

EXERCICE SUR LES SERIES TEMPORELLES

```
In [1]: import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
```

```
In [2]: data=pd.read_csv("./jeu_de_donnée/jeu_data1.csv")
```

```
In [3]: data.head(7)
```

```
Out[3]:
```

	Period	Revenue	Sales_quantity	Average_cost	The_average_annual_payrol
0	01.01.2015	1.601007e+07	12729.0	1257.763541	
1	01.02.2015	1.580759e+07	11636.0	1358.507000	
2	01.03.2015	2.204715e+07	15922.0	1384.697024	
3	01.04.2015	1.881458e+07	15227.0	1235.606705	
4	01.05.2015	1.402148e+07	8620.0	1626.621765	
5	01.06.2015	1.678393e+07	13160.0	1275.374508	
6	01.07.2015	1.916189e+07	17254.0	1110.576805	

valeur statistique

```
In [4]: data["Average_cost"].describe()
```

```
Out[4]:
```

count	64.000000
mean	1695.061159
std	296.844793
min	1110.576805
25%	1499.142841
50%	1654.399798
75%	1916.401096
max	2559.328184

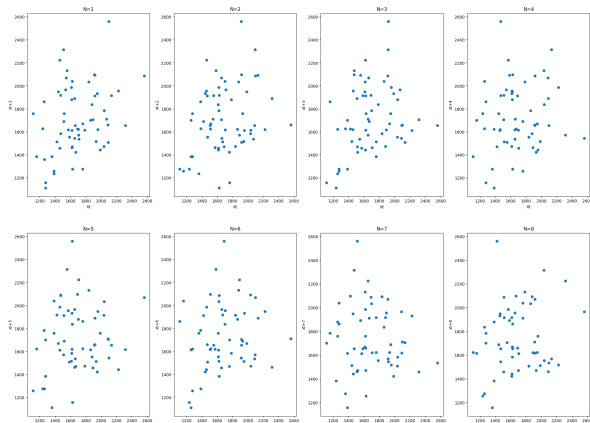
Name: Average_cost, dtype: float64

```
In [5]: moyenne=num.mean(data["Average_cost"])
print('moyenne', moyenne)
variance=num.std(data["Average_cost"])**2
print('variance', variance)
ecart_type=num.std(data["Average_cost"])
print('ecart-type', ecart_type)
```

moyenne 1695.0611591371598
variance 86740.00550102274
ecart-type 294.5165623543483

Représentation de la serie temporelle

```
In [6]: data.dropna(inplace=True)
#suppression des valeurs manquantes
```



Représenter la courbe des auto-corrélations $\hat{\rho}_n(k)$ avec

k = 1...50 (50 valeurs de k)

```
In [9]: moy=num.mean(data["Average_cost"])
```

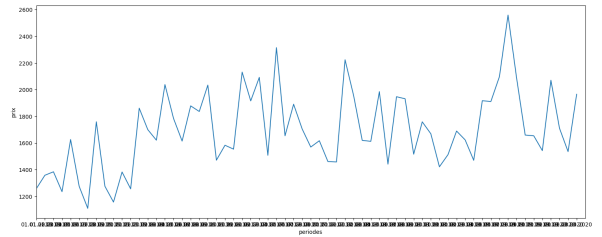
```
In [10]: def auto_cov(data,k,moy):
debut=0
fin=len(data)
xt=data[debut:fin-k]
xt_k=data[debut+k:fin]
cov=0
for i in range(0,fin-k):
cov=cov+(xt[i]-moy)*(xt_k[i]-moy)
#calcul de L'auto-covariance empirique
return (cov/(fin-k))
```

```
In [11]: def auto_corr(data,k,moy):
cov_0=auto_cov(data,0,moy)
cov_k=auto_cov(data,k,moy)
return (cov_k/cov_0)
```

```
In [12]: correlation_k=[]
d=list(data["Average_cost"])
for cov in range (1,51):
res=auto_corr(d,cov,moy)
correlation_k.append(res)
```

```
In [7]: plot.figure(figsize=[18,7])
plot.plot(data["Period"],data["Average_cost"])
plot.xlim(0,64)
plot.xlabel("periodes")
plot.ylabel("prix")
```

```
Out[7]: Text(0, 0.5, 'prix')
```



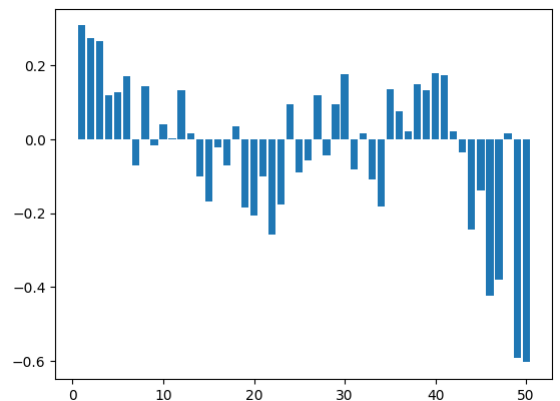
Différents nuages de point

```
In [22]: #N=1: (0-62) (1,63)
#sur les revenues
```

```
In [8]: plot.figure(figsize=[25,18])
for N in range(1,9):
plot.subplot(2,4,N)
debut=0
fin=64
plot.title(f"N={N}")
plot.xlabel("xt")
plot.ylabel(f"xt+{N}")
plot.scatter(data["Average_cost"][debut:fin-N],data["Average_cost"][d
```

```
In [13]: views=[i for i in range(1,51)]
plot.bar(views,correlation_k)
```

```
Out[13]: <BarContainer object of 50 artists>
```



```
In [ ]:
```