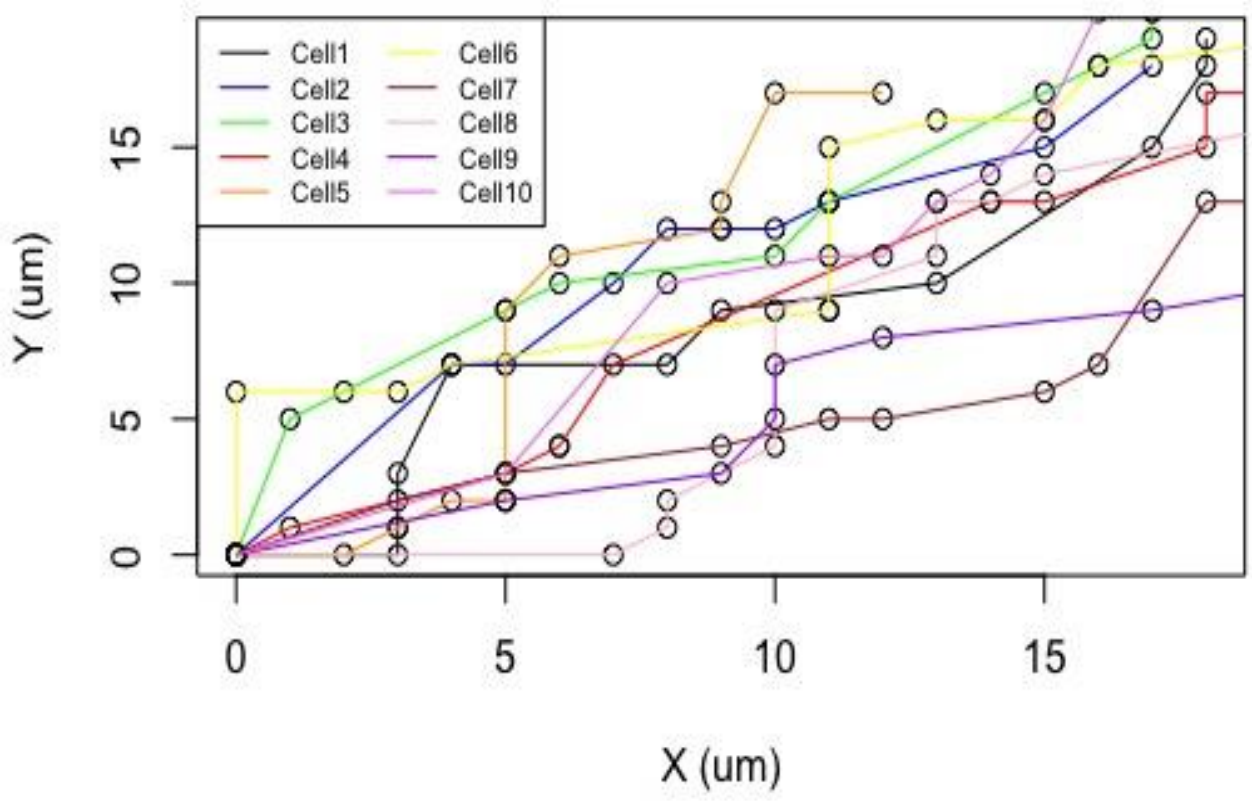
The following code loads and plots the cell trajectories.

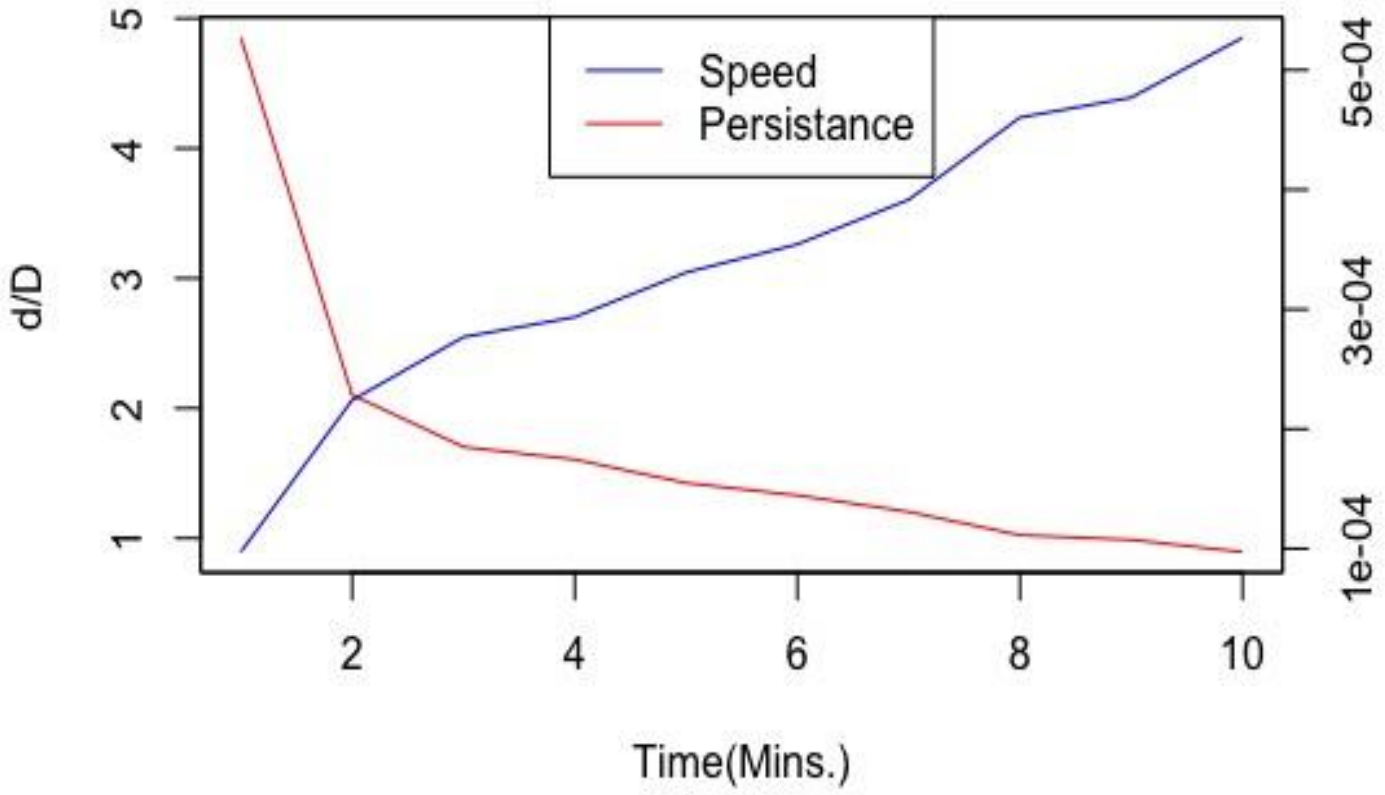
```
movt <- read.csv("Data set.csv", TRUE, ",")

plot(movt$X1, movt$Y1, ylab="Y (um)", xlab="X (um)")
lines(movt$X1, movt$Y1, pch="*", col="black")

points(movt$X2, movt$Y2)
lines(movt$X2, movt$Y2, pch="+", col="blue")

points(movt$X3, movt$Y3)
lines(movt$X3, movt$Y3, pch="*", col="green")

points(movt$X4, movt$Y4)
lines(movt$X4, movt$Y4, pch="*", col="red")

points(movt$X5, movt$Y5)
lines(movt$X5, movt$Y5, pch="*", col="orange")

points(movt$X6, movt$Y6)
lines(movt$X6, movt$Y6, pch="*", col="yellow")

points(movt$X7, movt$Y7)
lines(movt$X7, movt$Y7, pch="*", col="brown")

points(movt$X8, movt$Y8)
lines(movt$X8, movt$Y8, pch="*", col="pink")

points(movt$X9, movt$Y9)
lines(movt$X9, movt$Y9, pch="*", col="purple")

points(movt$X10, movt$Y10)
lines(movt$X10, movt$Y10, pch="*", col="violet")
```



The following code calculates the distances travelled by each cell and computes the speed and persistence.

```
#This is a matrix to store the values of Speed and Persistance
store_data_speed <- matrix(nrow=10, ncol=1, byrow=TRUE)
store_data_pers <- matrix(nrow=10, ncol=1, byrow=TRUE)
```

```
#for loop to load and calculate the distance, speed and persistance

for(j in 2:20){

  #This will help in selecting the 2 columns of every cell

  if (j%%2 == 0){

  #Initializing the total distance variable
    sum_dist = 0

for(i in 1:10){

  #distnce formulas, d=total distance, D=distance between start and end
    D = sqrt((movt[11,j] - movt[1,j])^2 + (movt[11,j+1] - movt[1,j+1])^2)
    d = sqrt((((movt[i+1,j] - movt[i,j])^2) + ((movt[i+1,j+1] - movt[i,j+1])^2)))

    #Accumulates all the total distance per cell
    sum_dist = sum_dist + d

    #Averages over 10 steps
    Ave_dist = sum_dist/10

    #Calculates the speed
    speed = Ave_dist/(100*60)

    #Calculates the Persistance
    pers = D/sum_dist

    #Stores the data in a 1X10 matrix to plot later
    store_data_speed[i,1] = speed
    store_data_pers[i,1] = pers

}

        }
}

plot(store_data_pers, col="red", ylab="d/D", xlab="Time(Mins.)", type="l")
par(new=TRUE)
plot(store_data_speed, yaxt="n", xaxt="n", ylab="", xlab="", col="blue", type="l")
axis(side=4)
legend("top", c("Speed", "Persistance"), col=c("blue", "red"), lty=c(1,1))
```


Speed
Persistance
d/D
1
2
3
4
5
1e-04
3e-04
5e-04
2
4
6
8
10
Time(Mins.)