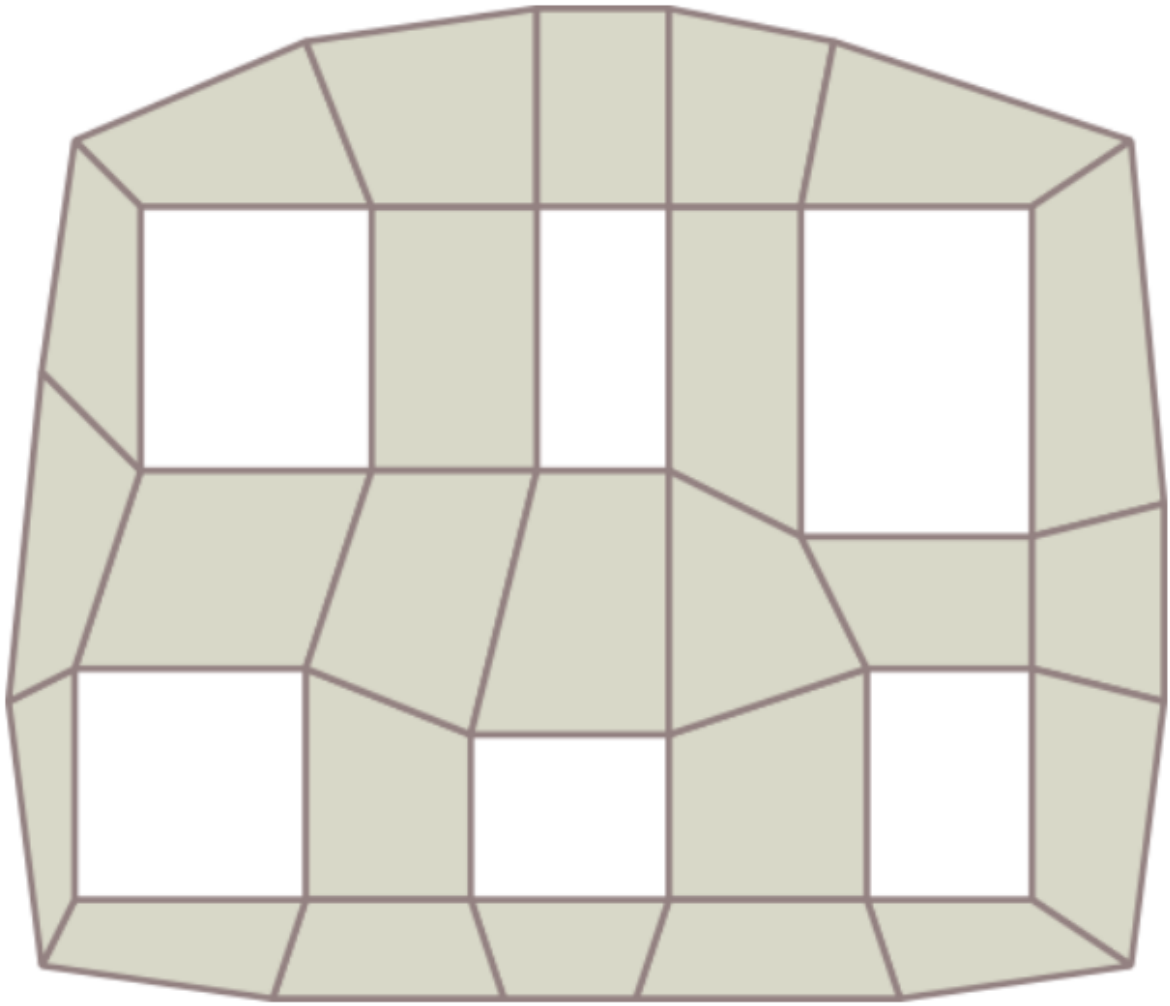
Navigation Meshes

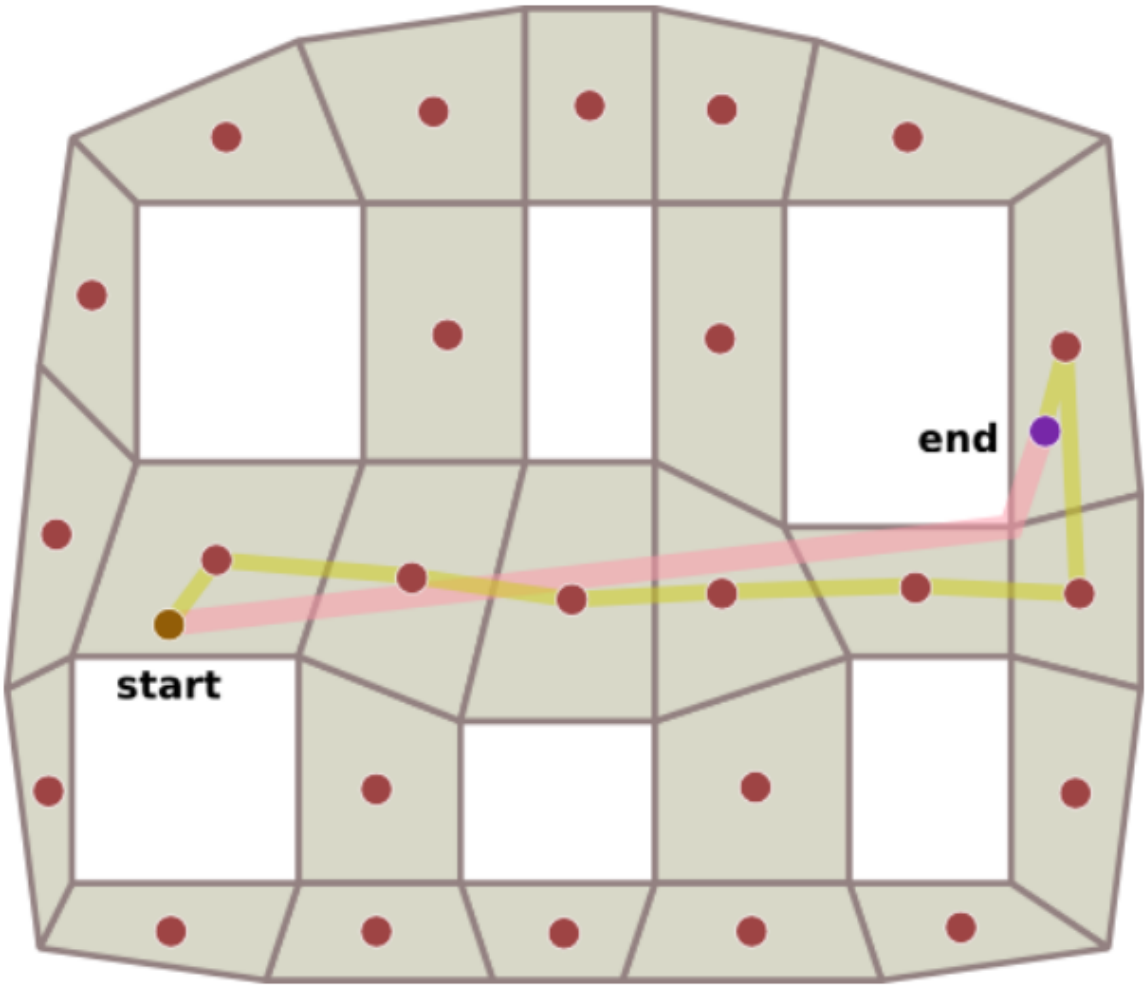
represent the walkable areas with non-overlapping polygons , which called a navigation mesh.

The walkable areas can have additional information attached to them (such as “requires swimming” or “movement cost 2”). Obstacles don’t need to be stored in this representation.



We can then treat this much like we treat a grid. As with a grid, we have a choice of using polygon centers, edges, or vertices as navigation points.

Polygon movement

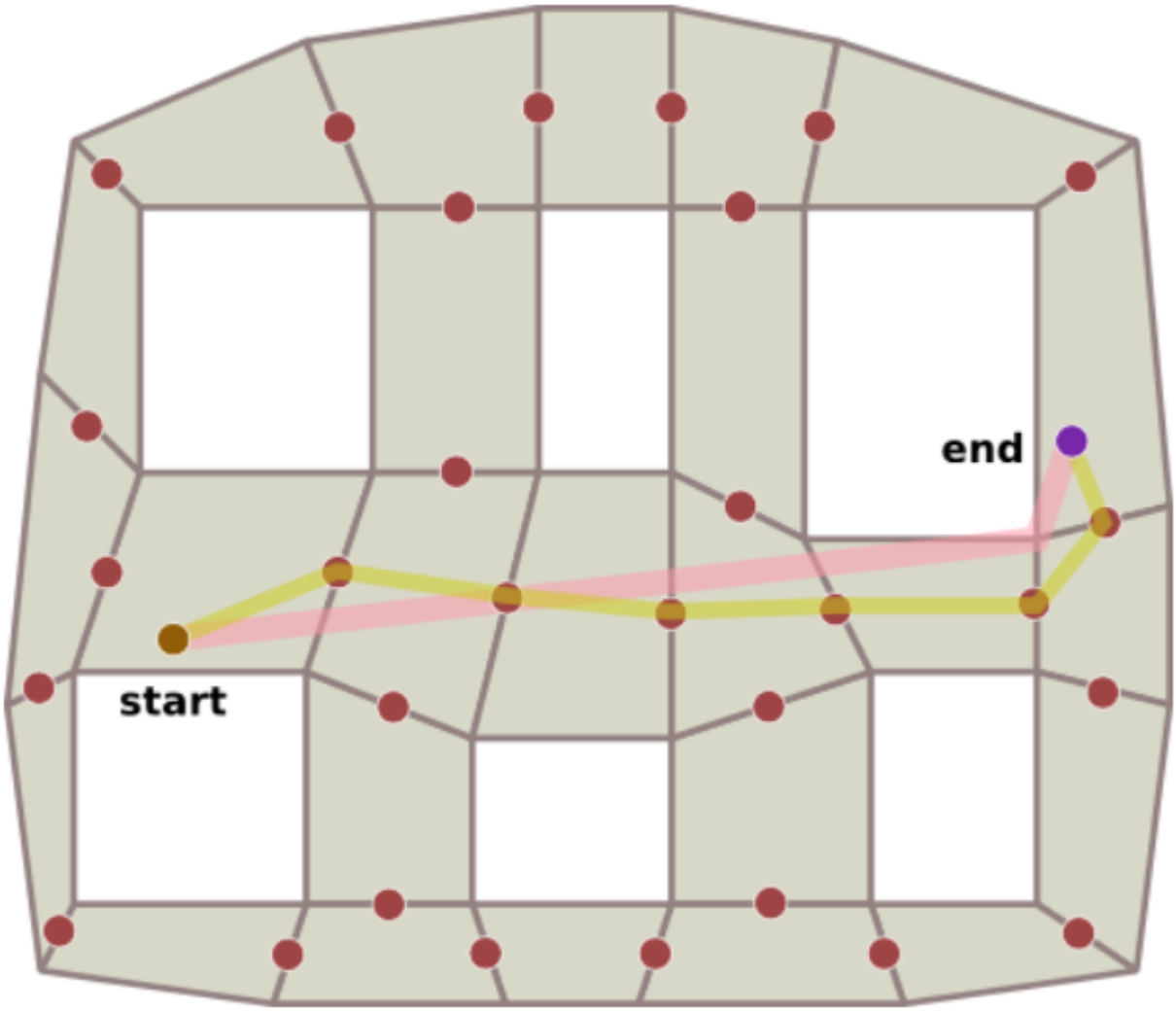


Pink is ideal path, yellow path is the what using a pathfinder through the polygon centers.

The path quality suffers.

Polygon edge movement

Moving to the center of the polygon is usually unnecessary, so we can move through the edges between adjacent polygons.



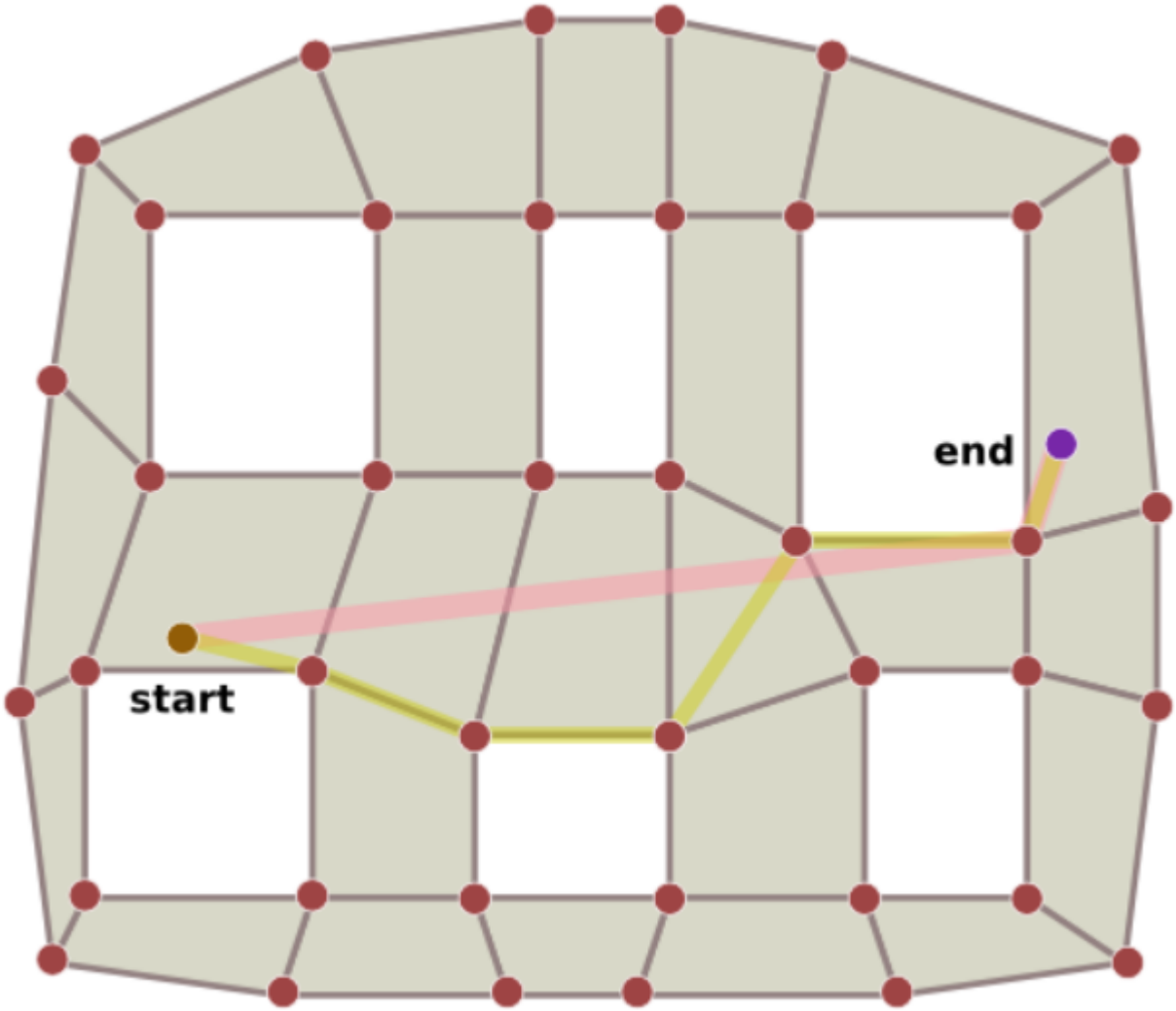
As we can see, the result become better.

We can pick more points along the edge to produce a better path.

Polygon vertex movement

The shortest way around an obstacle is to go around the corner.(Like pink path).

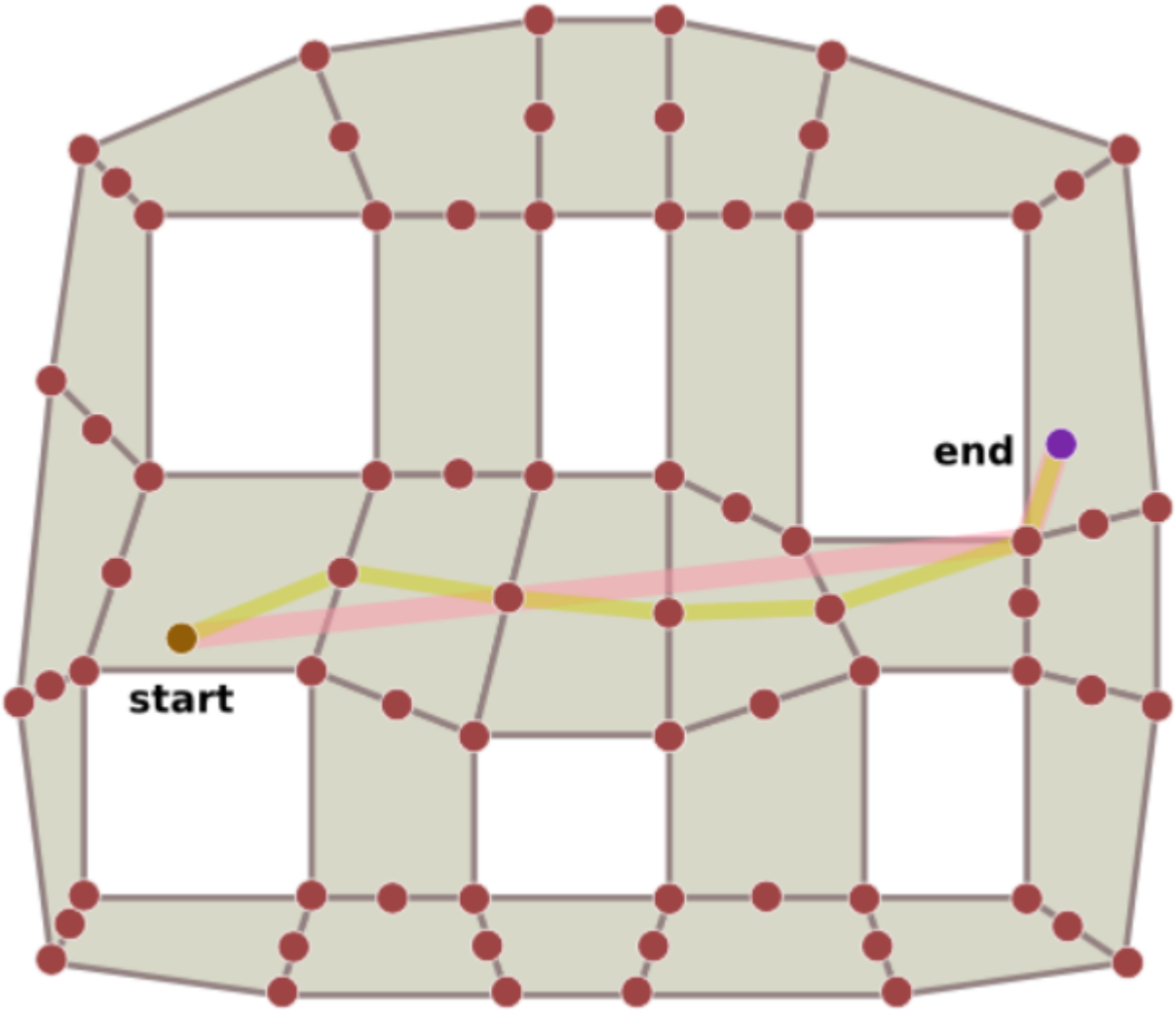
We can use vertices with navigation meshes:



However, the yellow path looks unnatural, with "wall hugging" behavior.

Hybrid movement

Combine the vertex and edge movement.



Path smoothing

Shortening the path found in an approximate map representation(navigation meshes) will not always produce paths that are as good as those found in a more exact representation(visibility graphs).