

# 1 Agents

- Rational:** Maximally achieving goals (actions that maximize utility function)
- Reflex Based:** Chooses action based on current percept (no future consideration)
- Goal Based:** Chooses action based on consequences (model of how the world reacts)
- Utility Based:** Goal based with trading off of multiple goals and uses probabilities

# 2 Searching

- Complete:** Guaranteed to find a solution if one exists
- Optimal:** Guaranteed to find the least cost path
- Properties:** n= number of states, b= maximum branching factor,  $C^*$ = optimal cost, d= depth of shallowest solution, m= max depth,  $\epsilon$  = min cost of all actions
- Heuristic  $h(n)$ :** An estimate of how close a state is to a goal
- Admissible:** Always an underestimate to the true lowest cost
- Consistent:** Always  $h(n) \leq h(n') + stepCost(n')$  where n' is a neighbor of n
- DFS:** Fringe uses a Stack, complete iff finite, not optimal, time:  $O(b^m)$ , space:  $O(bm)$
- BFS:** Fringe uses a Queue, complete, optimal (constant), time and space:  $O(b^d)$
- IDDFS:** Fringe uses a Stack, complete, optimal (constant), time:  $O(b^d)$ , space:  $O(bm)$
- Best First:** Fringe uses a PriorityQueue with cost fuction for each node
- Uniform Cost:** Best First with  $f(n)$  = sum of edge costs from start to n (explores increasing contours), complete, optimal, time and space:  $O(b^{\frac{C^*}{\epsilon}})$
- Greedy:** Best First with  $f(n) = h(n)$  (suboptimal goal is common)
- A\*:** Best First with  $f(n) = g(n) + h(n)$  with  $g(n)$  = sum of costs from start to n