Exploring Heuristic Action Selection in Agent Programming

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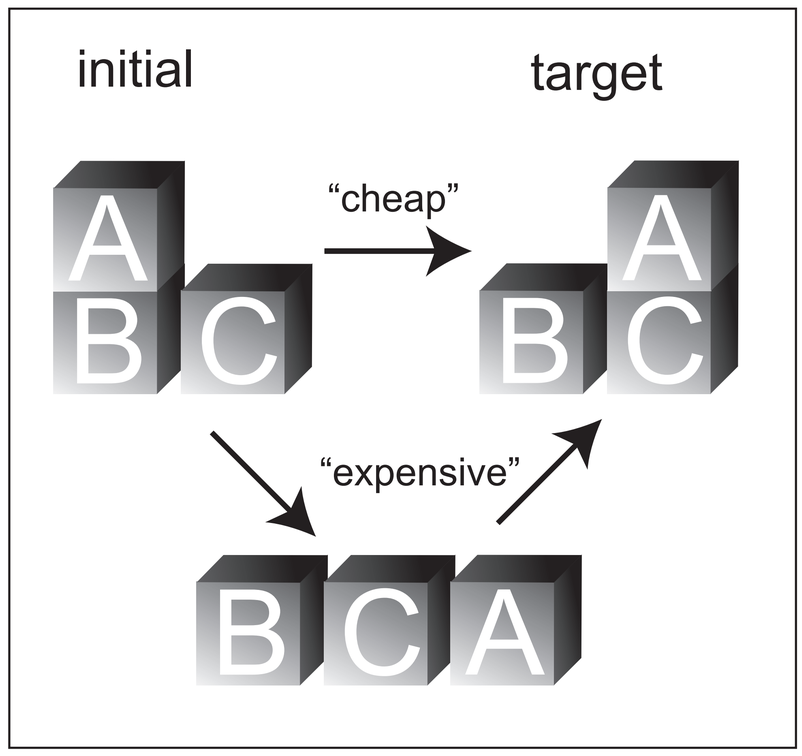
Problem: Picking the Best Action

Rational agents often can choose alternative paths of actions, all leading to the same goal. However some paths are cheaper than others.



Assign Utility to GOAL Actions

Our key contribution is that the utility is based on the beliefs and goals of the agent. This provides for a *purely qualitative/conceptual method* for defining a utility for actions and states.

```
case{
 bel(tower([Y|T]), a-goal(tower([X,Y|T])): cost(move(X,Y)) = 1. % a constructive move
 goal-a(above(X,Z)):                       cost(move(X,Y)) = 2. % X is a self-deadlock
 true:                                     cost(move(X,Y)) = 3. % otherwise
}
```

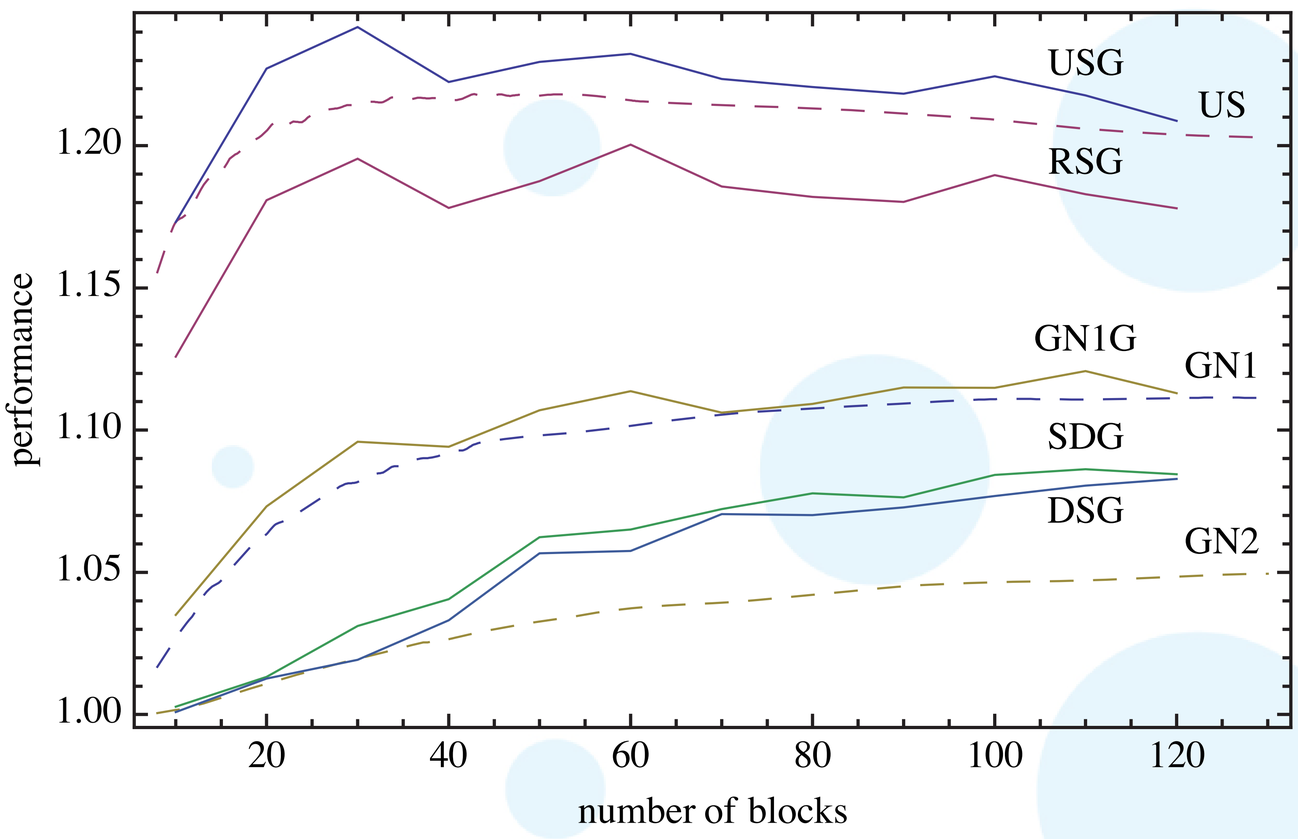
SDG heuristic

Search Horizon

A practical search has to be limited to a finite lookahead depth. Typically to handle large search spaces a good heuristic function is needed.

Performance in the Blocks World

Several strategies have been proposed in literature for the Blocks World. We explore a few of them to illustrate the use of utility values to guide the action selection mechanism of an agent. We found that this mechanism performs well.



Average performance for random blocks world versus number of blocks in that world. performance= #required moves / #moves minimally needed

AS, GN1, GN2: results from [Slaney01]
US(G): unstack all blocks first
GN1(G): prefer constructive moves
SDG: prefer resolving self-deadlocks
DSG: prefer resolving lower deficiency