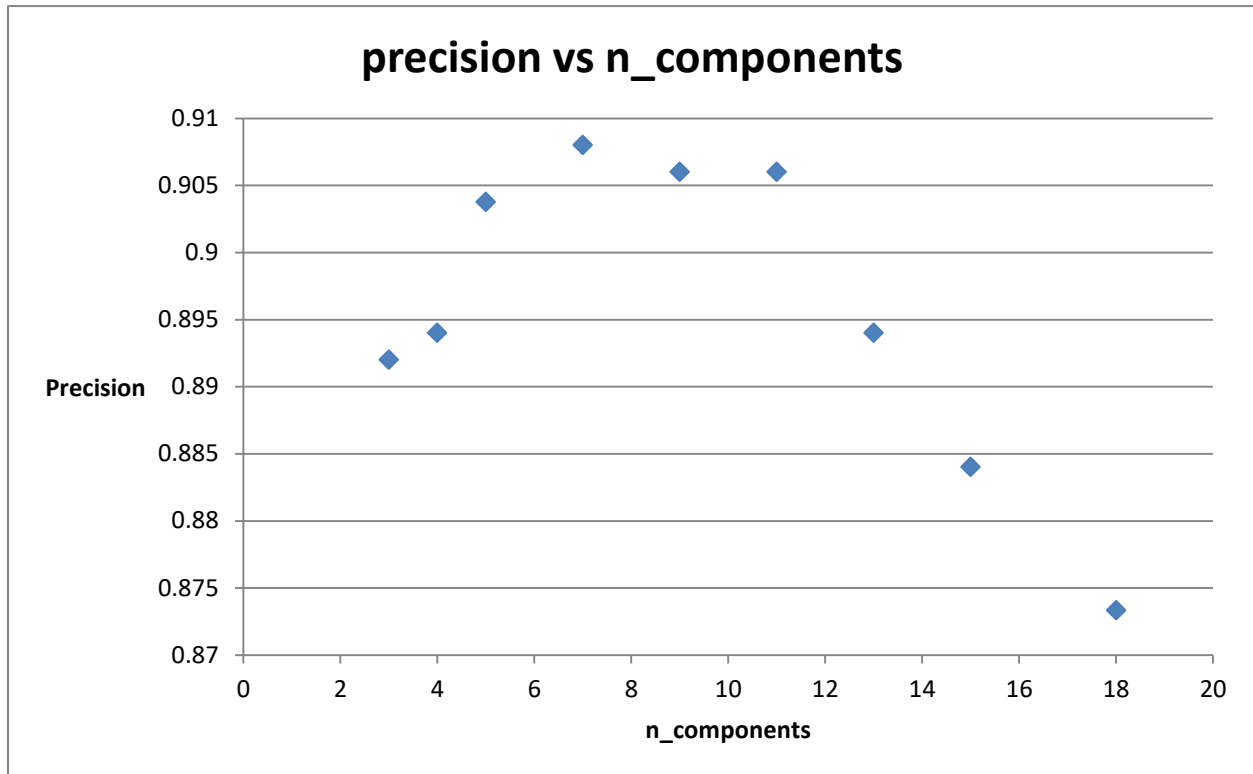


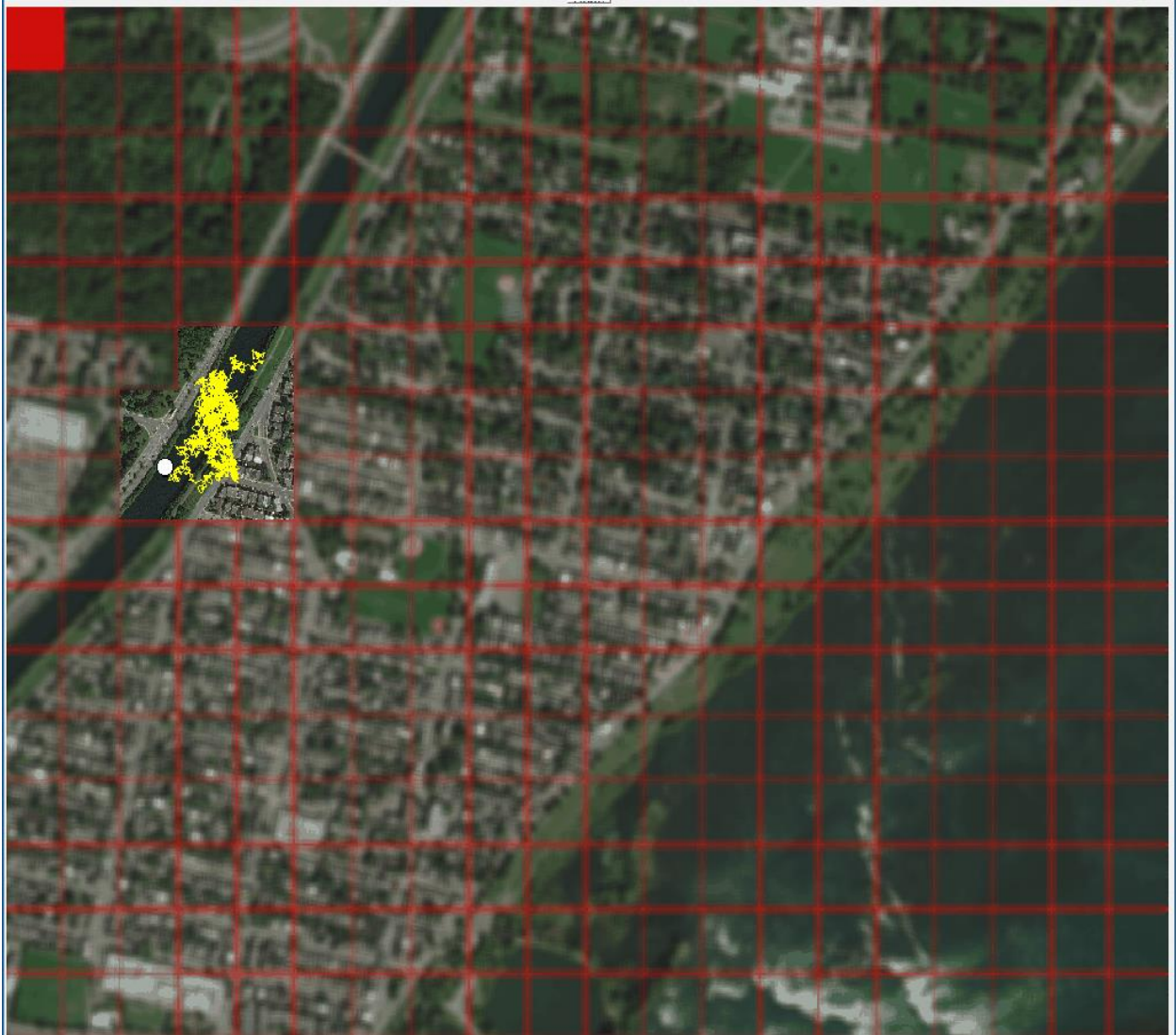
Part 1:



From the plotted results, it seems that the precision of the PCA doesn't increase in any significant way past the point of about 12 components (in fact, it seems to decrease a bit). This can probably be explained by the fact that 12 or so components are enough dimensions to approximate the data in GPS images. With this in mind, it seems the optimal value of components would be 10 to 12 or so components, I will be using 11.

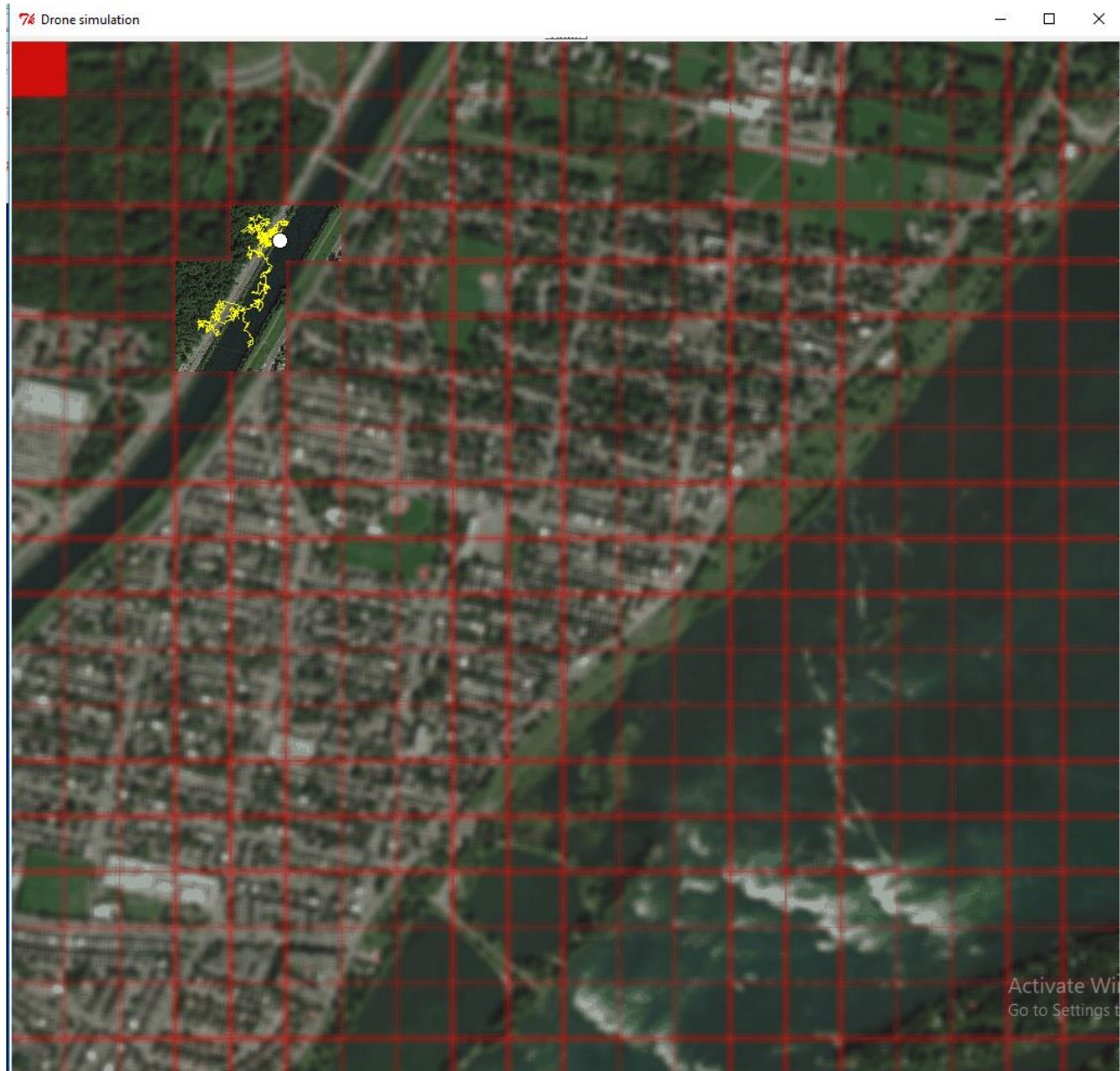
Part 2:

Brownian Motion with avoidance of urban tiles:



Pros: Since it's random there are no areas that it will purposely avoid, so eventually it should cover most of the non urban area.

Cons: Since it's random motion, depending on the step size, it is possible that this algorithm will not cover a significant amount of tiles and will most likely not move much. Also, since it's not guided it won't necessarily avoid going towards any type of tiles such as tiles that we have already visited or urban tiles.



The algorithm I made simply avoids going into urban tiles by looking ahead and seeing the type of tile in a certain direction and going in that direction if it's not an urban tile, otherwise it will try another direction.

Pros: It will avoid wasting too much time bumping against urban tiles (it still can go toward urban tiles due to randomness but it's much less likely than the Brownian motion algorithm)

Cons: Computationally more expensive, since it classifies at most 5 tiles instead of just 1. It is also victim to randomness if there are no adjacent urban tiles, resulting in some wandering.