DowJonesAnalysis

July 31, 2024

1 Dow Jones Industrial Averages

MarketWatch Dow Jones Industrial Average Use the following to download a csv file Download Data Specify the date range for the data and select "DOWNLOAD DATA (.CSV)"

[ ]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from scipy import signal
%matplotlib inline
```

Save the data to a file on your computer and modify the following to specify its location.

[ ]:
```
filename = '/home/cgreco/Downloads/DowJones_23_24_new.csv'
df = pd.read_csv(filename)
```

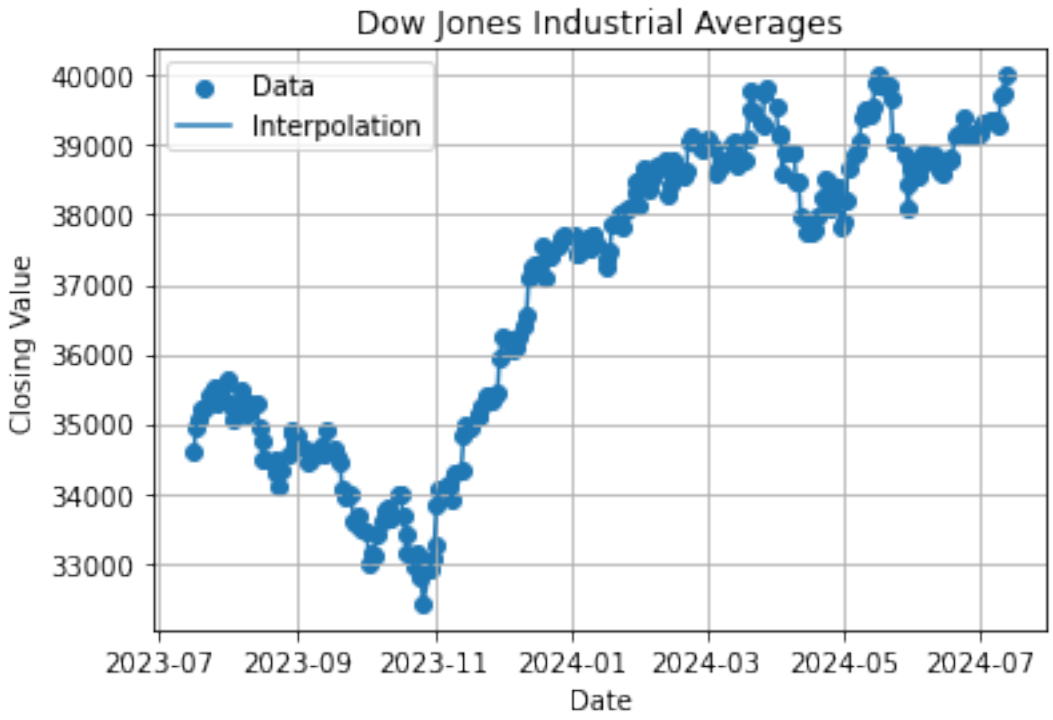
[ ]:
```
# Reverse from decreasing to increasing chronological order
df = df.iloc[::-1]

# Convert data from string to float type first removing commas
df['Open'] = df['Open'].str.replace(',','').astype(float)
df['High'] = df['High'].str.replace(',','').astype(float)
df['Low'] = df['Low'].str.replace(',','').astype(float)
df['Close'] = df['Close'].str.replace(',','').astype(float)
# Convert date in string format to date data type
df['Date'] = pd.to_datetime(df['Date'], format='%m/%d/%Y')
#print(df)
```

[ ]:
```
plt.figure()
#plt.plot(df['Date'],df['Close'])
plt.scatter(df['Date'],df['Close'],label='Data')
plt.grid()
plt.xlabel('Date')
plt.ylabel('Closing Value')
plt.title('Dow Jones Industrial Averages')
day_index = pd.date_range(start = df['Date'].min(), end = df['Date'].max(),␣
 ↪freq='D')
interp_values = np.interp(day_index, df['Date'], df['Close'])
```

```
plt.plot(day_index, interp_values, label='Interpolation')
plt.legend(loc = "best")
#coef = np.polyfit(day_index.to_numpy(), interp_values, 3)
#print(coef)
```

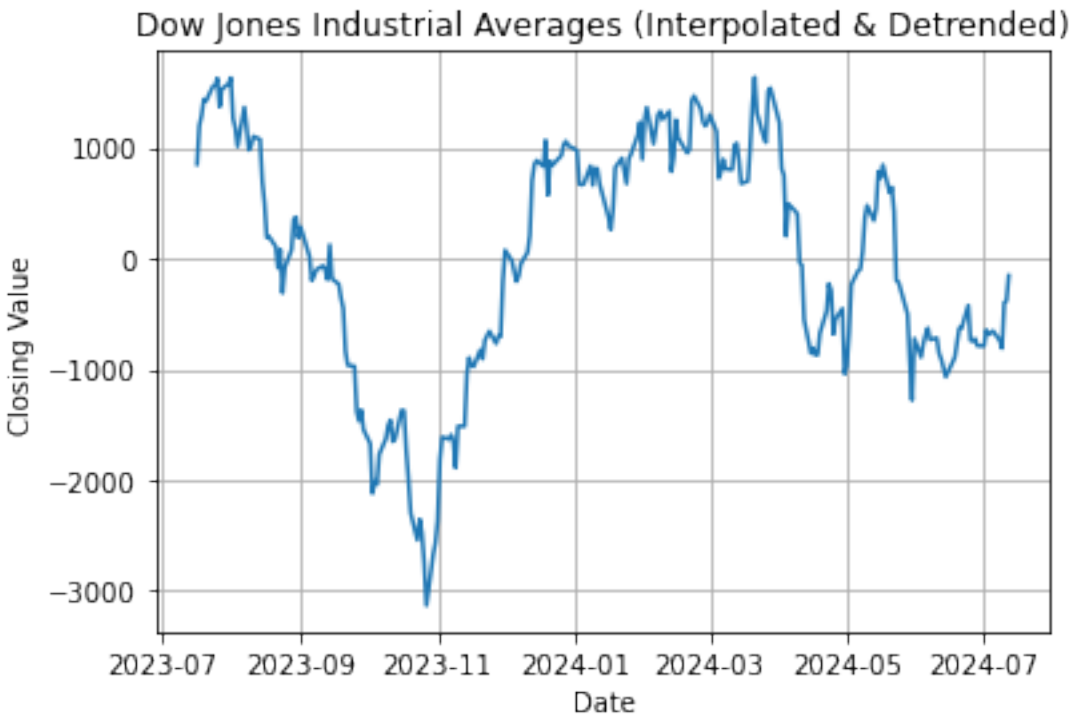
[ ]: <matplotlib.legend.Legend at 0x771a48133ca0>



Interpolate data for days market is closed

[ ]:
```
plt.figure()
detrended_interp_values = signal.detrend(interp_values,type='linear')
plt.plot(day_index,detrended_interp_values)
plt.grid()
plt.xlabel('Date')
plt.ylabel('Closing Value')
plt.title('Dow Jones Industrial Averages (Interpolated & Detrended)')
```

[ ]: Text(0.5, 1.0, 'Dow Jones Industrial Averages (Interpolated & Detrended)')

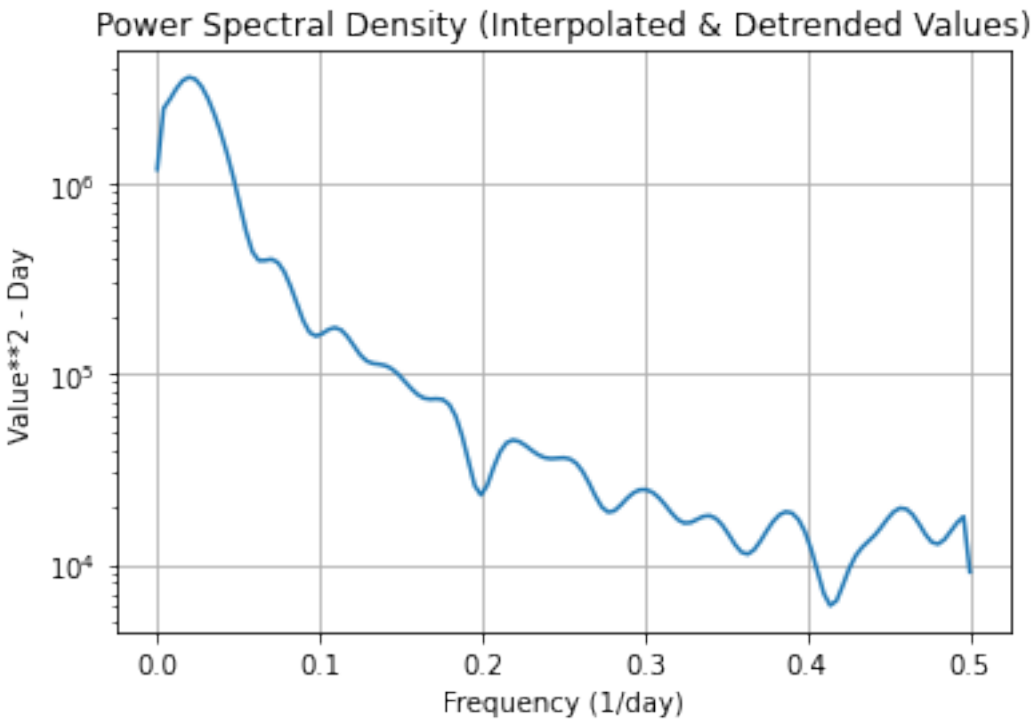


Power Spectral Density

[ ]:
```
f, Pxx = signal.welch(detrended_interp_values,fs=1.
↪0,window='hanning',nperseg=60,
                ␣
↪noverlap=30,nfft=256,detrend='linear',return_onesided=True,scaling='density')

plt.figure()
plt.semilogy(f, Pxx)
plt.grid()
plt.xlabel('Frequency (1/day)')
plt.ylabel('Value**2 - Day')
plt.title('Power Spectral Density (Interpolated & Detrended Values)')
```

[ ]:
```
Text(0.5, 1.0, 'Power Spectral Density (Interpolated & Detrended Values)')
```


Power Spectral Density (Interpolated & Detrended Values)
Value**2 - Day
10^6
10^5
10^4
0.0
0.1
0.2
0.3
0.4
0.5
Frequency (1/day)