Implementing Search Agents

COMP30024 Artificial Intelligence
Week 3 Supplementary Notes

Outline

The textbook “Artificial Intelligence A Modern Approach” (AIMA) by Russell and Norvig provides a set of class libraries to support the textbook

The AIMA Java libraries provide a sophisticated framework of classes to implement a wide variety of different searches

These supplementary notes give the top-level of an example of how to solve the N-Queens problem using the AIMA libraries

Basic framework

```
package aima.search.demos;

import java.util.HashSet;
...
import aima.core.search.framework.GraphSearch;
...
import aima.core.environment.nqueens.NQueensBoard;
...
import aima.core.search.uninformed.DepthFirstSearch;
import aima.core.search.uninformed.DepthLimitedSearch;

public class NQueensDemo {

   public static void main(String[] args) {
       nQueensWithDepthFirstSearch();
   }
```

Executing a search

```
private static void nQueensWithDepthFirstSearch() {
    try {
        Problem problem = new Problem(new NQueensBoard(4),
                NQueensFunctionFactory.getActionsFunction(),
                NQueensFunctionFactory.getResultFunction(),
                new NQueensGoalTest());

        Search search = new DepthFirstSearch(new GraphSearch());

        SearchAgent agent = new SearchAgent(problem, search);
        printActions(agent.getActions());
        printInstrumentation(agent.getInstrumentation());
    } catch (Exception e) {
        e.printStackTrace();
    }
}
```

Initial state of problem

Returns set of actions that can be executed in given state

Returns state resulting from executing a given action in a given state

Tests whether given state matches goal

Defines search strategy

Defines node in search

Applies search strategy to given problem, and stores result in a List<Action>

Trying out the AIMA framework

- Based on the tutorial exercise, think how you could implement N-Queens in this framework
- To understand the design of the N-Queens support classes, see aima.core.environment.nqueens.*
- These classes are available on nutmeg.eng.unimelb.edu.au or dimefox.eng.unimelb.edu.au under /home/subjects/comp30024/aima-java-read-only/aima-core
- These libraries are stored as an Eclipse project
- Note that you need to use Java 1.7 or higher