University of Sheffield: Department of Computer Science

COM1080: AI Techniques

Assignment 2 2005

# Stacking Blocks: a Comparison of AI Techniques

This assignment carries 70% of the assessment for COM1080 .

1. Objectives

The objectives of this assignment are

- to implement solutions to the same problem using different AI techniques which you have been introduced to

- to use the solutions as the basis for a comparative discussion of the techniques

2. The Stacking Problem

Initial State   *Goal State*
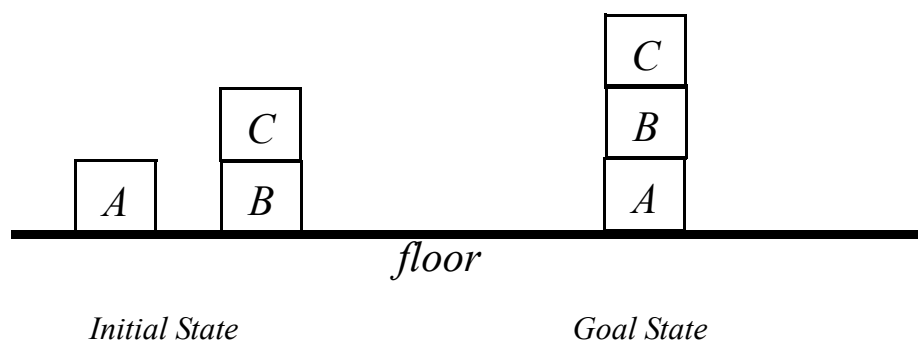
The above is an example of a stacking problem.

Robbie's task is to rearrange the blocks to produce the goal state.

- All the blocks are of the same size: a single block may be placed on top of another block.

- Robbie may place a block *x* on top of a block *y* provided both *x* and *y* are free, i.e. have no other blocks on top of them.

- A free block may be moved to the floor, which is assumed to be of infinite size.

- There may be any number of blocks.

- A goal state need not specify the position of every block, e.g. in the above we might require that A is on B, but not care about C.

So in the initial state above, the legal moves are

- Place A on C

- Place C on A

- Place C on the floor

3. What you must do

In

Is java code for the techniques introduced in COM1080.

A: Using this software, **implement & test 3 solutions to the stacking problem**, using

1. The planning system STRIPS,

2. A Production System,

3. State Space Searching.

B: **Discuss the relative merits of these three solutions,** in terms of

1. Whether they are guaranteed to find a solution if one exists,

2. Whether they are guaranteed to find the solution with the smallest number of moves,

3. Their efficiency in finding a solution,

4. Their merit as a model of human problem-solving.

Your discussion should be illustrated by experiments with chosen stacking problems.

50% of the credit for this assignment is available for part A and 50% for part B

4. What to hand in

Prepare a single unformatted text document (i.e. ASCII, not word or html or anything like that), consisting of

1. A first line looking like

   <your name> <your course> COM1080 Assignment 1

2. Commented code for the solutions A1,A2 and A3, together with results for the stacking problem above

3. Your discussion.

5. How to hand in

The project hand-in and marking will be handled electronically, not on paper.

You must obey the following exactly, or else your work may not be marked.

- We will create a sub-directory of your home directory on the DCS network called **handin/COM1080/as2**

- Put your exercise in this directory, readable only by you, in a file with the name **<your-dcs-login-name>.as2** , e.g. **u3pdg.as2.**

Beware: if you are using notepad your file may be saved with extension .as2.txt

- The report should be in place by the deadline date (see below).

- Any other files in the handin directory will be ignored.

An automatic collection script will run at 11am on the deadline day and for the next seven days including weekends thereafter. Note that this script will move not copy your work, so if you want to keep it, make sure you have a copy somewhere else. You will know when your work has been collected because the directory you placed it in will disappear. If the directory is empty it will remain until the script next runs.

DEADLINE: Monday 16th May (Week 12)