Lecture 2 – Searching

Lecture outline

- Last week
  - Introduced AI and the module
  - Brief recap of data structures
- This week
  - Introduction to searching methods
  - A* algorithm
  - Pathfinding

Why search?

- Finding a path from a starting point to an end point.
Before we look at searching it is worth considering graphs as a tool. Graphs consists of:
- Nodes - points/data items
- Edges - links, with or without weightings

Graph:
Depth-First Search
Taken from Jones (2005)

Breadth-First Search
Taken from Jones (2005)

Which is best?
- Breadth-first Search?
- Depth-first Search?
A Star
- Similar to DFS and BFS
- Measures of the cost of the nodes
- DFS and BFS search blindly - The work 'blindly' relying a the approach to get the answer.
- A* is a Heuristic search it use a measure to direct the follow the system.

A Star
- Three parameters
  - H  Distance of node from goal node
  - G  Cost of moving from the parent node to the new node.
  - F=H+G

Common rules:
\[
H = \text{cost} \times (\text{abs(node}_{x} - \text{goal}_{x}) + \text{abs(node}_{y} - \text{goal}_{y}))
\]
\[
G = 1 + \alpha \times (\text{ParentGvalue} - 1)
\]
Next Week

- Evolutionary algorithms - These have searching at their core.

- What were the key points of today?
  - Summarise them as 5 points.
References

- Jones MT (2005)
  *AI Application Programming* 2nd Edition
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