Intro to Artificial Intelligence Lab 1 : Year-round Orienteering

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Cost function:

Open land (248, 148, 18): 1.5 m/sec
Average human speed on plain grassland.
Rough meadow (255, 192, 0): 1.2 m/sec
Looks hard to cross, but with right tools in hand, and with proper gear one can move at a considerable pace.
Easy movement forest (255, 255, 255): 1.4 m/sec
Looks quite similar to open land, but has sloped terrains, hence little slower in this type of field.
Slow run forest (2, 208, 60): 1.1 m/sec
Filled with hefty obstacles, due to these hinderances one can not speed through this variety of field.
Walk forest (2, 136, 40): 1 m/sec
Densely covered with vegetation hence takes time.
Impassible vegetation (5, 73, 24): 0.2 m/sec
These areas cannot be encroached unless it provides terrific shortcut, hence assigned a low value.
Lake/Swamp/Marsh (0, 0, 255): 0.15 m/sec
These areas cannot be encroached unless it provides terrific shortcut, hence assigned a low value.
Paved road (71, 51, 3): 1.7 m/sec
Paved road helps in speeding, so higher than open land speed.
Footpath (0, 0, 0): 1.55 m/sec
Foot path helps in speeding, so higher than open land speed.
Out of bounds (205, 0, 101): 0.0001 m/sec
Making sure the algorithm does not encroach into out of bounds areas.
Easy movement forest during fall (255, 255, 255): 1.10m/sec
Change made as asked.
Water during winter (163, 208, 212): 0.9 m/sec
Walking on ice can be tricky, hence needs to be traversed slowly.
Mud during spring (139, 69, 19): 0.9 m/sec
Walking in mud takes lot of time, meaning low pace.

Heuristic Function:

Ratio of Euclidean distance between start point and end point (3-dimensional) and speed of the terrain traversing in.

A* algorithm works with Euclidean distance, but all terrains are not same, hence took the ratio of this distance and speed at which one can traverse through that terrain.

Seasonal Algorithms:

Fall: changed the Easy Movement Forest speed only since the natural speed gets affected due to leaves.

Winter: If season is winter, then from saved list of edge pixels which are bounded by water and land made the water ice inwards by 7 pixels using BFS.

Spring: If season is spring, then from saved list of edge pixels which are bounded by water and land made the land muddy outwards by 15 pixels using BFS if the elevation is less than 1 meter.

Summer: Using A* through valid heuristics of each terrain, I have found out the shortest and best path to traverse.

Human-Consumable Output:

Best Track Distance: Total distance traversed from start to end point, using the given conversion values 10.29 m in longitude (X) and 7.55 m in latitude (Y) and their hypotenuse if going diagonally.

Output Image: Has the final track in purple color describing the path to traverse.