CSCI 331 Lab 1 Write-up

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Cost Function:

For the cost function I used the A* algorithm:

$$f(n) = g(n) + h(n)$$

Where f(n) equals the estimated cost to get from *n* (current state) to the goal state. *g(n)* is the distance traversed, either 10.29 if moving east or west, or 7.55 if moving north or south, while also incorporating weights for terrain differences. *h(n)* is the straight line, 3d distance to get from n to the goal state, this gives us a lower bound for the total distance from the goal.

Terrain Weights:

After looking at the pictures given to me of the different terrain choices, I grouped them into three categories. No impediment, some impediment, and major impediment.

Terrain Name	Weight Value
Footpath	0
Paved Road	0
Open Land	0
Easy Movement Forest	20
Slow Run Forest	30
Rough Meadow	50
Walk Forest	50

Lake/Swamp/Marsh	250
Impassable Vegetation	500
Out of Bounds	$+\infty$

Certain choices of the weights may be criticized, such as the impassable vegetation. But it is not necessarily the same as ‘out of bounds’ so I gave it a very heavy weight to make the algorithm avoid it unless completely necessary.

Heuristic:

As mentioned previously in my cost function analysis, my heuristic is the straight line 3d distance between the current state and the goal. Calculated by this function:

$$h(n) = sqrt((x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2)$$

This provides a lower bound for the distance to travel between the current state and goal state.