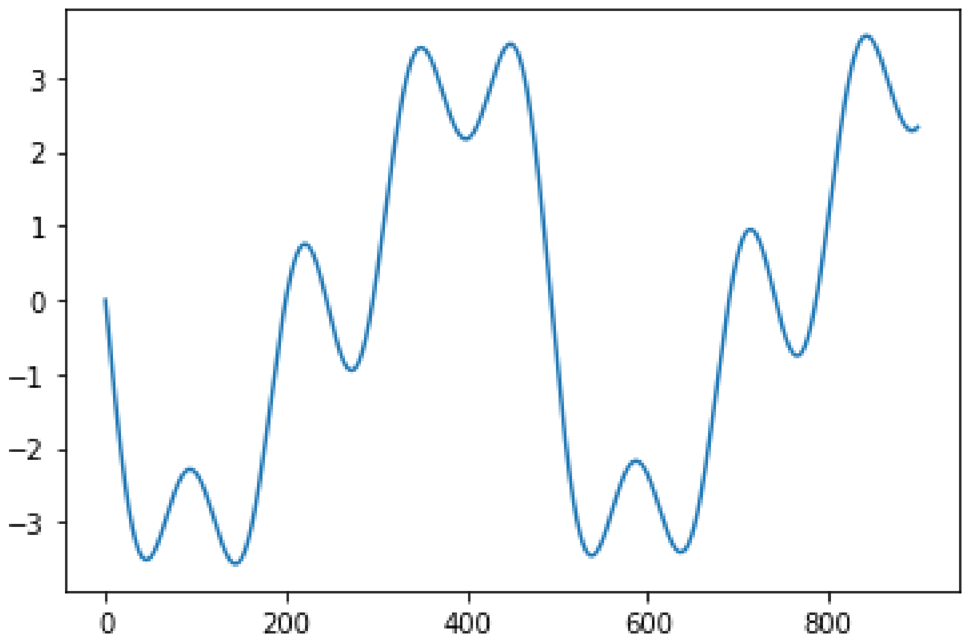
AdditiveSynn

October 21, 2019

[15]:
```
import numpy as np
import scipy as sp
import matplotlib.pyplot as plt
import pandas as pd
import random
```

0.1 i create a dummy signal

[16]:
```
t=np.arange(10000)
omega=2*3.14*2
a=0.1*np.sin(omega*t)
a1=np.sin(omega*t)
b=3*np.sin(2*omega*t)
b1=np.sin(2*omega*t)
c=np.sin(4*omega*t)
d=5*np.sin(8*omega*t)
d1=np.sin(8*omega*t)
e=a+b+c+d/4
plt.plot(e[0:900])
z=np.random.uniform(-0.5,0.5,900).reshape(1,900)
```



[17]:
```
m=e[0:900]+z
m.reshape(1,-1)
```

[17]:
```
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```
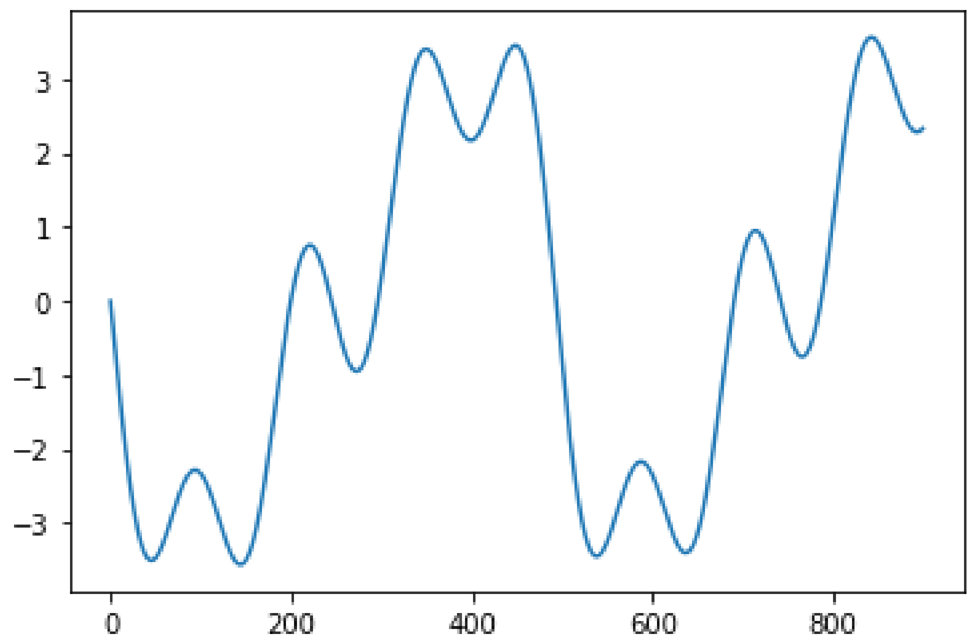

[18]:
```
plt.plot(e[0:900])
plt.show()
```



[19]:
```
kk=pd.DataFrame()
```

[20]:
```
kk['a']=a1[0:900]
kk['b']=b1[0:900]
kk['c']=c[0:900]
kk['d']=d1[0:900]
```

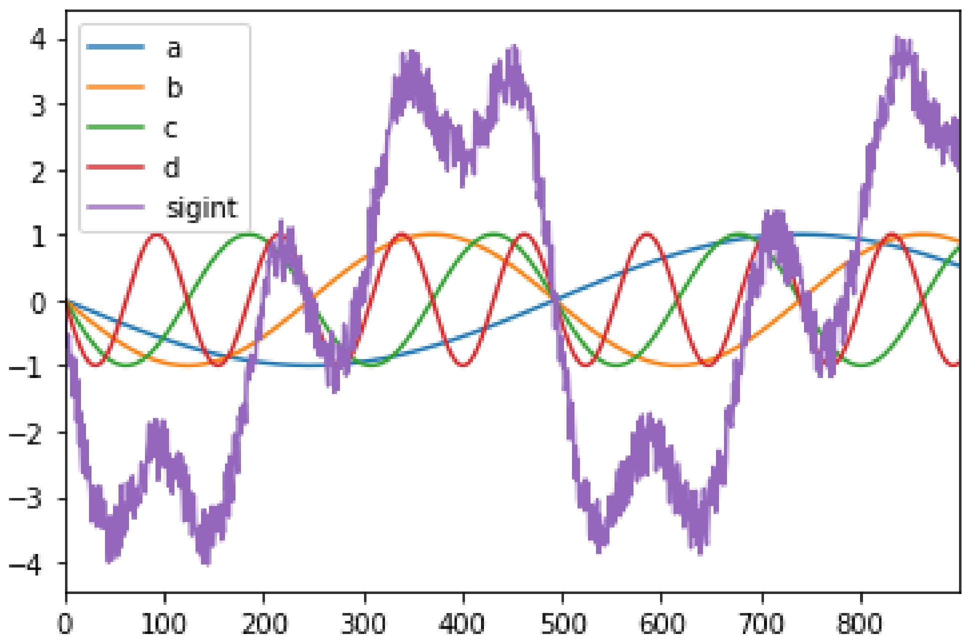
```
kk['sigint']=m[0:900].reshape(-1,1)
```

[21]:
```
kk.head()
```

[21]:
```
          a         b         c         d    sigint
0  0.000000  0.000000  0.000000  0.000000 -0.289972
1 -0.006371 -0.012741 -0.025480 -0.050943 -0.577846
2 -0.012741 -0.025480 -0.050943 -0.101753 -0.658654
3 -0.019111 -0.038214 -0.076373 -0.152300 -0.714567
4 -0.025480 -0.050943 -0.101753 -0.202451 -0.531117
```

[22]:
```
kk.plot()
```

[22]: <matplotlib.axes._subplots.AxesSubplot at 0x22736e38988>



[26]:
```
from sklearn.linear_model import LinearRegression
X=kk[["a","b","c","d"]]
y=kk[["sigint"]]
X.head()
y.head()
reg = LinearRegression().fit(X, y)
reg.score(X,y)
```

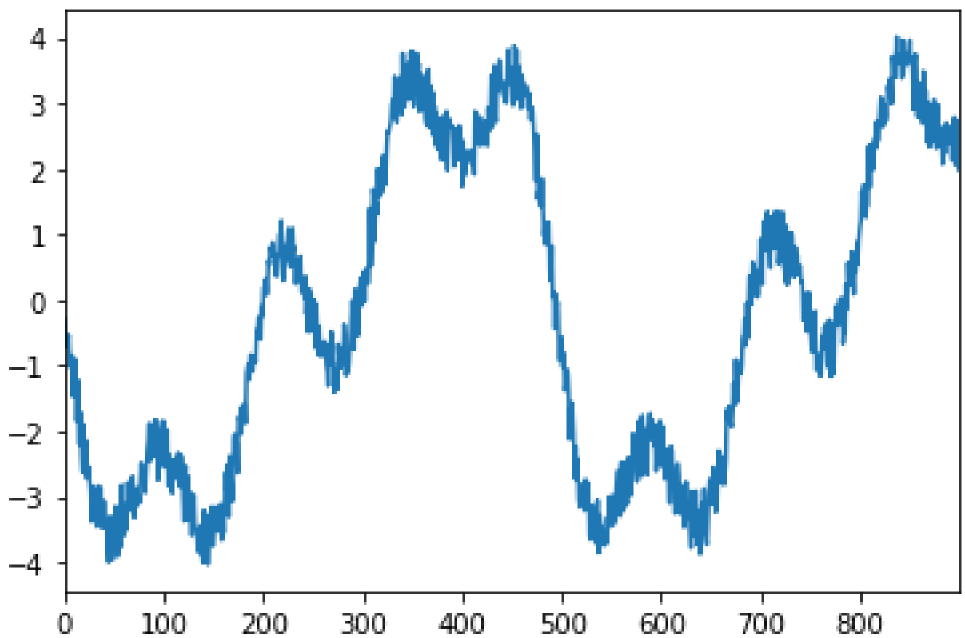
[26]: 0.9852518521904758

[27]:
```
pred=reg.predict(X)
```

[28]:
```
kk["Predicted"]=pred
```

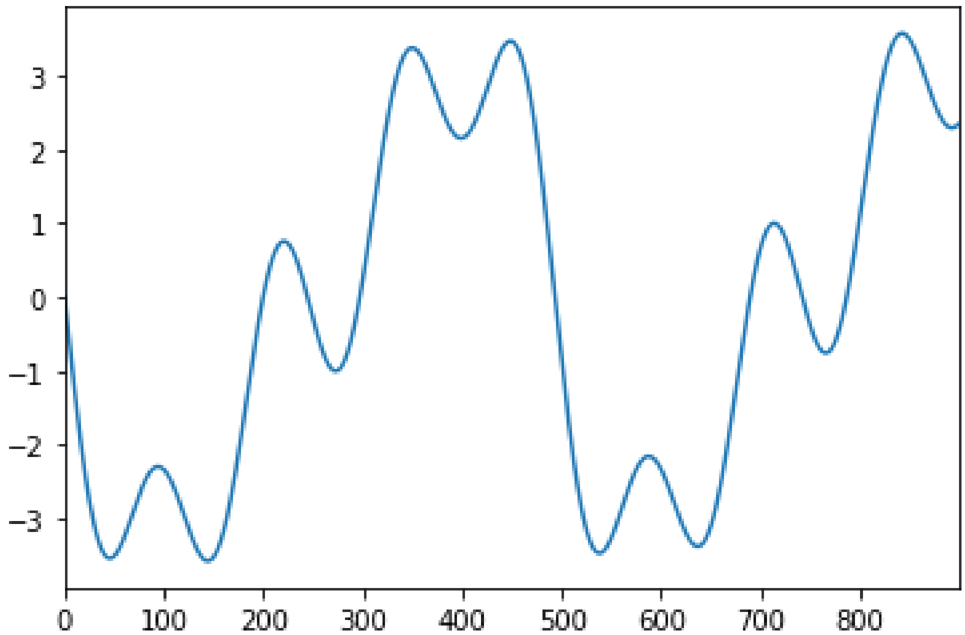
[29]:
```
kk["sigint"].plot()
```

[29]: <matplotlib.axes._subplots.AxesSubplot at 0x22736ef7c48>



[30]:
```
kk["Predicted"].plot()
```

[30]: <matplotlib.axes._subplots.AxesSubplot at 0x22736f38d88>



[31]:
```
reg.coef_
```

[31]: array([[0.12412582, 2.99521059, 1.02202689, 1.26271616]])

What i am trying to do is create a general formula for a sound signal of an instrument for its one note by using collection of sin wave harmonics What i have done: * created a signal using different amplitudes for sinwaves whose frequecies increase in by 2 every time * i have used f 2f 4f and 8f sinwaves with varrying amplitude to generate a wave. I add them and divide resultant vector by 4 * Then i add noise to the resultant wave * so this somehow represents how a real world arbitary sound wave would look

- now i take a table with vectors of each frequency of sinwave
- i append the input wave to this
- Apply least squares linear regression to this to calculate the weights

Observations till now :

- we get a good waveform which is similar to the input waveform

0.2 Most Important Observation here is that the we obtain a general formula for the input noisy wave and can now generate a wave which is perfect with no noise

[ ]:
```
```