Previous class
- Search: searching for a solution
  find a sequence of actions that
  will take the agent from the initial state
to the goal state
- Process: initialize a search tree with the initial state
  as the root
  the nodes of the tree contain the state
  (an other information)
  expand the tree until we find the goal state
- The unexpanded nodes are kept in a list
called the frontier.
- End of question was:
  Should we discard or store the expanded nodes?

This class
- Uninformed search strategies
- Evaluating search strategies

Expanding the search tree

![SearchTreeDiagram](image)

- BFS:
  - complete? yes
  - time complexity: both exponential
  - space complexity: BFS exponential
  - DFS

The example we are using: Finding a route (path) between two cities.
(A map with distances is given.)

frontier
A  B, C, D
B, C, D
C, D
DFS
DFS
BFS
BFS
CDEAFG
E AFG-CD

2: goal
d is not 0

DFS
complete? no
(without duplicates)
time complexity
consider the worst case
BFS

expand
how many nodes will be expanded when we find \( G \)?

\[
1 + b + b^2 + \cdots + b^{(d-1)} + b^d
\]

\( O(b^{d-1}) \)

\( O(b^d) \)

DFS
up to the maximum depth

DFS
\( m \) (not \( \infty \))

\( bm \)

\( O(bm) \)

both exponential in the worst case

\[
d = 100 \quad m = 150
\]

\[
b = 10 \quad 10^{100} \quad 10^{150}
\]

10,800 subatomic particles
the more
- Space complexity
  maximum # of nodes stored

BFS (Faster)

DFS

\[ O(b^d) \quad O(b^{d-1}) \]