

# Covariance\_Correlation\_Stock

September 29, 2021

## 1 Variance, Covariance, and Correlation

```
[1]: import numpy as np

import warnings
warnings.filterwarnings("ignore")

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

```
[2]: symbol = 'AMD'
market = '^GSPC'
start = '2018-01-01'
end = '2019-01-01'

# Read data
dataset = yf.download(symbol,start,end)['Adj Close']
benchmark = yf.download(market,start,end)['Adj Close']

# View Columns
dataset.head()
```

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

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

```
[2]: Date
2018-01-02    10.98
2018-01-03    11.55
2018-01-04    12.12
2018-01-05    11.88
2018-01-08    12.28
Name: Adj Close, dtype: float64
```

```
[3]: benchmark.head()
```

```
[3]: Date
    2018-01-02    2695.810059
    2018-01-03    2713.060059
    2018-01-04    2723.989990
    2018-01-05    2743.149902
    2018-01-08    2747.709961
    Name: Adj Close, dtype: float64
```

### 1.0.1 Math for variance

```
[4]: variance = ((dataset - dataset.mean())**2).sum() / len(dataset)
```

```
[5]: print("The Variance for " + symbol + ":", variance)
```

The Variance for AMD: 38.0712087425131

### 1.0.2 Math for covariance

```
[6]: covariance = ((dataset - dataset.mean()) * (dataset - dataset.mean())).sum() /
    ↪(len(dataset) - 1)
```

```
[7]: print("The Covariance for " + symbol + ":", covariance)
```

The Covariance for AMD: 38.223493577483154

### 1.0.3 Math for correlation coefficient

```
[8]: upper = ((dataset - dataset.mean()) * (benchmark - benchmark.mean())).sum()
    lower = np.sqrt((((dataset - dataset.mean())**2).sum()) * (((benchmark -
    ↪benchmark.mean())**2).sum()))

    correlation_coefficient = upper/lower
```

```
[9]: print("The Correlation Coefficient for " + symbol + ":",
    ↪correlation_coefficient)
```

The Correlation Coefficient for AMD: 0.5603999826657514

```
[10]: r_square = correlation_coefficient**2
```

```
[11]: print("The R-Square for " + symbol + ":", r_square)
```

The R-Square for AMD: 0.3140481405717745