Chebyshev_Distance_Stock

September 29, 2021

1 Chebyshev Distance

1.0.1 Chebyshev distance (or Tchebychev distance), maximum metric, or L∞ metric. is a metric defined on a vector space where the distance between two vectors is the greatest of their differences along any coordinate dimension (wikipeida).

1.1 Formula: max(|xA - xB|, |yA - yB|)

[1]:
```
import numpy as np
from scipy.spatial import distance

import matplotlib.pyplot as plt

import warnings
warnings.filterwarnings("ignore")

# yfinance is used to fetch data
import yfinance as yf
yf.pdr_override()
```

[2]:
```
symbol = 'AMD'

start = '2018-01-01'
end = '2019-01-01'

# Read data
dataset = yf.download(symbol,start,end)

# View Columns
dataset.head()
```

```
[**********100%**********]  1 of 1 completed
```

[2]:

Date	Open	High	Low	Close	Adj Close	Volume
2018-01-02	10.42	11.02	10.34	10.98	10.98	44146300
2018-01-03	11.61	12.14	11.36	11.55	11.55	154066700
2018-01-04	12.10	12.43	11.97	12.12	12.12	109503000

```
2018-01-05  12.19  12.22  11.66  11.88      11.88   63808900
2018-01-08  12.01  12.30  11.85  12.28      12.28   63346000
```

[3]:
```
Open = np.array(dataset['Open'])
Close = np.array(dataset['Adj Close'])
High = np.array(dataset['High'])
Low = np.array(dataset['Low'])
```

[4]:
```
Open
```

[4]:
```
array([10.42000008, 11.60999966, 12.10000038, 12.18999958, 12.01000023,
       12.        , 11.63000011, 12.06999969, 11.81999969, 12.05000019,
       11.89999962, 12.18000031, 12.56000042, 12.60999966, 12.81999969,
       13.02000046, 12.77999973, 12.69999981, 13.13000011, 13.11999989,
       13.23999977, 13.61999989, 13.05000019, 12.05000019, 11.03999996,
       11.69999981, 11.72000027, 11.53999996, 11.47000027, 11.60000038,
       11.72000027, 12.39999962, 12.10999966, 11.72000027, 12.11999989,
       11.81999969, 11.94999981, 12.14000034, 12.43000031, 12.65999985,
       12.26000023, 11.67000008, 11.68999958, 12.01000023, 11.57999992,
       12.39999962, 12.02999973, 11.76000023, 11.5       , 11.69999981,
       11.43000031, 11.48999977, 11.40999985, 11.40999985, 11.15999985,
       11.10000038, 10.90999985, 10.71000004, 10.51000023,  9.98999977,
        9.93999958,  9.98999977,  9.63000011,  9.07999992, 10.05000019,
        9.82999992,  9.75      ,  9.75      ,  9.86999989,  9.97999954,
       10.19999981, 10.        , 10.27999973, 10.51000023, 10.18000031,
       10.05000019, 10.09000015, 10.18999958, 10.06000042, 10.86999989,
       11.19999981, 11.06000042, 10.82999992, 11.10000038, 10.89999962,
       10.88000011, 11.31999969, 11.48999977, 11.64999962, 11.97999954,
       11.89000034, 12.14000034, 12.18000031, 12.64000034, 12.78999996,
       13.06000042, 13.25      , 13.        , 12.93000031, 13.06000042,
       13.39999962, 13.44999981, 13.47999954, 13.73999977, 13.97999954,
       14.76000023, 14.85000038, 15.06999969, 15.82999992, 14.52000046,
       15.21000004, 15.84000015, 15.81000042, 16.62000084, 16.05999947,
       16.18000031, 16.85000038, 16.82999992, 16.64999962, 15.77999973,
       15.64000034, 15.31999969, 15.64999962, 14.85000038, 15.40999985,
       14.80000019, 15.21000004, 15.13000011, 15.52000046, 16.72999954,
       16.59000015, 16.14999962, 16.40999985, 16.68000031, 16.42000008,
       16.5       , 16.94000053, 16.70999908, 16.65999985, 16.46999931,
       16.75      , 16.29999924, 17.15999985, 19.06999969, 19.39999962,
       19.35000038, 18.34000015, 18.17000008, 18.94000053, 18.88999939,
       19.53000069, 19.45999908, 19.57999992, 19.09000015, 19.15999985,
       19.96999931, 19.86000061, 19.86000061, 19.12000084, 19.79000092,
       19.97999954, 20.28000069, 21.19000053, 22.90999985, 24.94000053,
       25.51000023, 24.36000061, 25.29000092, 24.88999939, 25.62000084,
       29.40999985, 28.12000084, 26.95999908, 28.14999962, 30.02000046,
       29.90999985, 33.15999985, 31.43000031, 31.75      , 32.99000168,
       31.52000046, 32.09999847, 31.19000053, 31.12999916, 33.18000031,
```

```
       32.40000153, 31.86000061, 32.24000168, 30.69000053, 30.72999954,
       29.04000092, 27.98999977, 28.06999969, 26.72999954, 26.14999962,
       27.37999916, 24.73999977, 26.77000046, 26.37999916, 26.62999916,
       28.40999985, 27.07999992, 27.03000069, 24.45999908, 24.18000031,
       25.04000092, 17.92000008, 18.48999977, 18.20999908, 16.37999916,
       17.87000084, 18.40999985, 20.59000015, 20.12000084, 19.5       ,
       21.42000008, 21.77000046, 20.77000046, 20.68000031, 19.28000069,
       20.18000031, 20.71999931, 19.87000084, 20.39999962, 17.39999962,
       20.04999924, 18.61000061, 19.95999908, 19.77000046, 21.81999969,
       21.19000053, 21.29999924, 22.47999954, 23.35000038, 20.21999931,
       21.29999924, 19.35000038, 20.70999908, 20.31999969, 20.62999916,
       19.57999992, 20.01000023, 19.14999962, 19.44000053, 18.11000061,
       18.12000084, 16.52000046, 16.87999916, 17.43000031, 17.53000069,
       18.14999962])
```

[5]:
```
Close
```

[5]:
```
array([10.97999954, 11.55000019, 12.11999989, 11.88000011, 12.27999973,
       11.81999969, 11.96000004, 12.14000034, 12.02000046, 11.90999985,
       12.18000031, 12.47000027, 12.59000015, 12.64999962, 12.93999958,
       12.71000004, 12.40999985, 12.94999981, 13.31999969, 12.86999989,
       13.73999977, 13.25      , 12.44999981, 11.56999969, 11.64999962,
       11.60000038, 11.22000027, 11.31000042, 11.68000031, 11.77999973,
       12.19999981, 12.18999958, 11.81999969, 12.02000046, 11.72000027,
       11.84000015, 12.06999969, 12.42000008, 12.52999973, 12.10999966,
       11.89999962, 11.81000042, 11.90999985, 11.76000023, 12.23999977,
       11.97000027, 11.69999981, 11.52000046, 11.64000034, 11.35999966,
       11.46000004, 11.47000027, 11.43000031, 11.10999966, 11.26000023,
       10.90999985, 10.63000011, 10.43999958, 10.        ,  9.81000042,
       10.05000019,  9.52999973,  9.55000019,  9.77000046, 10.02000046,
        9.60999966,  9.52999973,  9.97999954,  9.81999969, 10.07999992,
        9.93000031, 10.09000015, 10.52000046, 10.35999966, 10.10999966,
        9.98999977, 10.03999996, 10.09000015,  9.71000004, 11.03999996,
       11.10999966, 10.88000011, 11.13000011, 10.97000027, 10.93000031,
       11.27999973, 11.59000015, 11.60999966, 11.94999981, 12.13000011,
       11.94999981, 12.22999954, 12.44999981, 12.81999969, 12.81999969,
       13.        , 12.98999977, 12.97999954, 13.10000038, 13.40999985,
       13.53999996, 13.35999966, 13.81999969, 13.72999954, 14.39999962,
       14.85000038, 14.85000038, 15.67000008, 14.89000034, 15.25      ,
       15.72999954, 15.85000038, 16.31999969, 16.25      , 16.34000015,
       17.11000061, 16.69000053, 16.52000046, 15.64999962, 15.80000019,
       15.10999966, 15.5       , 14.97000027, 15.31000042, 14.98999977,
       15.15999985, 15.        , 15.5       , 16.36000061, 16.61000061,
       16.54999924, 16.27000046, 16.55999947, 16.27000046, 16.57999992,
       16.87000084, 16.85000038, 16.70999908, 16.5       , 16.65999985,
       16.19000053, 16.04999924, 18.35000038, 18.94000053, 19.42000008,
       18.32999992, 18.47999954, 18.79000092, 18.48999977, 19.43000031,
```

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       19.55999947, 19.57999992, 19.10000038, 19.05999947, 19.72999954,
       20.02000046, 19.70000076, 19.32999992, 19.77000046, 19.97999954,
       20.39999962, 20.89999962, 22.29000092, 23.97999954, 25.26000023,
       25.04999924, 25.20000076, 24.88999939, 25.17000008, 28.05999947,
       28.51000023, 27.84000015, 27.37999916, 29.88999939, 30.10000038,
       32.20999908, 30.47999954, 32.72000122, 32.43000031, 31.93000031,
       31.20999908, 31.18000031, 31.02000046, 32.61000061, 32.56999969,
       32.18999863, 32.59000015, 30.88999939, 31.42000008, 29.02000046,
       28.43000031, 27.78000069, 27.35000038, 26.45999908, 27.23999977,
       25.        , 25.29999924, 26.34000015, 26.26000023, 28.18000031,
       27.29999924, 26.62000084, 23.65999985, 25.03000069, 25.09000015,
       22.79000092, 19.27000046, 17.62999916, 16.85000038, 17.20000076,
       18.20999908, 20.21999931, 20.22999954, 19.89999962, 20.68000031,
       21.84000015, 21.20000076, 21.03000069, 19.03000069, 19.61000061,
       20.80999947, 21.48999977, 20.65999985, 19.11000061, 19.20999908,
       18.72999954, 19.37999916, 20.07999992, 21.04999924, 21.34000015,
       21.43000031, 21.29999924, 23.70999908, 21.12000084, 21.29999924,
       19.45999908, 19.98999977, 19.97999954, 20.47999954, 19.86000061,
       19.89999962, 18.82999992, 19.5       , 18.15999985, 17.94000053,
       16.93000031, 16.64999962, 17.89999962, 17.48999977, 17.81999969,
       18.45999908])
```

[6]:
```
max(Close)
```

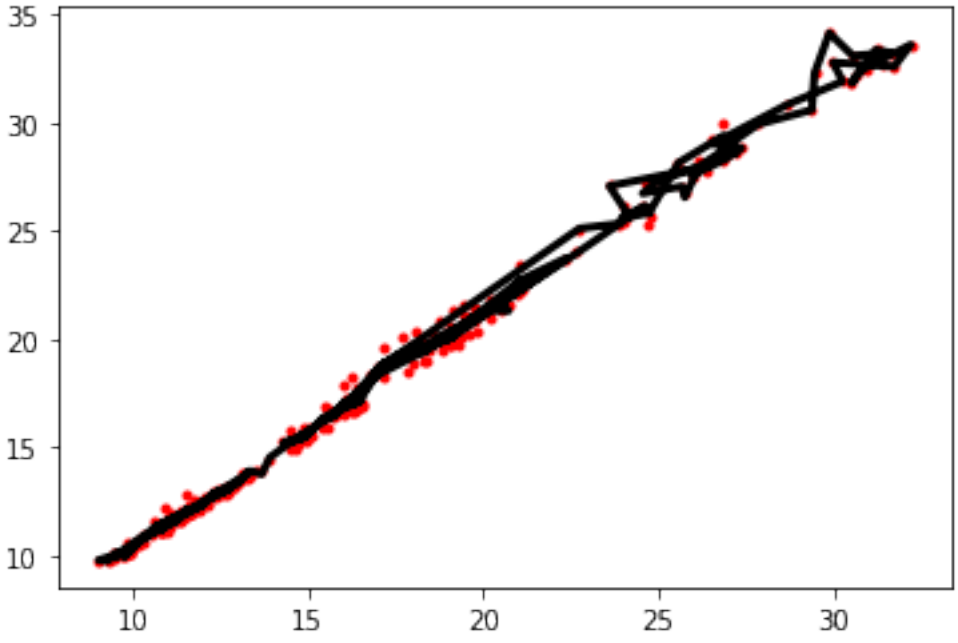
[6]:
```
32.720001220703125
```

[7]:
```
distance.chebyshev(Open, Close)
```

[7]:
```
3.3700008392333984
```

[8]:
```
x = Low
y = High
p = np.polynomial.Chebyshev.fit(x, y, 90)

plt.plot(x, y, 'r.')
plt.plot(x, p(x), 'k-', lw=3)
plt.show()
```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