Path Planning on a Compressed Terrain

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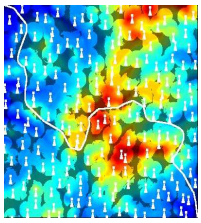
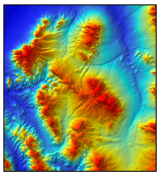
We simulate a smugglers and border guards scenario to evaluate terrain compression. Multiple Observer Siting is used to place observers so that they jointly see as much of the terrain is possible. Our path planning algorithm computes a smuggler's path.

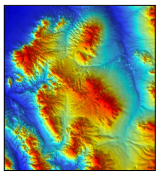


Red: High elevation
Blue: Low elevation
Bright: Visible
Dark: Hidden

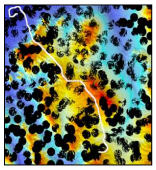
A sample smuggler's path on a 400x400 terrain.



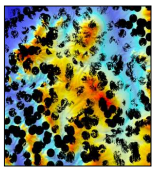
Compress the terrain then uncompress it to generate the alternate representation.



Perform multiple-observer siting on the alternate representation to generate a set observers, along with the corresponding joint viewshed



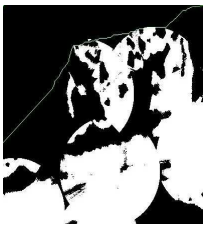
Site the same group of observers on the original terrain, and compute the new joint viewshed.



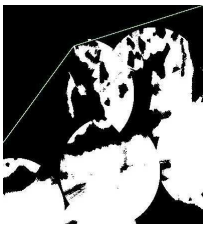
Evaluate how well visibility is preserved, and compute smugglers' paths to evaluate how well path costs are preserved.

The smuggler's cost metric includes penalties for observer detection and uphill movement: not simply distance around obstacles.

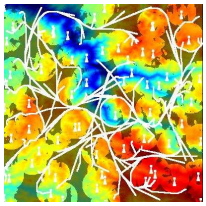
1st pass: Chebyshev



2nd pass: Euclidean

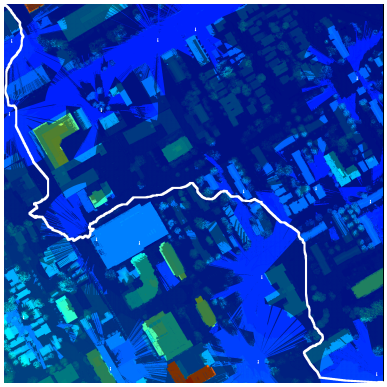


Our two pass path planner efficiently allows a full range of Euclidean motion on a raster terrain.



Compute many separate paths to sample a larger portion of the terrain.

Our path planning algorithm:
1)Accounts for complex cost metrics
2) Allows full range of Euclidean motion on a 2D grid
3) Is efficient on high-res terrain



Smuggler's path on 2000x2000 terrain derived from Ottawa LIDAR scan