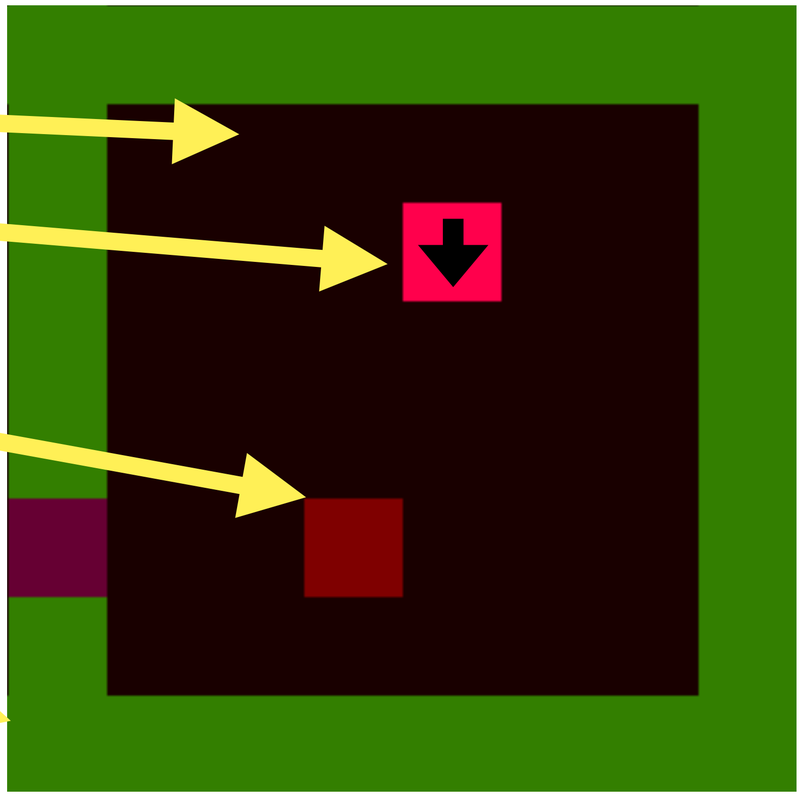
# Basic representation of a gridworld state

s : State =

**type** Object =
{ empty,
  agent,
  key,
  door,
  wall }

**type** Action =
{ start, forward, left, right, pickup, toggle }

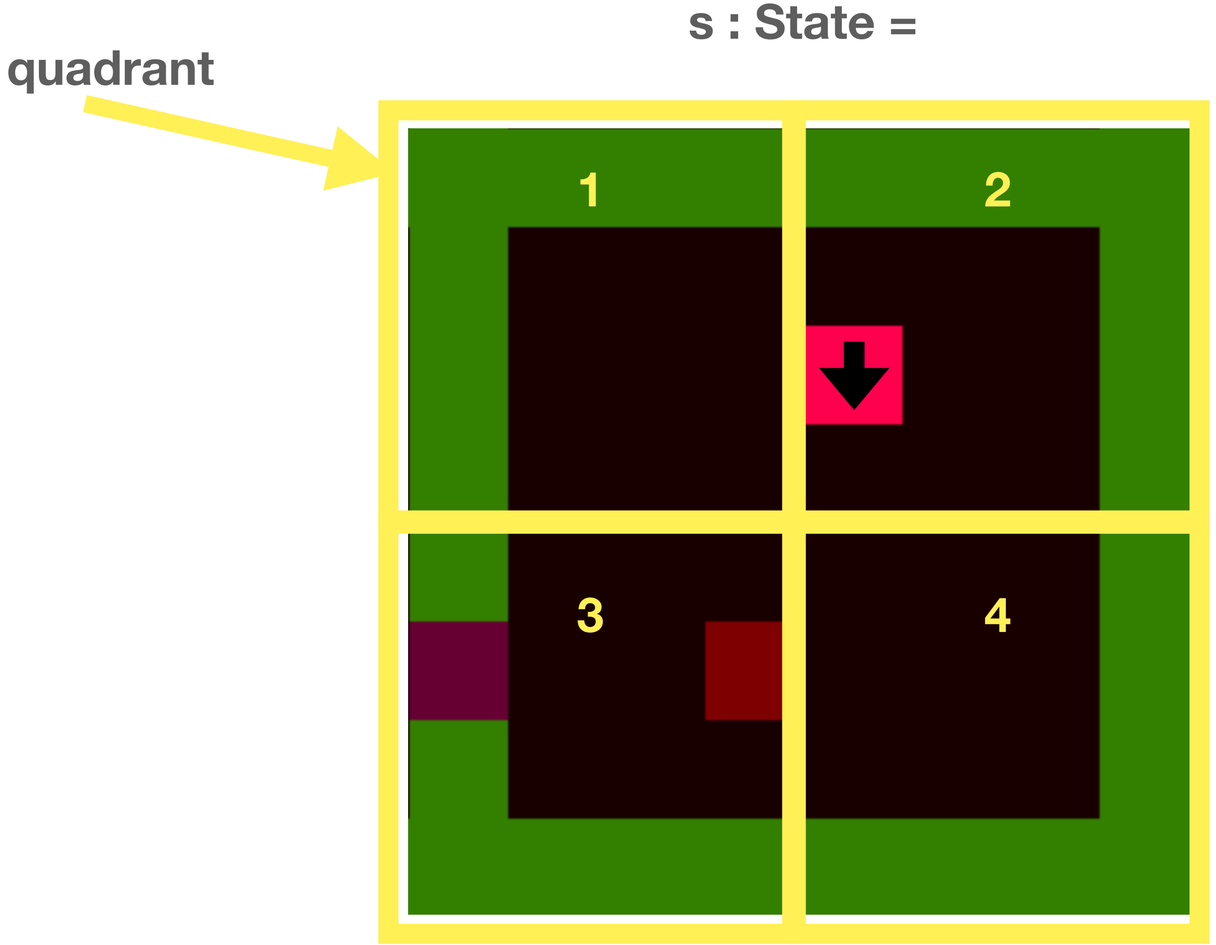
**viewpoint** lastAction : State -> Action
  lastAction(a) = start



# Birdseye representation

**type** Quadrant = {1,2,3,4}
**type** Orientation = {N,E,S,W}

**viewpoint** qAgent : State -> Quadrant
  qAgent(s) = 2
**viewpoint** qKey : State -> Quadrant
  qKey(s) = 3
**viewpoint** qDoor : State -> Quadrant
  qDoor(s) = 3
**viewpoint** agentFacing : State -> Orientation
  agentFacing(s) = S



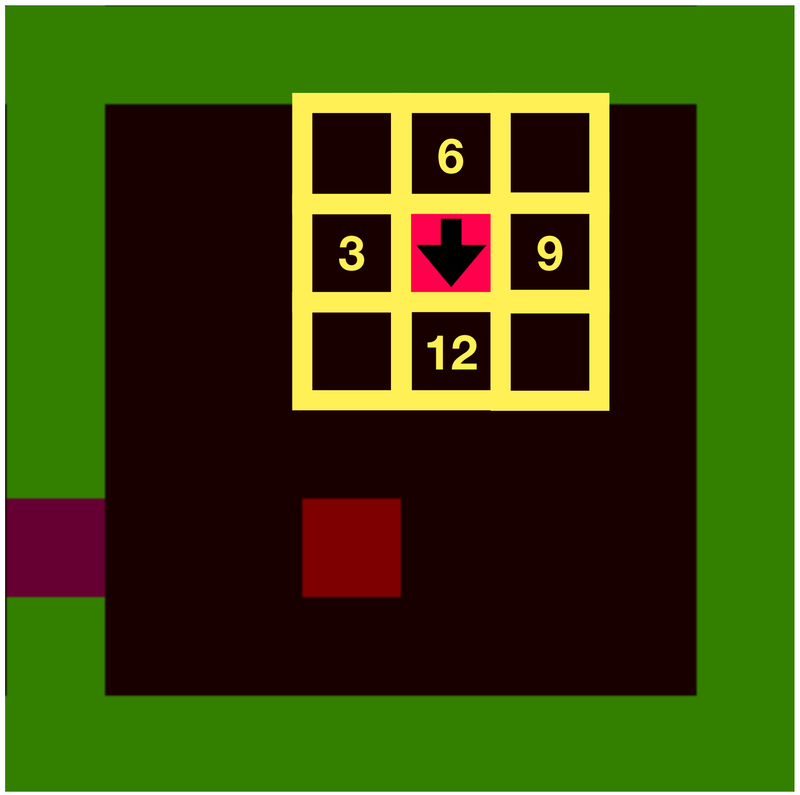
# First person representation

8 viewpoints giving the object in each square surrounding the agent and labelled using clock bearings

**viewpoint** a12 : State -> Object
**viewpoint** a130 : State -> Object
**viewpoint** a3 : State -> Object
**viewpoint** a430 : State -> Object
**viewpoint** a6 : State -> Object
**viewpoint** a730 : State -> Object
**viewpoint** a9 : State -> Object
**viewpoint** a1030 : State -> Object

a12(s) = empty
a130(s) = empty
…
a1030(s) = empty

**s : State =**



# Other viewpoints

Additional viewpoints capturing the basic relationship between agent, door, key and far fall.

**viewpoint** canSeeKey : State -> Bool

canSeeKey(s) = true

**viewpoint** canSeeDoor : State -> Bool

canSeeDoor(s) = true

**viewpoint** distance : State -> Integer

distance(s) = 4

s : State =