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**Assignment 1 - A\* Search and Heuristic**

**Heuristic:**

The heuristic used is based on pythagorean theorem. A\* will determine a stronger pathing if the hypotenuse of both the elevation and nodal distance between the current and goal node are less than other nodes. This heuristic was used in this scenario because pathing does not take into account real time data like traffic and construction. In a static scenario such as this, relative and actual distance provide the most accurate data. The nodes that take the path closer towards the goal node in both the x and y distances would produce the shortest path in most scenarios.

**Heuristic Math:**

Nodal\_Distance =  $\sqrt{(\text{goalNode.x} - \text{currNode.x})^2 + (\text{goalNode.y} - \text{currNode.y})^2}$

Elevation\_Distance =  $\text{goalNode.elevation} - \text{currNode.elevation}$

Pythagorean\_Distance =  $\sqrt{\text{Elevation\_Distance}^2 + \text{Nodal\_Distance}^2}$

**File Handling:**

- Parsing .osm file with xml.etree.ElementTree package leveraging parse function
- Parsing .bil file using struct package leveraging unpack functionality and passing argument "<h" to account for little endian format

**Code:** <https://github.com/uoitsofe/SOFE3720-ASS-AE>