Task 6 Spike: Navigation with Graphs

Context:

Moving agents that intelligently plan and navigate environments, both static and dynamic, is a common and useful problem to solve. The solutions are relevant in both a game context, as well as real-world navigation and routing problems. In this spike you will create a simulation where agents plan paths using heuristic search algorithms, and then navigate the environment using line-following movement.

Knowledge/Skill Gap:

Developers need to be able to create and navigation graphs for dynamic environments so that moving agents can move in an environment.

Goals/Deliverables:

Expand the Task 5 navigation graph simulation to demonstrate the following:

- A game world that is divided into a larger number of navigation tiles, and corresponding larger navigation graph structure.
- A path-planning system that can create paths for agents, based on the current dynamic environment, using cost-based heuristic algorithms that accounts for at least six types of 'terrain' (i.e. nodes with different costs).
- Demonstrate multiple independent moving agent characters (at least four) that are able to each follow their own independent paths.
- Demonstrate at least two different types of agents that navigate the world differently

Planning Notes:

- Suggest not using force-based movement. Just use simple constant speed movement from point to point along the path line.
- Reuse the box-world and path-planning code as much as you want.
- The different types of agents might: interact have different costs for different terrains; or use different graph structures; or eschew the navigation graph and terrain obstacles entirely.

Extensions:

- Have some agents destroy others when on the same tile – then update the 'cost' of the tiles for different agent types so they start to avoid places where their compatriots die a lot.
- Try a different tile shape – hexes, triangles, or even cubes. Or for a **real** challenge: try an irregular tessellation with multiple tile shapes.
- Have a dynamic map size, or a map that wraps along one axis or both!