

CSE 571
Homework 2
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Wednesday 24th May, 2023

1.2.2

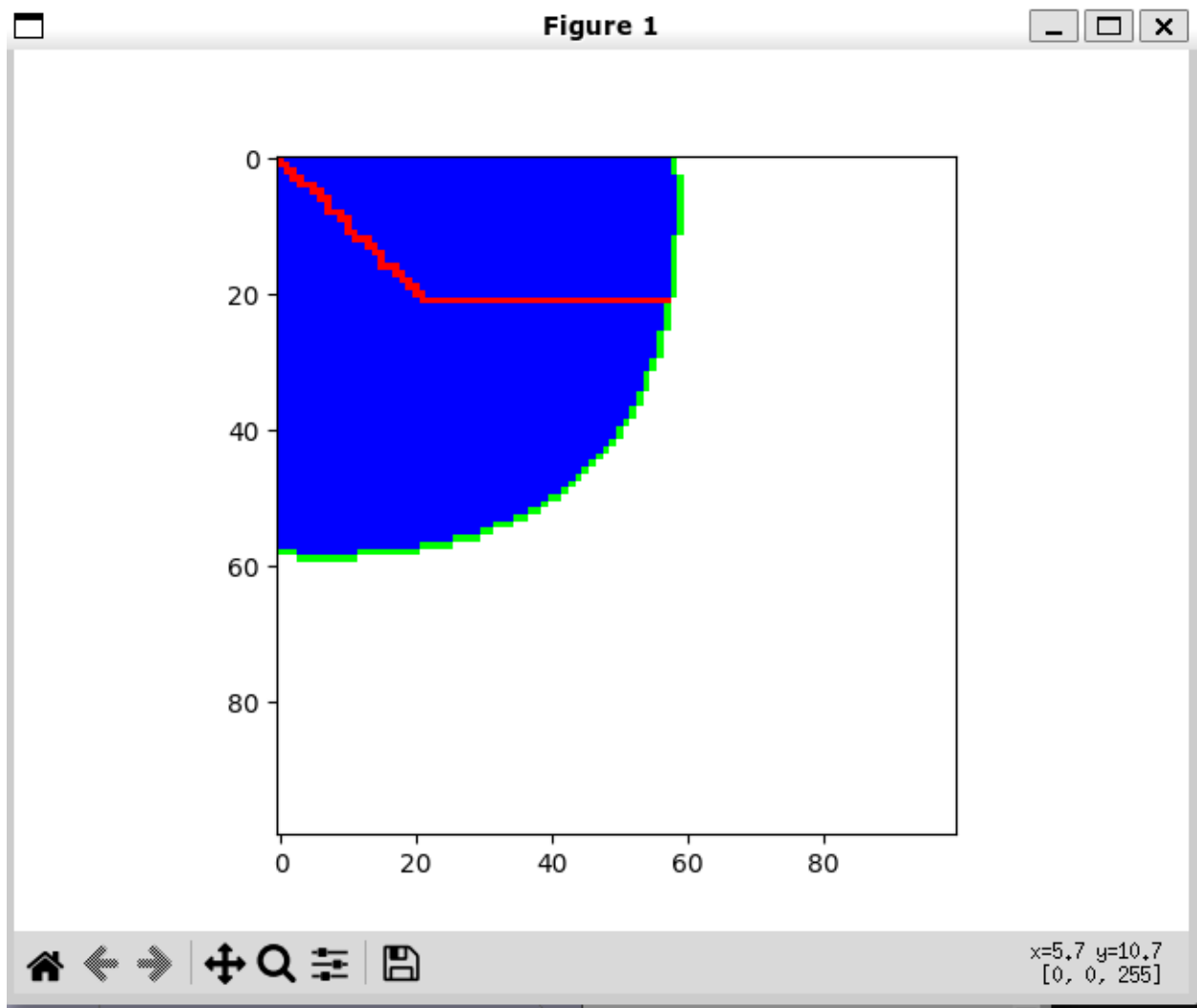
(a)

For 2dof, 0 obstacles, seed 0, epsilon 1:

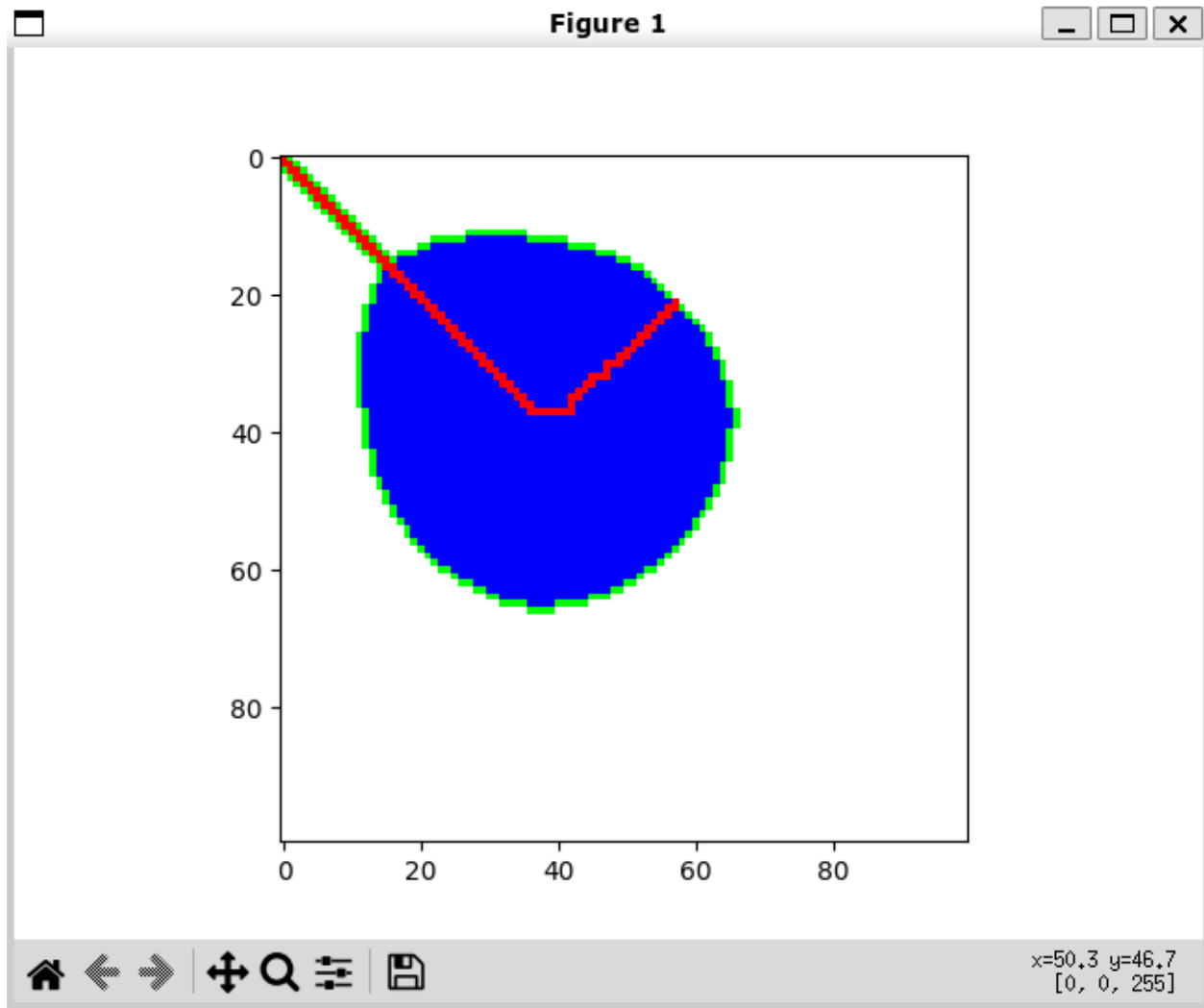
Time cost: 0.1976490020751953

cost: 78.0

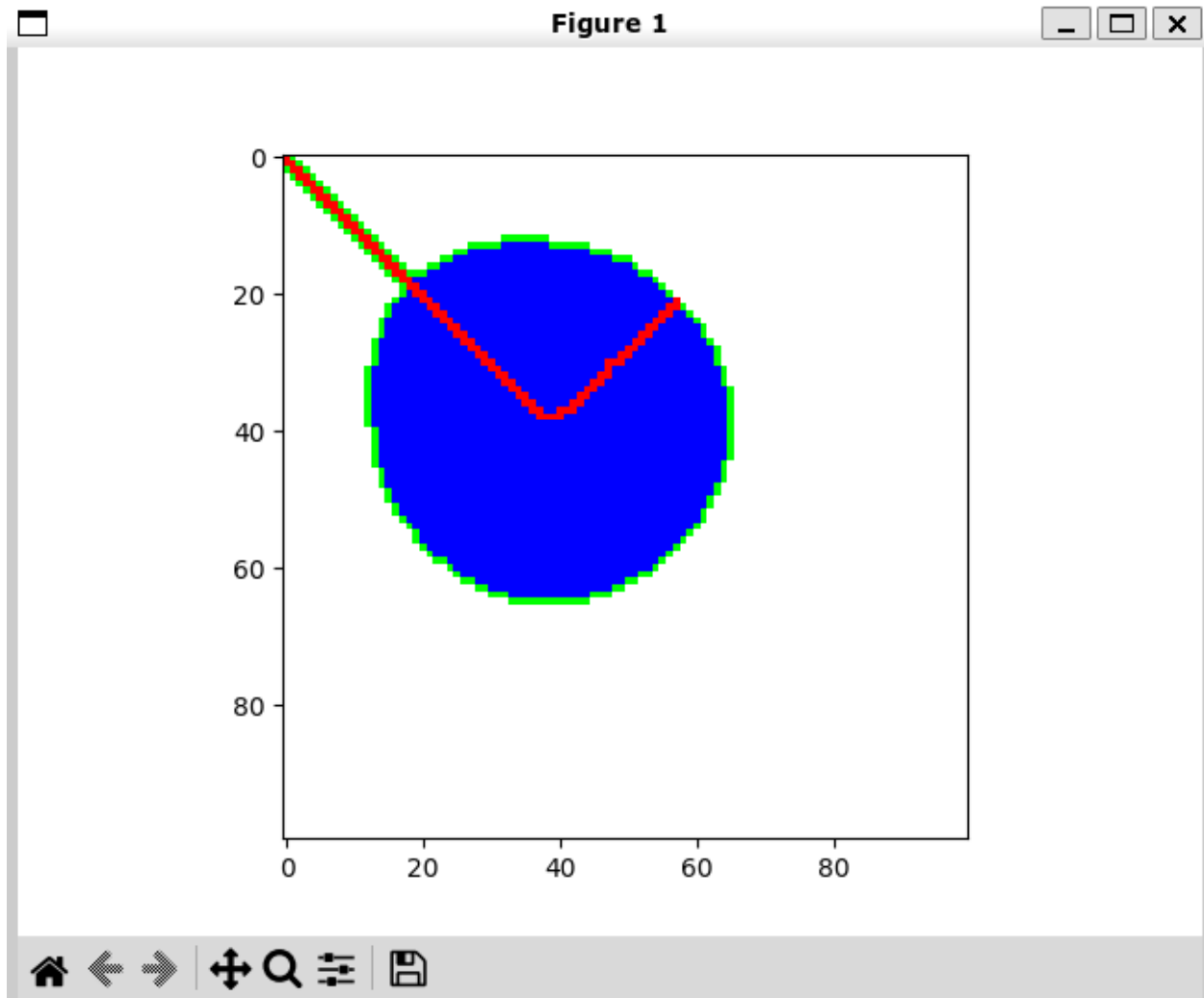
states explored: 3003



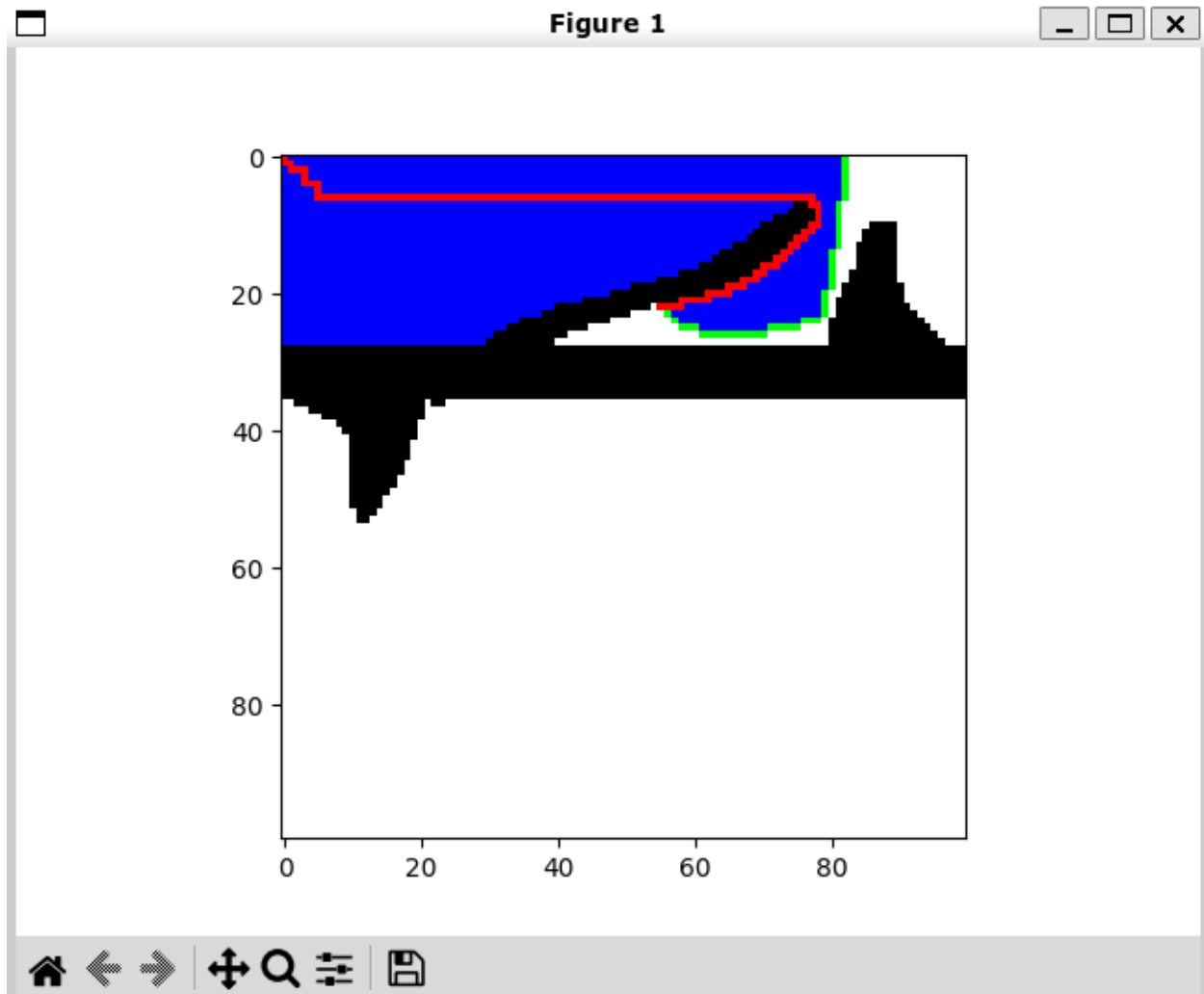
For 2dof, 0 obstacles, seed 0, epsilon 10:
Time cost: 0.18625855445861816
cost: 110.0
states explored: 2284



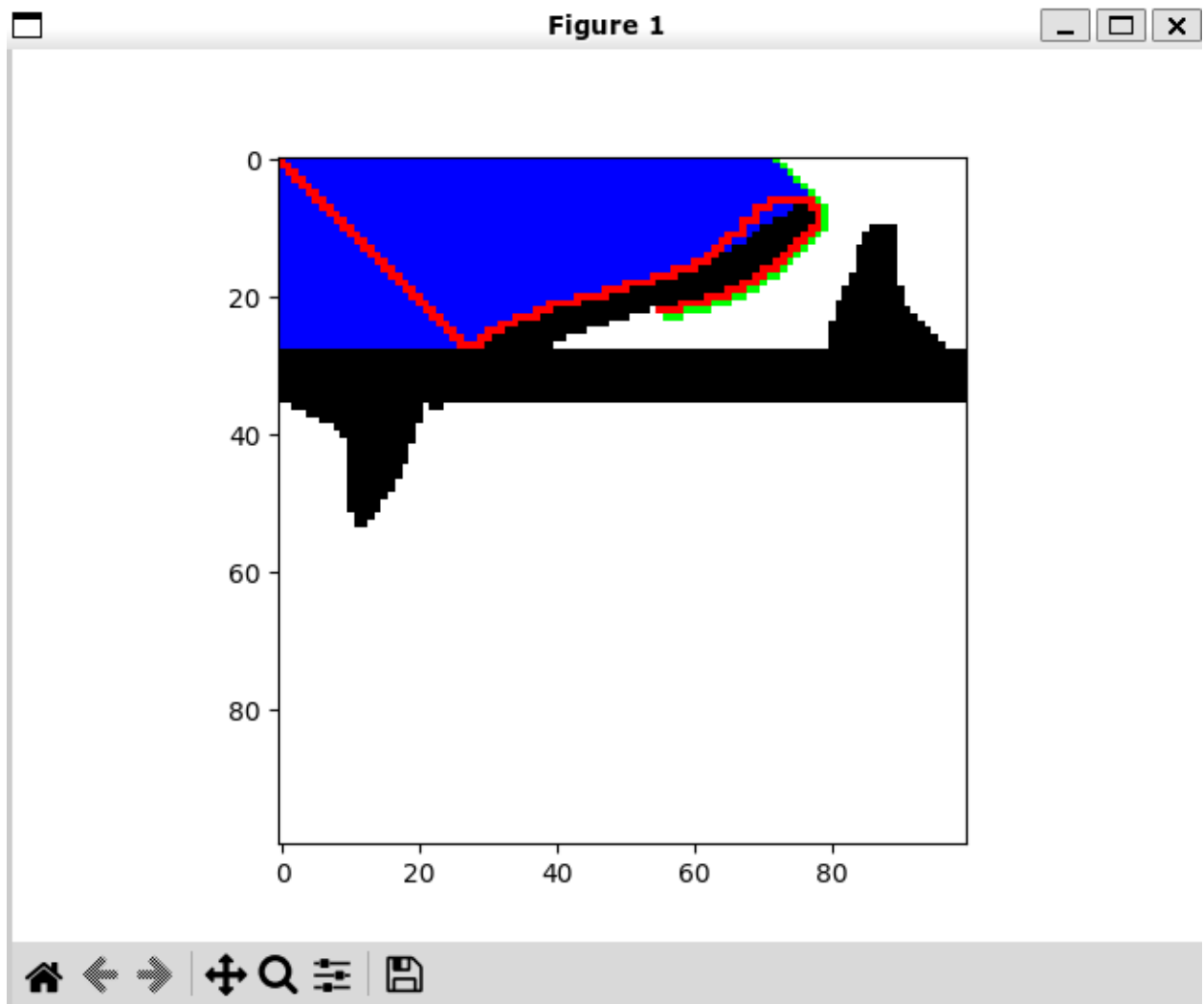
For 2dof, 0 obstacles, seed 0, epsilon 20:
Time cost: 0.35789942741394043
cost: 112.0
states explored: 2179



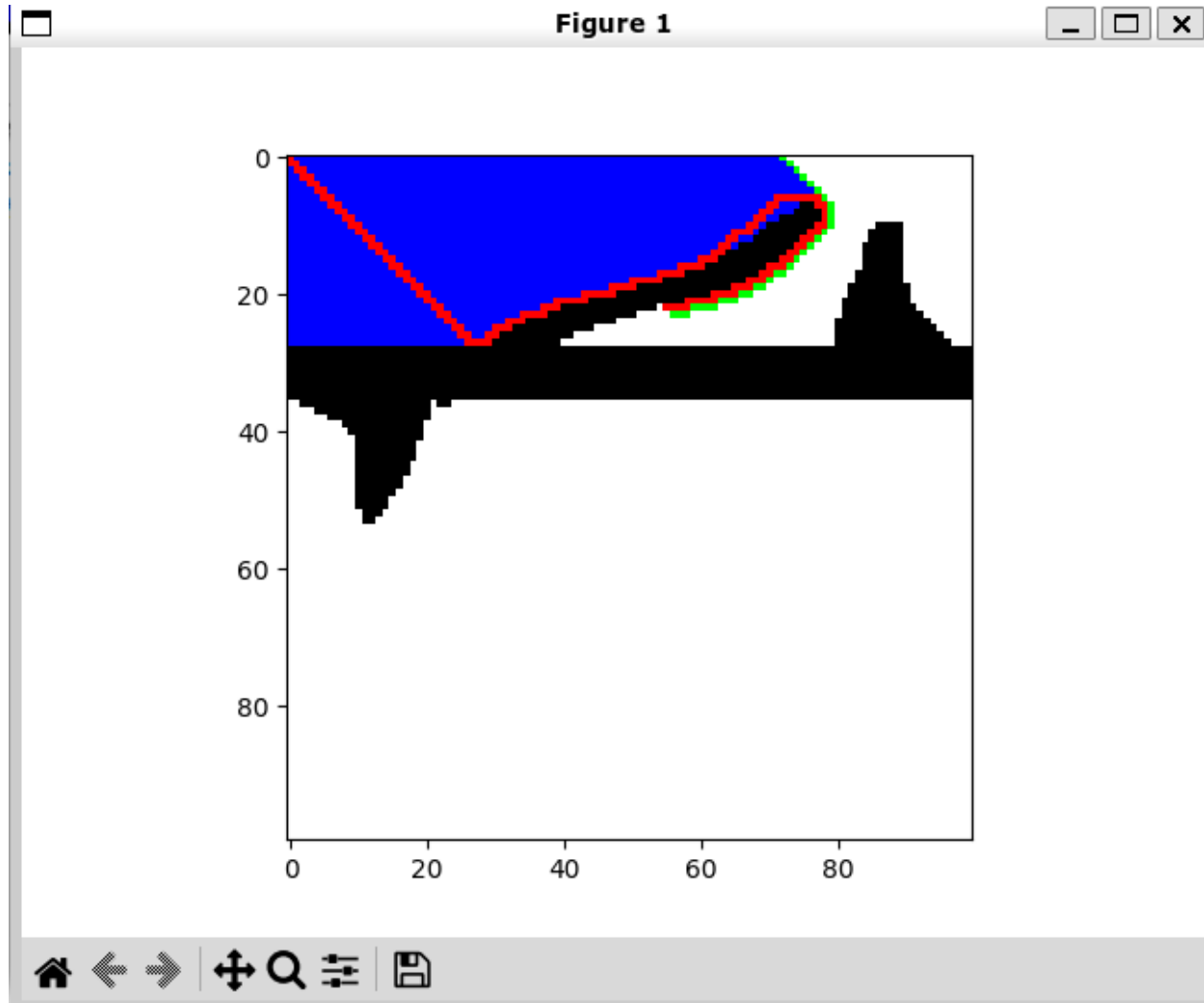
For 2dof, 2 obstacles, seed 0, epsilon 1:
Time cost: 0.13791441917419434
cost: 123.0
states explored: 1927



For 2dof, 2 obstacles, seed 0, epsilon 10:
Time cost: 0.19238662719726562
cost: 165.0
states explored: 1710



For 2dof, 2 obstacles, seed 0, epsilon 20:
Time cost: 0.14766478538513184
cost: 165.0
states explored: 1710



For 3dof, 2 obstacles, seed 0, epsilon 1:
Time cost: 85.62292218208313
cost: 168.0
states explored: 617567

For 3dof, 2 obstacles, seed 0, epsilon 10:
Time cost: 66.75209498405457
cost: 206.0
states explored: 477500

For 3dof, 2 obstacles, seed 0, epsilon 20:
Time cost: 73.14428973197937
cost: 242.0
states explored: 503642

- (b) When we increase the discretization of the c space, it causes more states to be explored which results in a significantly slower runtime or higher time cost.
- (c) There was a lot of printing and reshaping of the variables. Also, I had dtype issues because all my configurations were in floats and I had to convert them to ints.

1.2.3

(a)

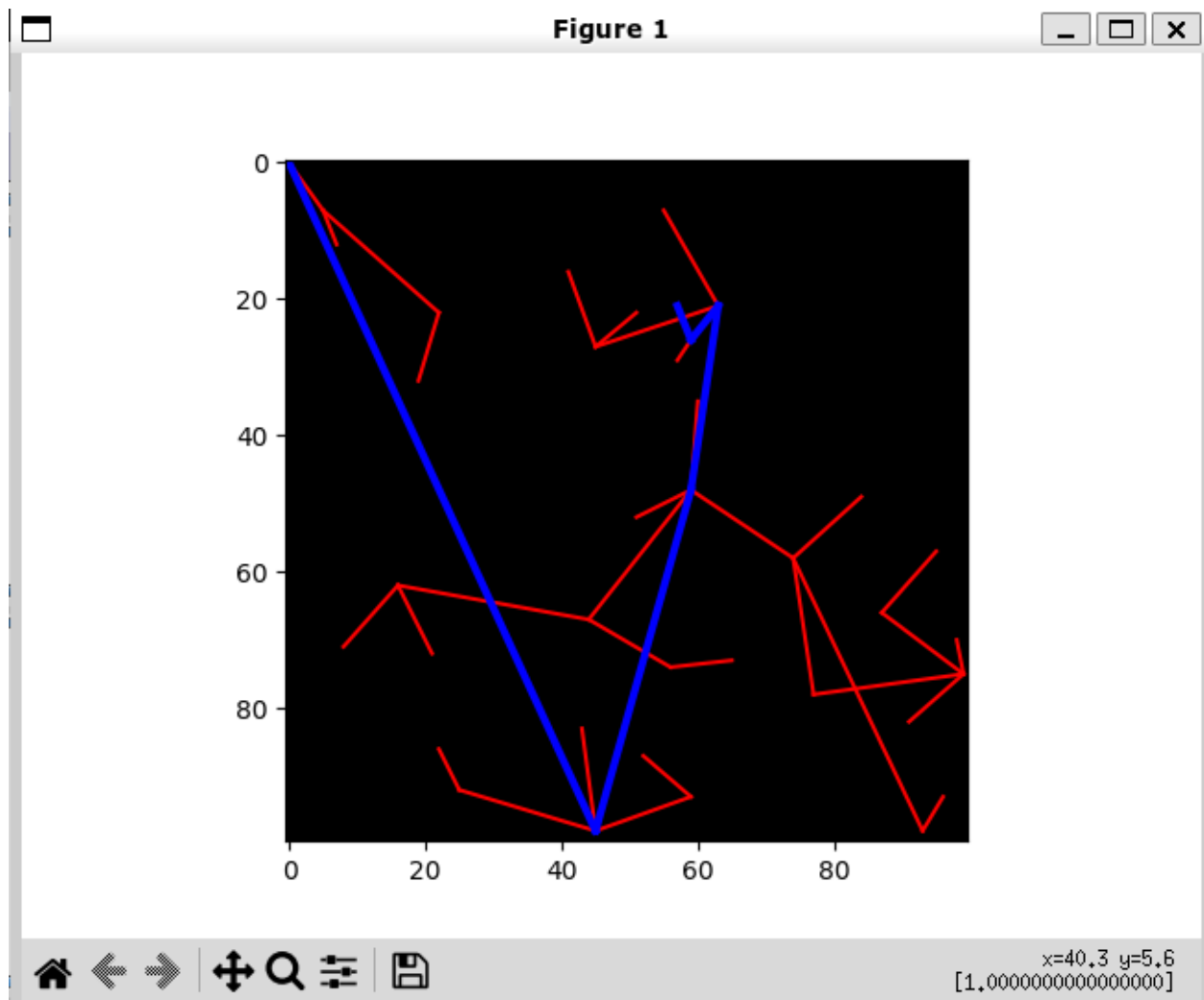
For 2dof, 0 obstacles, seed 0, bias 0.05, eta 1:

Mean time cost: 0.03266654014587402

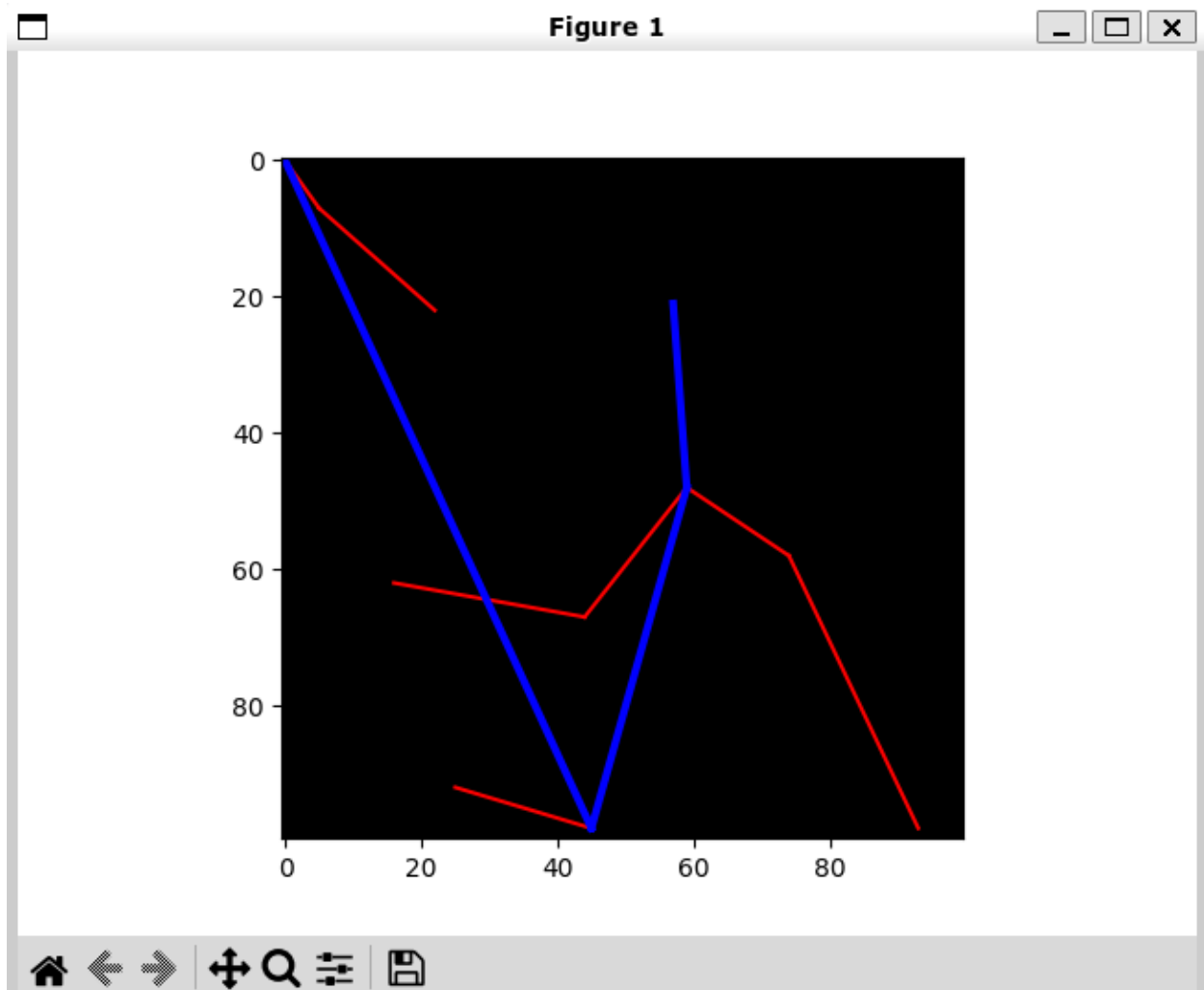
std time cost: 0.004816227321101959

Mean cost: 198.84383834015168

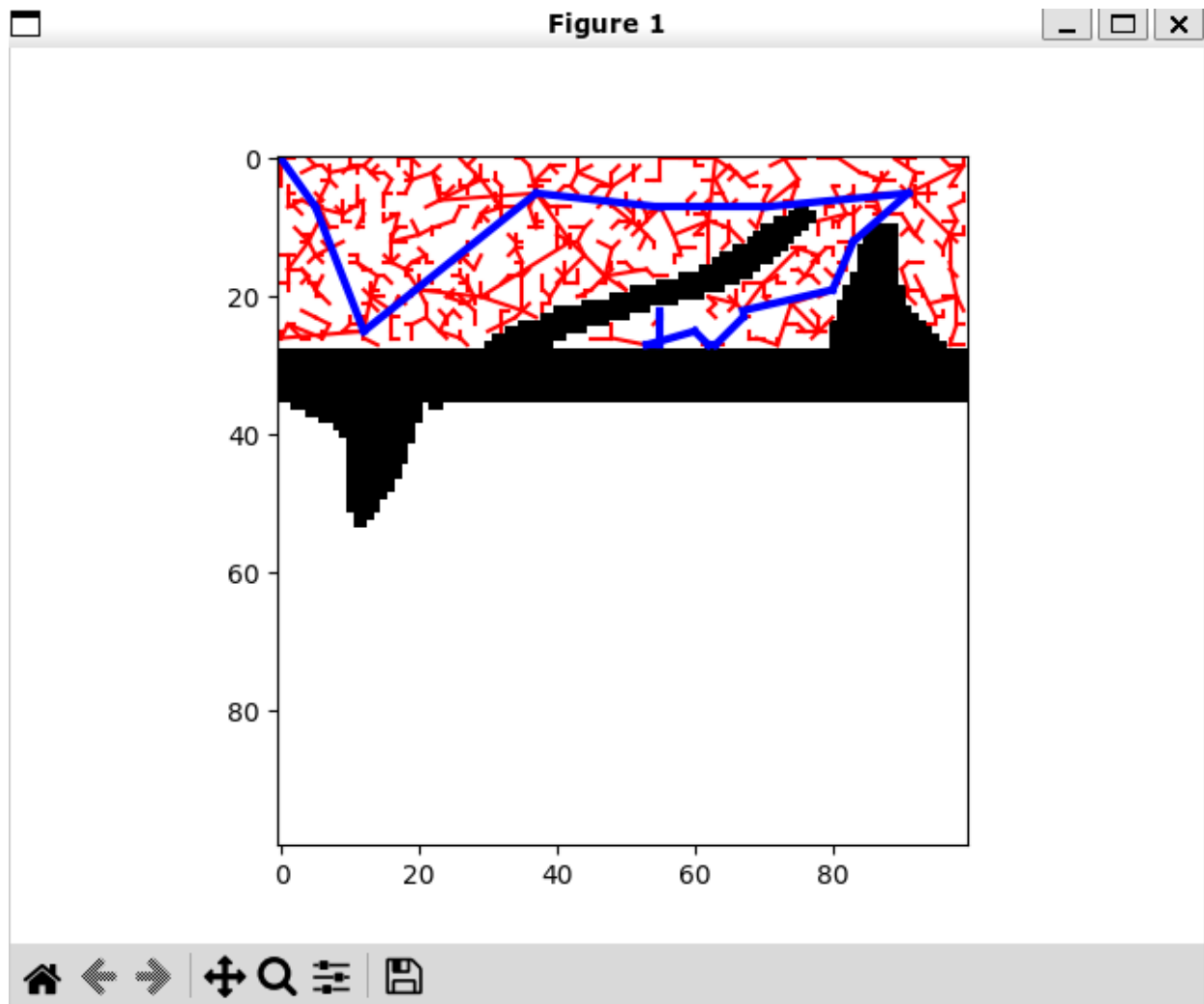
std cost: 0



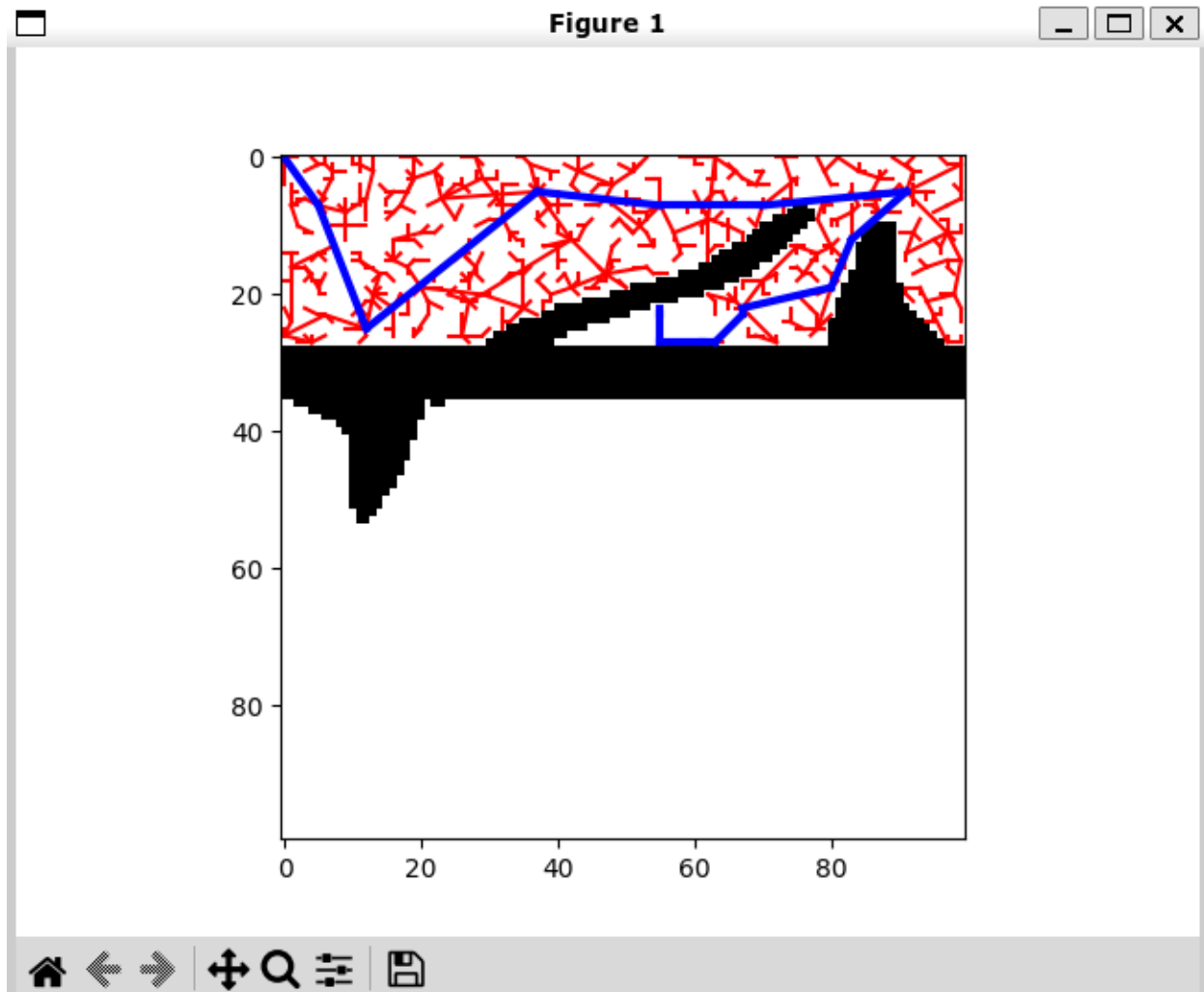
For 2dof, 0 obstacles, seed 0, bias 0.20, eta 1:
Mean time cost: 0.010440444946289063
std time cost: 0.007366496014662235
Mean cost: 186.8348339090337
std cost: 0



For 2dof, 2 obstacles, seed 0, bias 0.05, eta 1:
Mean time cost: 12.094391918182373
std time cost: 0.8803641282889242
Mean cost: 170.48992200228264
std cost: 0



For 2dof, 2 obstacles, seed 0, bias 0.20, eta 1:
Mean time cost: 12.508381557464599
std time cost: 1.0861471231038184
Mean cost: 165.38138498825595
std cost: 0



For 3dof, 2 obstacles, seed 0, bias 0.05, eta 1:
Mean time cost: 0.4529536724090576
std time cost: 0.024719701008380498
Mean cost: 166.89315959188136
std cost: 0

For 3dof, 2 obstacles, seed 0, bias 0.20, eta 1:
Mean time cost: 0.4529536724090576
std time cost: 0.2381973708990498
Mean cost: 160.71335399323842
std cost: 0

(b)

RRT March, second implementation of extend:

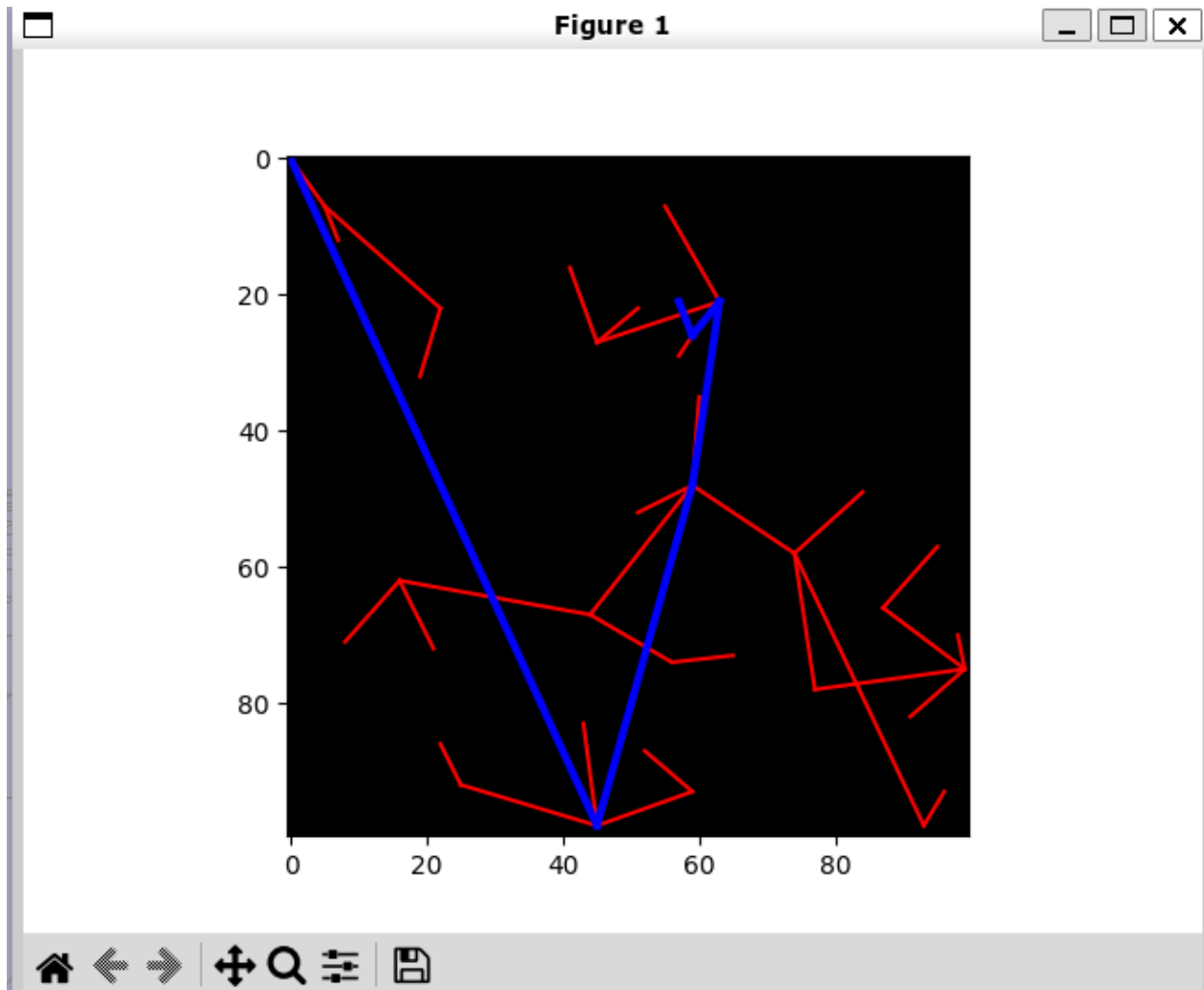
For 2dof, 0 obstacles, seed 0, bias 0.05, eta 0.5:

Mean time cost: 0.04942936897277832

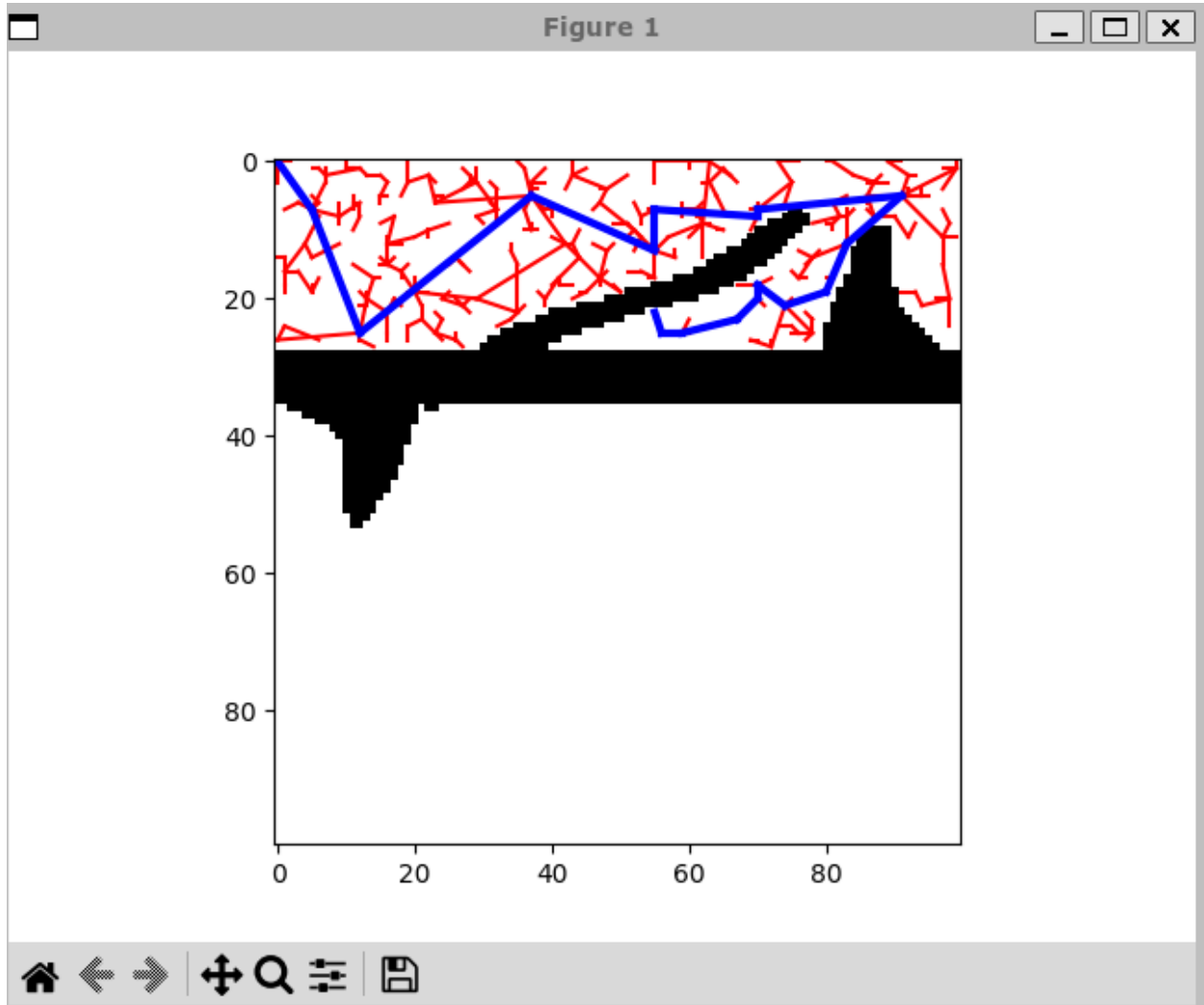
std time cost: 0.007734758176455442

Mean cost: 198.84383834015168

std cost: 0



For 2dof, 2 obstacles, seed 0, bias 0.05, eta 0.5:
Mean time cost: 2.6797648429870606
std time cost: 1.3367084419108544
Mean cost: 172.97879329918723
std cost: 0



For 3dof, 2 obstacles, seed 0, bias 0.05, eta 0.5:
Mean time cost: 0.48250865936279297
std time cost: 0.023874138955334672
Mean cost: 176.76436970166458
std cost: 0

RRT, first implementation of extend:

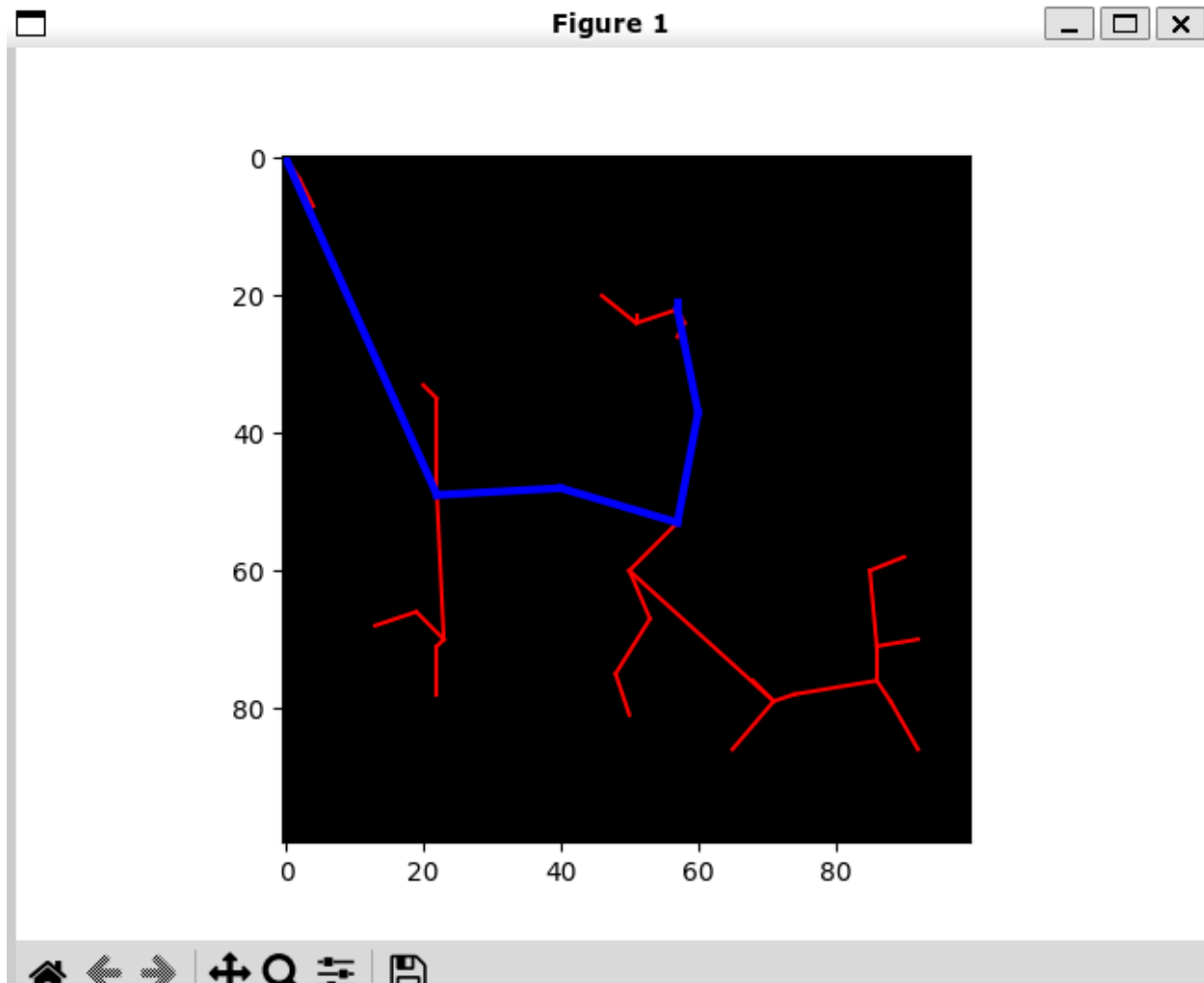
For 2dof, 0 obstacles, seed 0, bias 0.05, eta 0.5:

Mean time cost: 0.03715581893920898

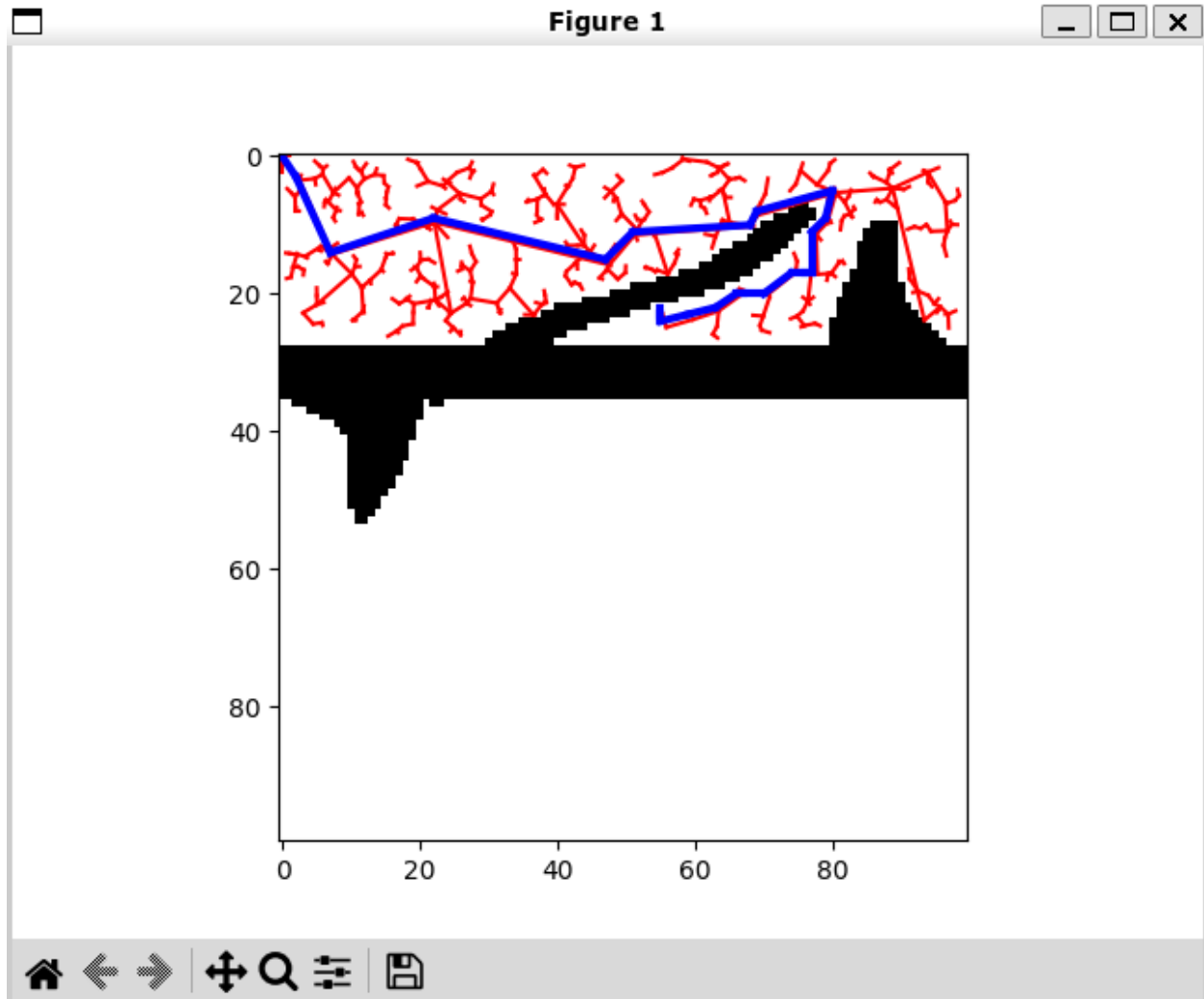
std time cost: 0.011440791863672061

Mean cost: 122.03587666885049

std cost: 0



For 2dof, 2 obstacles, seed 0, bias 0.05, eta 0.5:
Mean time cost: 4.403400039672851
std time cost: 0.363473027693708
Mean cost: 132.33726393523844
std cost: 0



For 3dof, 2 obstacles, seed 0, bias 0.05, eta 0.5:
Mean time cost: 3.583830165863037
std time cost: 0.5896547456333934
Mean cost: 140.88443212444028
std cost: 0

I think in practice it would be better to use RRT March because we can see that for all configurations it has a faster time and travels further (higher cost).

(c) Some challenge I faced doing this was trying to figure out why when I sample points it wasn't able to get close enough to the goal, I was able to fix this by removing reshaping when inserting to the tree. I used a lot of print statements to debug the shapes and figure out what was wrong.

1.2.4

In data folder but I wasn't able to attach it here in time.