

TP DE SERIE TEMPORELLE

REALISE PAR MEKA MOISE CHRISTIAN JUNIOR 21T2561

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

```
In [2]: FILEPATH="Datasets/annual_rainfall_dallas.csv"
HORIZON=np.random.randint(1,100)
FEATURE="Total"
SEP=","
YLABEL="Total"
XLABEL="Annee"
TITLE="Evolution annuelle du total des pluies de dallas"
```

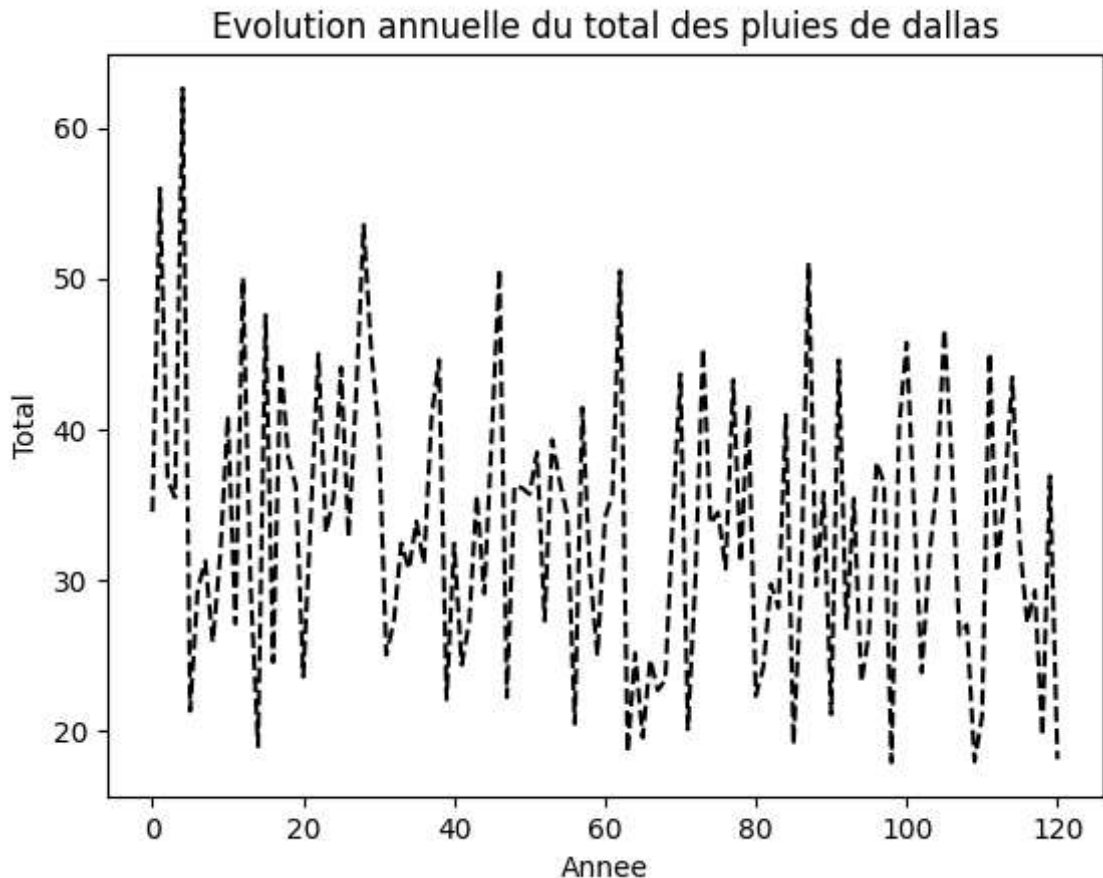
```
In [3]: df=pd.read_csv(FILEPATH,sep=SEP)
```

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In [4]: df.head()
df=df.dropna()
```

```
In [5]: all_alpha=[0.001,0.005, 0.01, 0.05, 0.1, 0.3, 0.5, 0.9]
#all_alpha=np.linspace(0.001,0.9,10)
```

```
In [6]: plt.plot(df[FEATURE], c="black", ls='--')
plt.xlabel(XLABEL)
plt.ylabel(YLABEL)
plt.title(TITLE)
```

```
Out[6]: Text(0.5, 1.0, 'Evolution annuelle du total des pluies de dallas')
```



```
In [7]: def predict_simple_expo_lissage(data, alpha, taille, horizon=1):
        results=[]
        for i in range(taille-horizon):
            if i==0:
                results.append((1-alpha)*data[i])
            else:
                tmp=(1-alpha)*data[i]+alpha*results[i-1]
                results.append(tmp)
        return results
```

```
In [8]: alpha=all_alpha[-1]
        res=predict_simple_expo_lissage(df[FEATURE], alpha, len(df[FEATURE]))
```

```
In [9]: all_results={}
        for alpha in all_alpha:
            all_results[f"alpha_{alpha}"]=predict_simple_expo_lissage(df[FEATURE], alpha
```

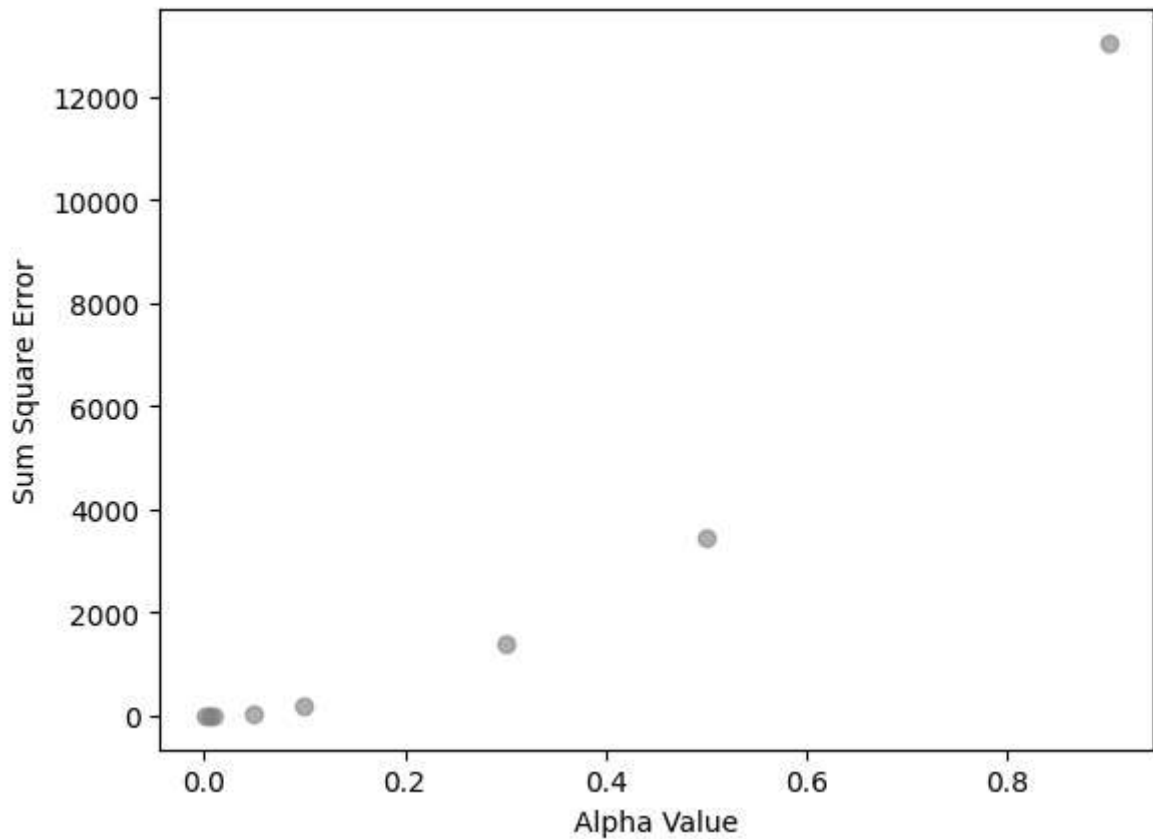
```
In [10]: def sum_square_error(real, predic):
          result=real-predic
          result=result**2
          return np.sum(result)
```

```
In [11]: all_error={}
          for key in all_results.keys():
              real=np.array(df[FEATURE])
              predic=np.array(all_results[key])
              all_error[key]=sum_square_error(real[:real.shape[0]-HORIZON],predic)
```

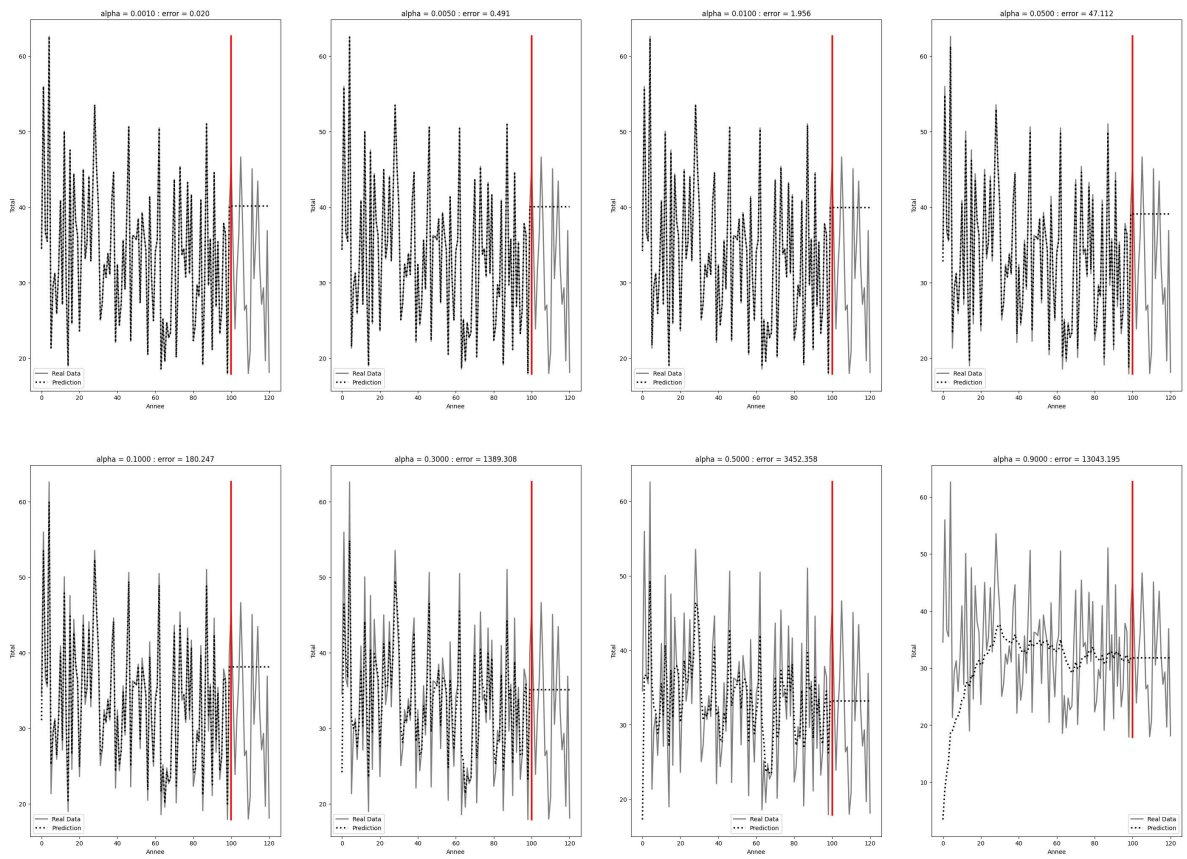
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In [12]: list_=[]
          for key in all_error.keys():
              list_.append(all_error[key])
```

```
plt.scatter(all_alpha, list_, alpha=0.6, c="gray")
plt.xlabel("Alpha Value")
plt.ylabel("Sum Square Error")
```

Out[12]: Text(0, 0.5, 'Sum Square Error')



```
In [13]: plt.figure(figsize=[35, 25])
for i in range(len(all_alpha)):
    plt.subplot(2, int(len(all_alpha)/2), i+1)
    plt.plot(df[FEATURE] , label='Real Data', c='gray', lw=2)
    m1=np.max(df[FEATURE])
    m2=np.min(df[FEATURE])
    x=len(df)-HORIZON
    y=np.linspace(m2,m1,100)
    x=np.ones(y.shape)*x
    plt.plot(x,y, c="red", lw=2.7, ls="-")
    last=all_results[f"alpha_{all_alpha[i]}"][-1]
    tmp=all_results[f"alpha_{all_alpha[i]}"]
    for j in range(HORIZON):
        tmp.append(last)
    plt.plot(tmp, label='Prediction', lw=2.5 , ls=':', c='black')
    alpha=f"alpha_{all_alpha[i]}"
    plt.title(f"alpha = {all_alpha[i]:.4f} : error = {all_error[alpha]:.3f}")
    plt.xlabel(XLABEL)
    plt.ylabel(YLABEL)
    plt.legend()
```



In []: