

Artificial and Machine Intelligence

Semester 1, 2017

Assignment

The written part of the assignment will be handed in by one minute before **midnight** on Monday **the 1th of May, 2017**. Submission details are given below.

The demonstrations of the assignment will be held during the practical sessions starting from the **8th of May**.

Informed search strategy implementation

Objective

The objective of the assignment is to get practical experience in implementing two informed search strategies.

Your Task

You are required to implement:

- 1) the beam informed search (covered in the lecture) for finding the path between two user specified nodes in an undirected graph. All nodes in the graph will have a heuristic cost. The beam search uses a K value which limits the number of path options to be explored and for your implementation you can assume that the K value will range from 1 to 3. Thus if K=1 then the search will always expand only one node at each stage whereas if K=2 the “best” two paths will be explored (according to the heuristic measure).

(worth 40% of the overall mark)

- 2) a memory limited A* search strategy for finding the path between two user specified nodes in an undirected graph. All edges in the graph will have a specific cost and the heuristic measure will also be provided. The memory size is limited to 15 nodes and therefore, the search can have store at most 15 nodes at a time.

(worth 60% of the overall mark)

The implementation should handle general graphs. The graph information will be available in the same format as in the tutorials.

For the search, the program should prompt the user for the start and end node in the graph (or alternatively, the user can specify the start/goal nodes via command line arguments). The program should then return the solution path between the two nodes as well as a list of the alternative solutions and all paths stored by the program at the time each solution is found.

You are required to submit the following:

ON THE DUE DATE, THE 1st of MAY

- 1) *A three page report (10 point font) that specifies the following:*
 - *any problems, bugs that the search strategies still have and how you have tried to address these problems & bugs (at most 1/2 page)*
 - *an official title page, signed and dated by you. These are available from Computing Colloquium on Blackboard or from the Computing reception*
- 2) *The source code should be fully documented. In addition the code should run on the lab machines and it should run without any modifications. Failure of the code to run will result in a mark of 0 for the demonstration. The name of the beam informed search strategy binary should be **beam-search** while the name of the memory limited A* search strategy should be **alim-search**. If you choose to use a language that makes executables of this name impossible, provide appropriately named scripts.*
- 3) *Your submissions must be made electronically via Blackboard. The files to be submitted (code files and report only, no executable or object files but you may submit unit testing files if desired). It is your responsibility to ensure that your submission is complete and correct (we recommend that you download your submission and extract it into a separate folder to check).*

The programs should not depend on any files in your home area – it will be tested in a specially setup directory via a script – one more time please note that if your program fails to run, you will be awarded a mark of 0 for the assignment.

NOTE!

- 1) ***The programs should be ready by the 24th of April – the last week should be spent on testing the programs.***
- 2) ***You are also required to attend the tutorials to demonstrate your work. Failure to demonstrate your work will result in a mark of 0 for the demo part of the assignment (which represents 90% of the assignment mark). This means that you if you are not present when your name is called, you will receive a mark of zero.***