Particle filter – Monte Carlo localization

Steps

- Sample generation using probabilistic Odometry model as the robot moves.
- Whenever it is time to localize, stop the robot, take sensor readings, apply measurement model to each and every sample, produce probabilities of points, save in an array called prob
- Normalize these probabilities deviding them all by their sum
- Save x(2:100), y(2:100), theta(2:100) and prob(2:100) in a matrix called X.
- Sample from these points 99 new points according to weights using the following function:

```
X = datasample(X(2:100,:),99,'Weights',X(2:100,4));
```

Steps: continued

- Update x, y, theta

```
x(2:100) = X(2:100,1);
y(2:100) = X(2:100,2);
theta(2:100) = X(2:100,3);
```

- Calculate three distributions using these points using the following functions:

```
pdx = fitdist(x(2:100)','Normal');
pdy = fitdist(y(2:100)','Normal');
pdtheta = fitdist(theta(2:100)','Normal');
```

Update position and continue going to goal position

- x(1) = pdx.mu
- y(1) = pdy.mu
- theta(1) = pdtheta.mu
- Continue going to goal position