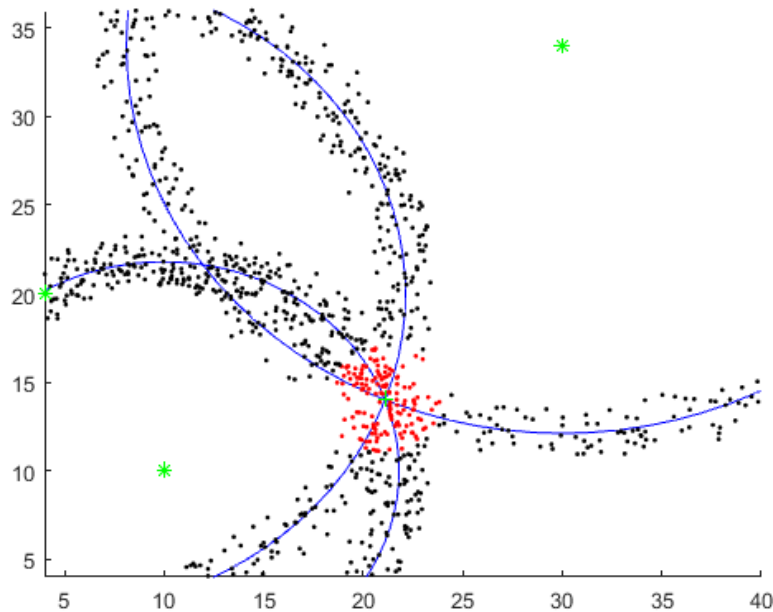


Homework 5

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Problem 1: Given the following observation models, please use importance sampling and resampling techniques to estimate the robot location.



My code : written by matlab

```
function p=sample_point(landmark,a)
    p=zeros(900,2);
    r=sqrt((landmark(1)-a(1)).^2+(landmark(2)-a(2)).^2);
    for i=1:900
        deltat = i*pi/180;
        x1 = landmark(1) + r*cos(deltat)-1.5+3*rand;
        y1 = landmark(2) + r*sin(deltat)-1.5+3*rand;
        p(i,1)=x1;
        p(i,2)=y1;
    end
    rectangle('Position',[landmark(1)-r,landmark(2)-
r,2*r,2*r],'Curvature',[1,1],'edgecolor','b');
    hold on
end

landmark1=[10,10];
landmark2=[30,34];
landmark3=[4,20];
position=[21.1,14];

p1=[sample_point(landmark1,position);sample_point(landmark2,position);s
ample_point(landmark3,position)];
```

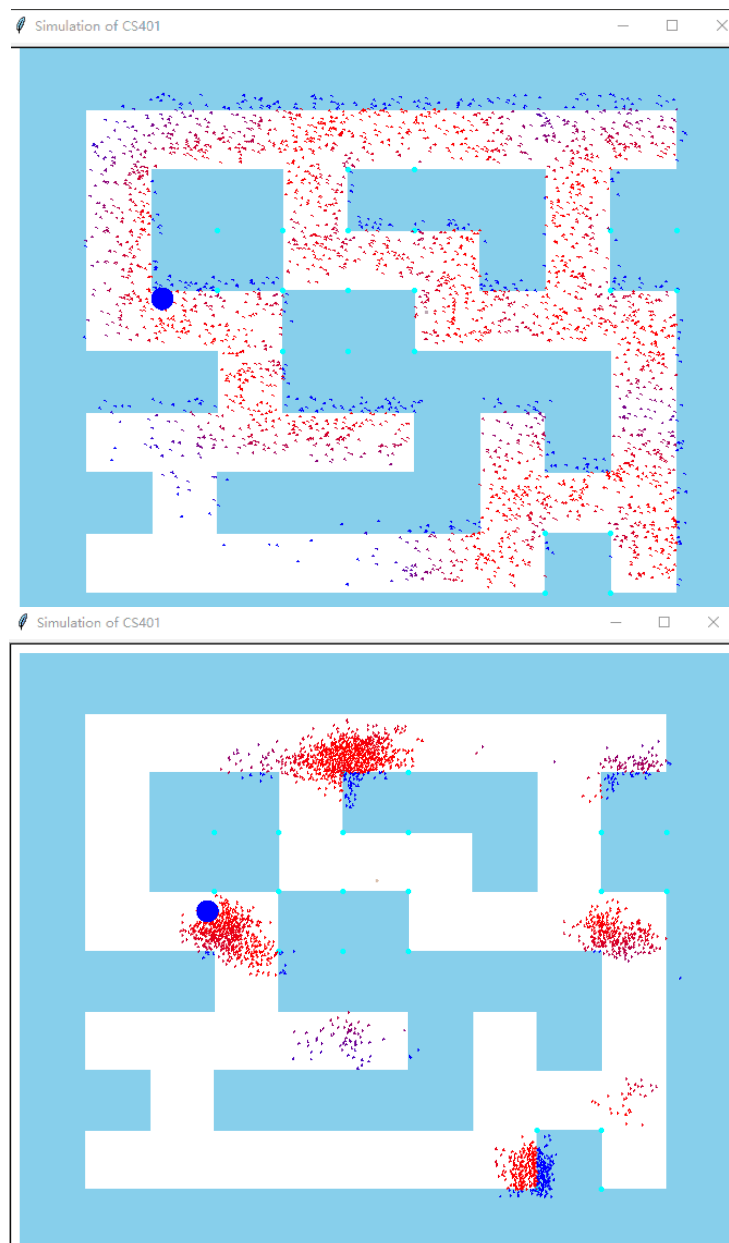
```

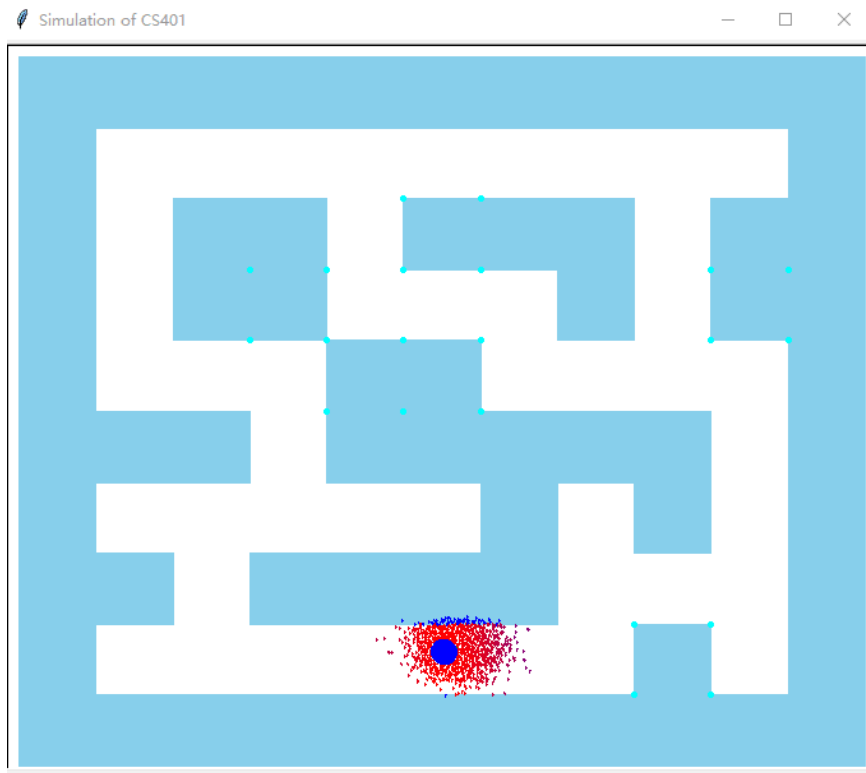
for ii =1: size(p1,1)
    if norm(p1(ii,:)-position)<3
        plot(p1(ii,1),p1(ii,2), 'r.');
    else
        plot(p1(ii,1),p1(ii,2), 'k.');
    end
    hold on
end

plot(landmark1(1),landmark1(2), 'g*');hold on
plot(landmark2(1),landmark2(2), 'g*');hold on
plot(landmark3(1),landmark3(2), 'g*');hold on
plot(position(1),position(2), 'g+');hold on
axis([4 40 4 36]);

```

Problem 2: Given a map and the ultrasound sensor model, please use importance sampling and resampling techniques to estimate the robot location and path.





This code is written by Python3. The reference is https://github.com/mjl/particle_filter_demo. I changed the map and add my own method of sample.