Ex3_RandomWalk

November 17, 2019

[2]:
```
import matplotlib.pyplot as plt
import numpy as np
from pandas.plotting import autocorrelation_plot
plt.rcParams['figure.figsize'] = [10, 5]
```

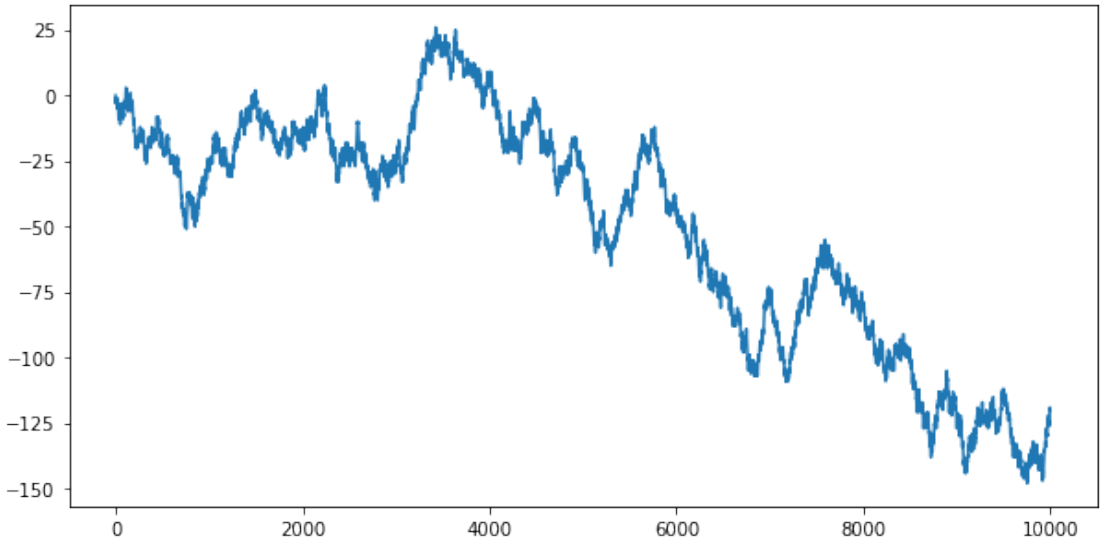
[3]:
```
#initialize the list
s=1
random_walk = [0]
```

[4]:
```
#Generate 10000 numbers from a Normal Distribution N(0,1)
random_normal = np.random.normal(0,1,10000)
```

[5]:
```
#Create the walk
for r in random_normal:
    mv = 1 if r>0 else -1
    value = random_walk[-1] + s*mv
    random_walk.append(value)
```

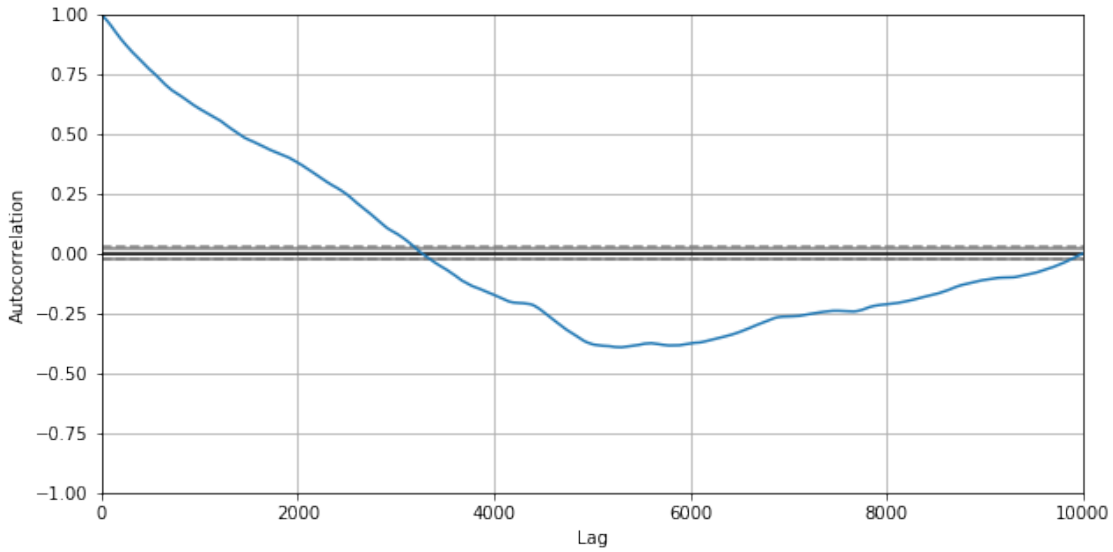
[6]:
```
plt.plot(random_walk)
```

[6]:
```
[<matplotlib.lines.Line2D at 0x7ffbec51d710>]
```



[7]:
```
autocorrelation_plot(random_walk)
```

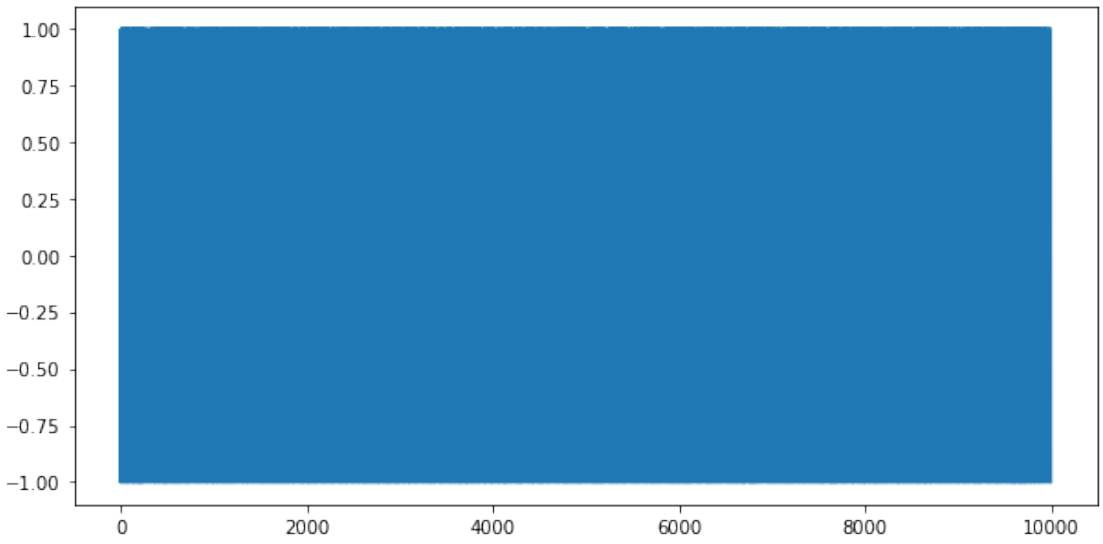
[7]: <matplotlib.axes._subplots.AxesSubplot at 0x7ffbbff8c690>



[8]:
```
#Calculate the differences
diff = []
for i in range(1,len(random_walk)):
    value = random_walk[i] - random_walk[i-1]
    diff.append(value)
```

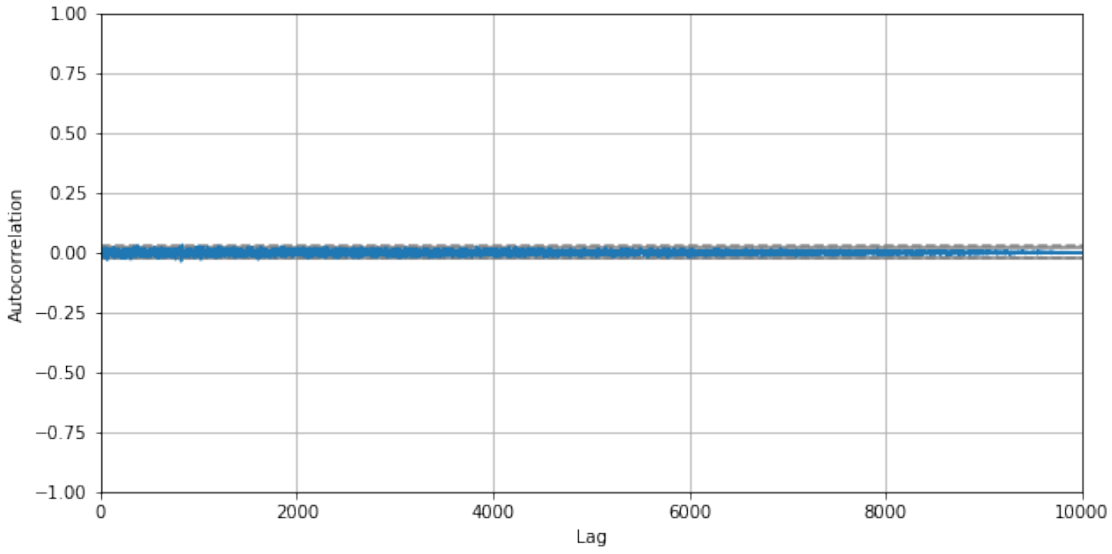
[9]:
```
#plot the diffs
plt.plot(diff)
```

[9]: [<matplotlib.lines.Line2D at 0x7ffbc00c1ed0>]



[10]:
```
#plot the autocorelation of diff
autocorrelation_plot(diff)
```

[10]: <matplotlib.axes._subplots.AxesSubplot at 0x7ffbbff716d0>



[11]:
```
#mean(m) of the diffs should be close to the mean of the N(m,s^2)
np.mean(diff)
```

[11]: -0.012

[12]:
```
#Variance(s^2) of diffs should be close to the variance of N(m,s^2)
np.var(diff)
```

[12]:
```
0.9998559999999997
```

[ ]:
```
#General statistics: X a random variable with mean = E(X) and var = Var(X) then␣
↪a*X is a random variable with mean E(a*X)=a*E(X)
#and variance Var(a*X) = a^2 * Var(X)
#So the noise of the random walk (s) should be s = a from the above variance
```