

2000 Paper 8 Question 7

Artificial Intelligence

This question considers the monkey-and-bananas problem, in which there is a monkey in a room with some bananas hanging out of reach from the ceiling, but a box is available that will enable the monkey to reach the bananas if he climbs onto it. Initially the monkey is at location A, the bananas at B and the box at C. The monkey and box have height x , but if the monkey climbs onto the box he will have height y , the same as the bananas. The actions available to the monkey include Go from one place to another, Push an object from one place to another, Climb onto an object, and Grasp an object. Grasping results in holding the object if the monkey and object are in the same place at the same height.

- (a) Write the initial state description using a representation of your choice. [4 marks]
- (b) Write definitions of the four actions, providing at least some obvious preconditions, additions and deletions. [10 marks]
- (c) Suppose the monkey wants to fool the observers, who have gone to lunch, by grabbing the bananas but leaving the box in its original place. Write this as a goal (but not assuming the box is necessarily at location C) in the language of situation calculus. [3 marks]
- (d) If the box is filled with bricks, its position will remain the same when the Push operator is applied. Is this an example of the frame problem or the circumscription problem? Justify your answer. [3 marks]