Correlation Analysis

```
import warnings
warnings.filterwarnings('ignore')
```

Load Data

- 키, 몸무게 데이터

```
import pandas as pd

url = 'https://raw.githubusercontent.com/rusita-ai/pyData/master/PII.csv'
DF = pd.read_csv(url)

DF.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 17 entries, 0 to 16
Data columns (total 8 columns):
 #   Column     Non-Null Count  Dtype  
---  ------     --------------  -----  
 0   Name       17 non-null     object 
 1   Gender     17 non-null     object 
 2   Age        17 non-null     int64  
 3   Grade      17 non-null     int64  
 4   Picture    17 non-null     object 
 5   BloodType  17 non-null     object 
 6   Height     17 non-null     float64
 7   Weight     17 non-null     float64
dtypes: float64(2), int64(2), object(4)
memory usage: 1.2+ KB
```

```
DF.head()
```

	Name	Gender	Age	Grade	Picture	BloodType	Height	Weight
0	송태섭	남자	21	3	무	B	179.1	63.9
1	최유정	여자	23	1	유	A	177.1	54.9
2	이한나	여자	20	1	무	A	167.9	50.2
3	김소혜	여자	23	3	무	O	176.1	53.5
4	서태웅	남자	24	4	무	B	176.1	79.8

I. Covariance

1) 공분산

```
import numpy as np

np.cov(DF.Height, DF.Weight)[0][1]
```

```
63.83036764705884
```

2) Pearson 상관계수

- 공분산을 두 변수의 표준편차의 곱으로 나눈 값

```
np.cov(DF.Height, DF.Weight)[0][1] /    ₩
((np.std(DF.Height, ddof = 1) *         ₩
  np.std(DF.Weight, ddof = 1)))
```

```
0.6848075756314844
```

II. scipy

```
from scipy import stats
```

1) Karl Pearson 상관계수

- 기본적으로 등간척도/비율척도 변수에만 적용가능

```
stats.pearsonr(DF.Height, DF.Weight)[0]
```

```
0.6848075756314843
```

2) spearman 상관계수

- 서열척도 변수가 포함되어도 적용가능
- 등간척도/비율척도 두 변수 간의 관계가 비선형적 일 때 적용

```
stats.spearmanr(DF.Height, DF.Weight)[0]
```

```
0.6507060771796446
```

3) kendall tau

- spearman 상관계수와 같은 경우 적용가능
- 표본이 작을 때 spearman 상관계수보다 신뢰할 수 있음

```
stats.kendalltau(DF.Height, DF.Weight)[0]
```

```
0.5278846884821402
```

III. pandas

1) Pearson 상관계수

- method('pearson', 'spearman', 'kendall')

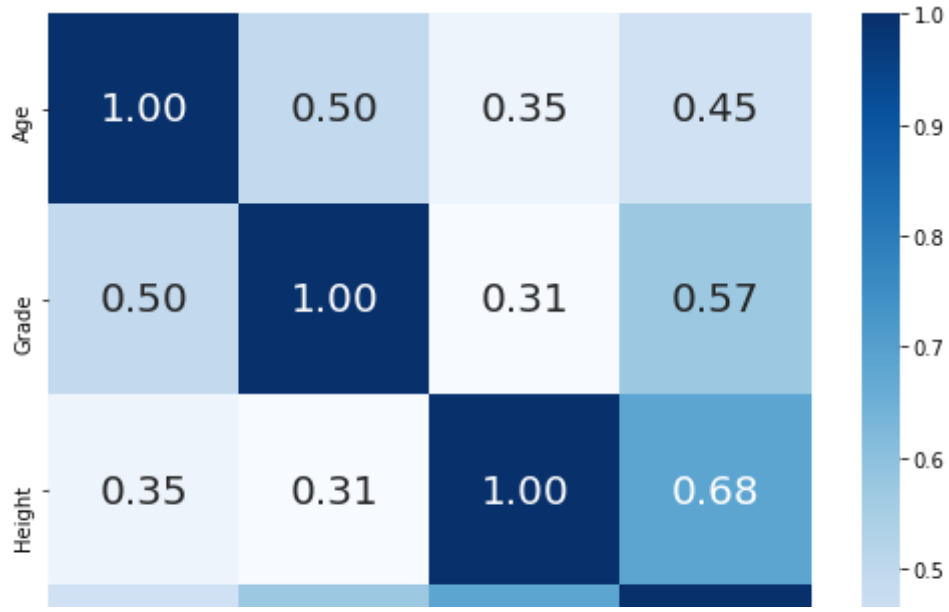
```
DF.corr(method = 'pearson')
```

	Age	Grade	Height	Weight
Age	1.000000	0.495118	0.349681	0.452384
Grade	0.495118	1.000000	0.312777	0.574785
Height	0.349681	0.312777	1.000000	0.684808
Weight	0.452384	0.574785	0.684808	1.000000

2) Heat Map

```
import matplotlib.pyplot as plt
import seaborn as sns

plt.figure(figsize = (9, 7))
sns.heatmap(DF.corr(),
            cbar = True,
            annot = True,
            annot_kws={'size' : 20},
            fmt = '.2f',
            square = True,
            cmap = 'Blues')
plt.show()
```



IV. numpy

```
import numpy as np
```

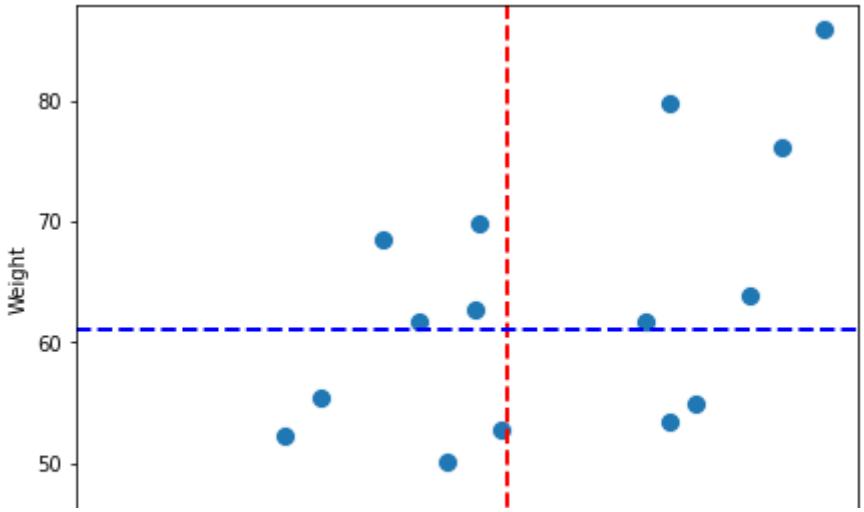
1) Pearson 상관계수

```
np.corrcoef(DF.Height, DF.Weight)[0][1]
```

```
0.6848075756314843
```

V. Visualization

```
plt.figure(figsize = (7, 5))
sns.scatterplot(x = DF.Height,
                y = DF.Weight,
                s = 100)
plt.axvline(DF.Height.mean(),
            color = 'r',
            linestyle = 'dashed',
            linewidth = 2)
plt.axhline(DF.Weight.mean(),
            color = 'b',
            linestyle = 'dashed',
            linewidth = 2)
plt.show()
```



#

#

#

The End

#

#

#