:
  - Forward checking:
    - Remove values from unassigned variables that violate constraints
    - Backtrack when any unassigned variable have no more legal values

14

MIN REMAINING VALUE

- Backtracking (aka DFS). Optimizations:
  - Forward checking:
    - Remove values from unassigned variables that violate constraints
    - Backtrack when any unassigned variable have no more legal values
  - Variable ordering?

15

MIN REMAINING VALUE

Which territory to color next? NSW, V, SA, T?

16

MIN REMAINING VALUE

- Backtracking (aka DFS). Optimizations:
  - Forward checking:
    - Remove values from unassigned variables that violate constraints
    - Backtrack when any unassigned variable have no more legal values
  - Variable ordering:
    - MRV heuristic: Choose variable with min remaining values

MAX DEGREE HEURISTIC

Coloring SA first will prune more values from remaining unassigned variables

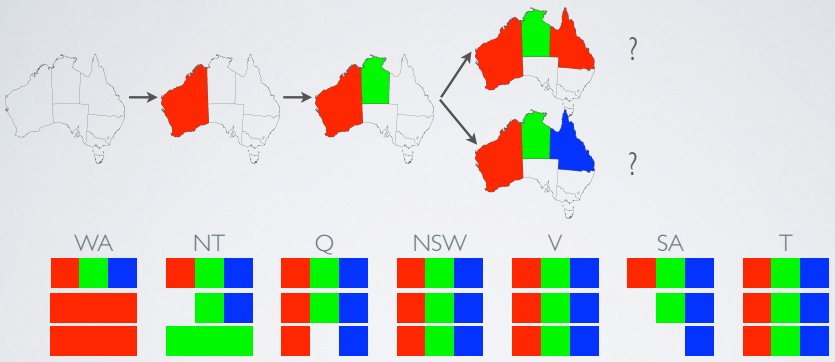
MAX DEGREE HEURISTIC

- Backtracking (aka DFS). Optimizations:
  - Forward checking:
    - Remove values from unassigned variables that violate constraints
    - Backtrack when any unassigned variable have no more legal values
  - Variable ordering:
    - MRV heuristic: Choose variable with min remaining values
    - Max degree heuristic: Choose variable with max degree

LEAST CONSTRAINING VALUE

- Backtracking (aka DFS). Optimizations:
  - Forward checking:
    - Remove values from unassigned variables that violate constraints
    - Backtrack when any unassigned variable have no more legal values
  - Variable ordering:
    - MRV heuristic: Choose variable with min remaining values
    - Max degree heuristic: Choose variable with max degree
  - Value ordering?

LEAST CONSTRAINING VALUE



21

LEAST CONSTRAINING VALUE

Allows 1 value for SA

Allows 0 value for SA

22

LEAST CONSTRAINING VALUE

- Backtracking (aka DFS). Optimizations:
  - Forward checking:
    - Remove values from unassigned variables that violate constraints
    - Backtrack when any unassigned variable have no more legal values
  - Variable ordering:
    - MRV heuristic: Choose variable with min remaining values
    - Max degree heuristic: Choose variable with max degree
  - Value ordering:
    - LCV heuristic: Choose value that eliminates the fewest values in remaining variables

23

BACKTRACKING

	Backtracking
Correct the solution it finds is optimal	Yes
Complete it terminates	Yes
Space Complexity max nodes in memory	$O(bm)$
Time Complexity max nodes expanded	$O(b^m)$

branching factor b
depth of the goal d
depth of tree m

24