Intro to AI – ITCS 3153
Program Assignment #2

Instructions

Write a program that implements the A* algorithm to find a path from any two given nodes. You may use any of the following languages: C++, C#, Java, ActionScript.

Problem Overview & Algorithm Description

In a fully-observable environment where there are both pathable and blocked nodes, an agent must find a good path from their starting node to the goal node. The agent must use the A* algorithm to determine its path. For this program, you must use the Manhattan method for calculating the heuristic.

Remember: your heuristic function is a representation of how good or close you are to the goal state.

Program Requirements

No graphics are required for this program but using them will help you with debugging and problem solving. Your environment should be a 15x15 tile-based world that randomly generates nodes that are unpathable (blocks) in 10% of the nodes. This should be done each time the program compiles ensuring that there are different environment makeups each run. The program should display the generated environment when the program runs, and should allow the user to select a starting node and goal node. This can be done via text input into the console or with a GUI. Once the start and goal nodes have been defined, the program should run the A* algorithm to find a path. The path should be displayed (series of [x,y] nodes, highlighting nodes, or actually moving the agent) if one exists, or a message indicating that a path could not be found. The user should be able to continue specifying starting and goal nodes after paths have been found.

All program submissions should be done via Moodle.

The rubric below will be used in the grading of your program. Partial points may be awarded for each category.

Category	**Value**
Program is free of syntax and runtime errors	**/ 10**
Program uses A* and successfully finds a solution	**/ 40**
Program displays “no path could be found” if one does not exist	**/ 10**
Program generates and displays a 15x15 tile-based environment	**/ 10**
Blocks (unpathable tiles) are randomly placed in 10% of the node (not hard coded)	**/ 5**
User is able to specify and start and goal node	**/ 10**
The solution (path) is properly displayed	**/ 10**
Program utilizes an appropriate heuristic (Manhattan method)	**/ 5**
Program shows the agent moving along the path from start to goal	**/5 (bonus)**
Total Points	**/ 100**