COMP3411/9814 Artificial Intelligence 20T0, 2020

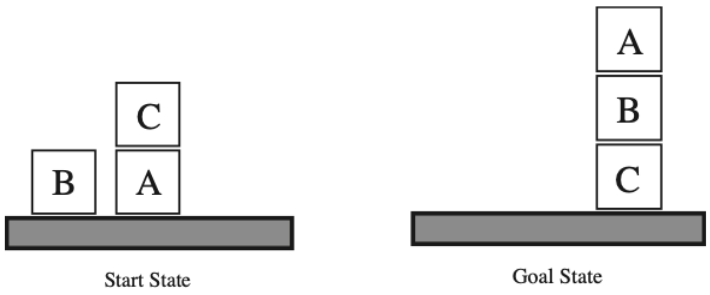
Tutorial Solutions - Week 3 tutorial 5a

Week 3 Planning (Week 3 Lecture 1)

Tutorial 5a: Planning

5a.1 Formulate the blocks world using STRIPS planning operators. The actions are stack (move one block to the top of another) and unstack (move one block to the table). The robot can hold only one block at a time.
To simplify the world, assume the only objects are the blocks and the table, and that the only relations are the on relation between (table and) blocks and the clear predicate on table and blocks. Also assume that it is not possible for more than one block to directly support another block (and vice versa).

5a.2 The Sussman anomaly, shown below, is a simple planning problem that could not be solved by the early linear planners. Show how a partial order planner would solve this problem with the blocks world operators defined above.



(19T2 Tutorial 4, Q2l, Q3)

Solutions

5a.1 stack(A, B): precond clear(A), clear(B); add list on(A, B); delete list clear(B)
unstack(A): precond clear(A), on(A, B); add list on(A, Table), clear(B); delete list on(A, B)

5a.2 The nonlinear planner introduces the two actions stack(B, C) and stack(A, B). The clear(A) precondition of stack(A,B) does not hold in the initial state, so unstack(C) is added to the plan. Because stack(A,B) deletes clear(B), which is a precondition of stack(B,C), stack(B,C) must be before stack(A,B). For the same reason, unstack(C) must be before move(B, C). The plan is therefore unstack(C), stack(B, C), stack(A, B).