MINMAX SEARCH

:- dynamic true/1, does/2.

role(x).

role(o).

init(cell(1, 1, x)). init(cell(1, 2, b)). init(cell(1, 3, b)).

init(cell(2, 1, b)). init(cell(2, 2, o)). init(cell(2, 3, b)).

init(cell(3, 1, b)). init(cell(3, 2, b)). init(cell(3, 3, b)).

init(control(x)).

init(step(0)).

legal(W, mark(X, Y)) :- true(cell(X, Y, b)), true(control(W)).

legal(x, noop) :- true(control(o)).

legal(o, noop) :- true(control(x)).

next(cell(M, N, x)) :- does(x, mark(M, N)), true(cell(M, N, b)).

next(cell(M, N, o)) :- does(o, mark(M, N)), true(cell(M, N, b)).

next(cell(M, N, W)) :- true(cell(M, N, W)), W \== b.

next(cell(M, N, b)) :- does(\_W, mark(J, K)), true(cell(M, N, b)), ( M \== J ; N \== K ).

next(control(x)) :- true(control(o)).

next(control(o)) :- true(control(x)).

next(step(M)) :- true(step(N)), succ(N, M).

row(M, X) :- true(cell(M, 1, X)), true(cell(M, 2, X)), true(cell(M, 3, X)).

column(N, X) :- true(cell(1, N, X)), true(cell(2, N, X)), true(cell(3, N, X)).

diagonal(X) :- true(cell(1, 1, X)), true(cell(2, 2, X)), true(cell(3, 3, X)).

diagonal(X) :- true(cell(1, 3, X)), true(cell(2, 2, X)), true(cell(3, 1, X)).

line(X) :- row(\_M, X).

line(X) :- column(\_M, X).

line(X) :- diagonal(X).

open :- true(cell(\_M, \_N, b)).

goal(x, 100) :- line(x), \+line(o).

goal(x, 50) :- line(x), line(o).

goal(x, 50) :- \+line(x), \+line(o).

goal(x, 0) :- \+line(x), line(o).

goal(o, 100) :- \+line(x), line(o).

goal(o, 50) :- line(x), line(o).

goal(o, 50) :- \+line(x), \+line(o).

goal(o, 0) :- line(x), \+line(o).

terminal :- line(x).

terminal :- line(o).

terminal :- \+open.

heuristic(State, Rewards) :-

retractall(true(\_)),

forall(member(Proposition, State), assertz(true(Proposition))),

setof(Role, role(Role), Roles),

setof(goal(Role, Reward), (member(Role, Roles), goal(Role, Reward)), Rewards).

**OUTPUT**:

time(solve\_ids(Path)).

**Path** = [*does(*x,*mark(*3,3)),*does(*o,*mark(*3,2)),*does(*x,*mark(*1,2)),*does(*o,*mark(*1,3)),*does(*x,*mark(*3,1)),*does(*o,*mark(*2,1)),*does(*x,*mark(*2,3))]