

SAMSUNG

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Enabling People

Education for Future Generations

Samsung Innovation Campus

Artificial Intelligence Course

Chapter 3.

Python Libraries

AI Course

Chapter 3.

Python Libraries

| UNIT 1. NumPy Package

- 1.1. NumPy array basics.
- 1.2. NumPy array operations.
- 1.3. Linear algebra: vectors and matrices.

| UNIT 2. Pandas Package

- 2.1. Pandas Series and DataFrame.
- 2.2. Data summarization and manipulation.

| UNIT 3. Visualization

- 3.1. Introduction to visualization.
- 3.2. Matplotlib and Pandas visualization.
- 3.3. Seaborn visualization.

UNIT 3.

3.3. Seaborn visualization.

Seaborn Visualization Library (1/17)

| What the Seaborn library provides:

- ▶ **Internal dataset**: `load_dataset()`.
- ▶ **Basic graphic types**: `distplot()`, `jointplot()`, `kdeplot()`, `rugplot()`, `barplot()`, `countplot()`, etc.
- ▶ **Arrays**: `pairplot()`, `PairGrid()`, `FacetGrid()`, etc.
- ▶ With **regression (trend) line**: `lmpplot()`, `jointplot()`, etc.
- ▶ **Special graphic** types: `heatmap()`, `clustermap()`, etc.
- ▶ **Applied graph** types: `violinplot()`, `swarmplot()`, `stripplot()`, etc.

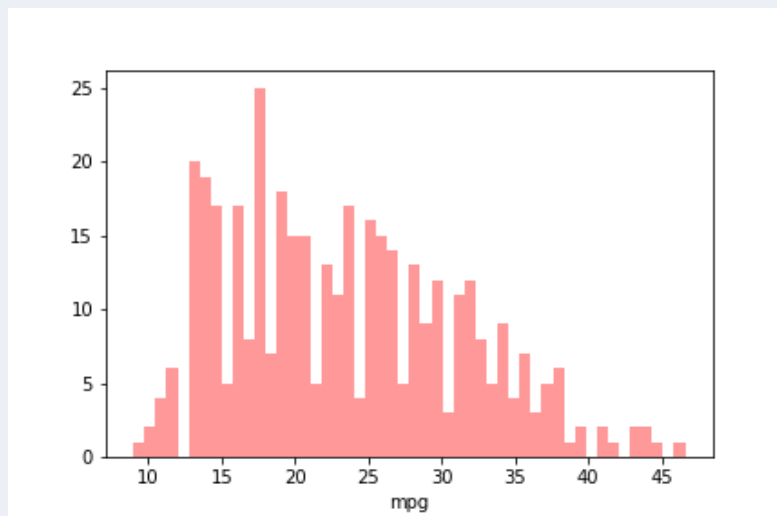
UNIT 3.

3.3. Seaborn visualization.

Seaborn Visualization Library (2/17)

| Histogram.

```
In[1] : import seaborn as sns  
        sns.distplot(dat.mpg, kde=False, rug=False, bins=50, color='red')  
        plt.show()
```



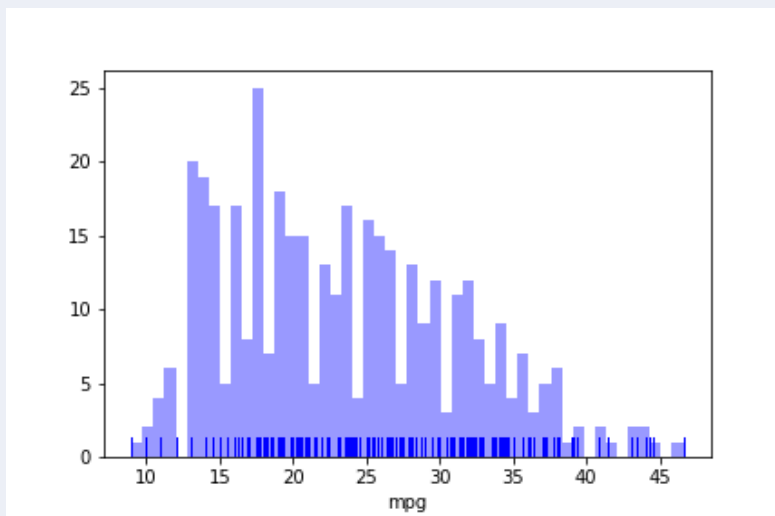
UNIT 3.

3.3. Seaborn visualization.

Seaborn Visualization Library (3/17)

Histogram + Rug.

```
In[1] : import seaborn as sns  
        sns.distplot(dat.mpg, kde=False, rug=True, bins=50, color='blue')  
        plt.show()
```



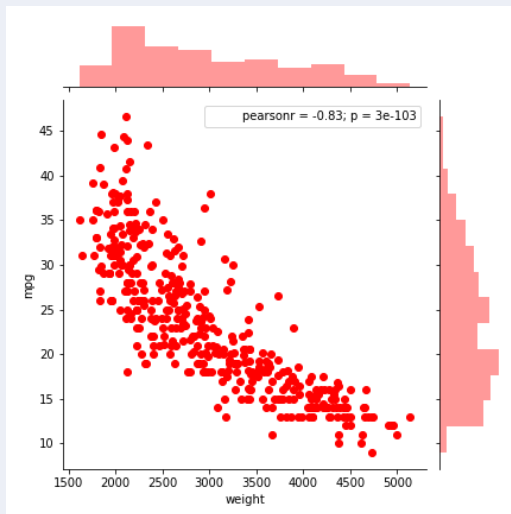
UNIT 3.

3.3. Seaborn visualization.

Seaborn Visualization Library (4/17)

Scatter plot.

```
In[1] : import seaborn as sns  
sns.jointplot(x='weight', y='mpg', data=dat, color='red', kind='scatter' )  
plt.show()
```



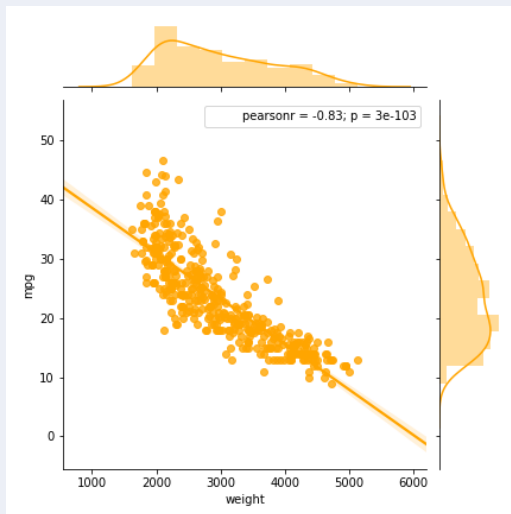
UNIT 3.

3.3. Seaborn visualization.

Seaborn Visualization Library (5/17)

Scatter plot + Regression line.

```
In[1] : import seaborn as sns  
sns.jointplot(x='weight', y='mpg', data=dat, color='orange', kind='reg' )  
plt.show()
```



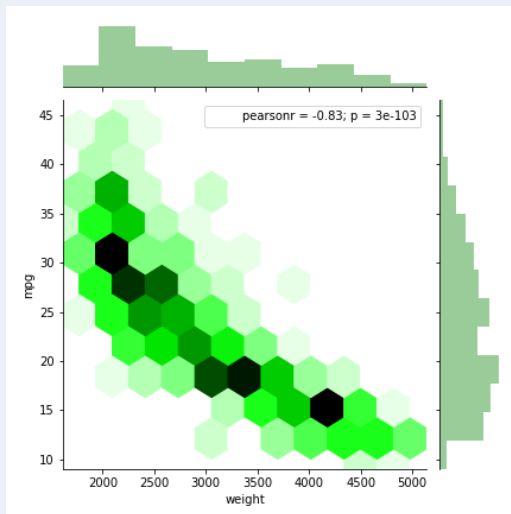
UNIT 3.

3.3. Seaborn visualization.

Seaborn Visualization Library (6/17)

Hex.

```
In[1] : import seaborn as sns  
sns.jointplot(x='weight', y='mpg', data=dat, color='green', kind='hex' )  
plt.show()
```



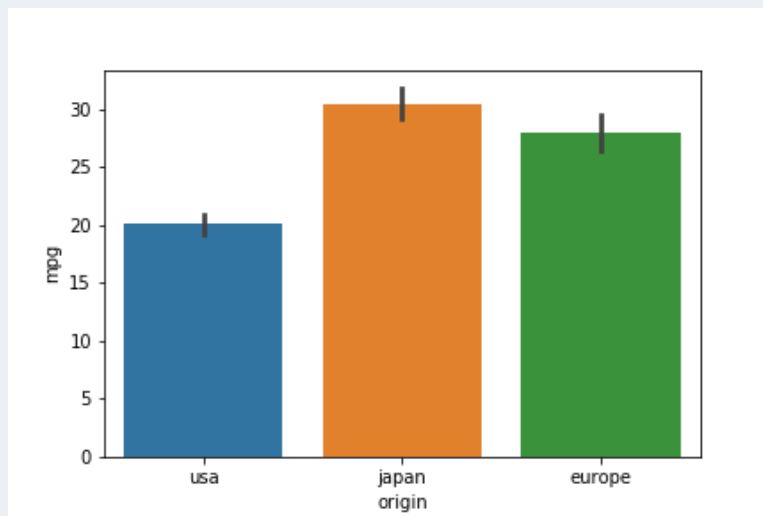
UNIT 3.

3.3. Seaborn visualization.

Seaborn Visualization Library (7/17)

| Bar plot.

```
In[1] : import seaborn as sns  
        sns.barplot(x='origin', y='mpg', data=dat)  
        plt.show()
```



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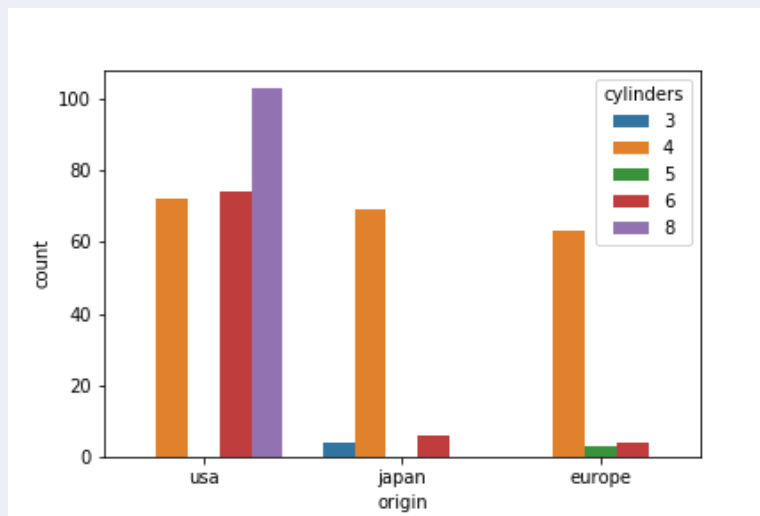
3.3. Seaborn visualization.

Seaborn Visualization Library (8/17)

Bar plot.

```
In[1] : import seaborn as sns  
sns.countplot(x='origin', data=dat, hue='cylinders')  
plt.show()
```

Hue to represent the 'cylinder' types.



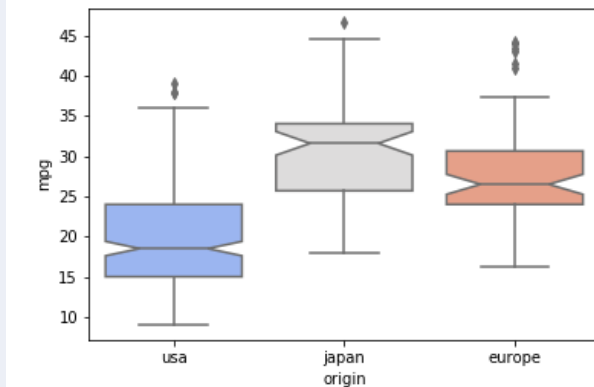
UNIT 3.

3.3. Seaborn visualization.

Seaborn Visualization Library (9/17)

Multiple Box plots.

```
In[1] : import seaborn as sns  
sns.boxplot(x='origin', y='mpg', data=dat, palette='coolwarm', notch=True)  
plt.show()
```



- There are other color palettes such as 'cubehelix', 'magma', 'seismic', etc.

UNIT 3.

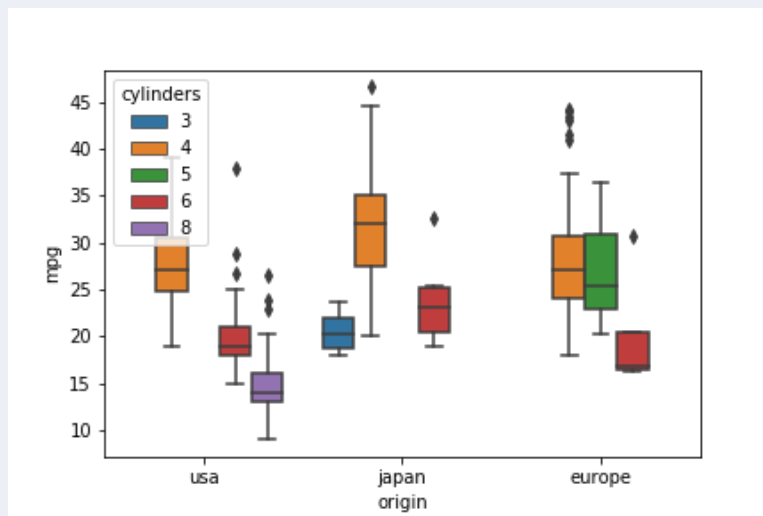
3.3. Seaborn visualization.

Seaborn Visualization Library (10/17)

Multiple **Box plots**.

```
In[1] : import seaborn as sns  
sns.boxplot(x='origin', y='mpg', data=dat, hue='cylinders')  
plt.show()
```

Hue to represent the 'cylinder' types.



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3.3. Seaborn visualization.

Coding Exercise #0213

Follow practice steps on 'ex_0213.ipynb' file

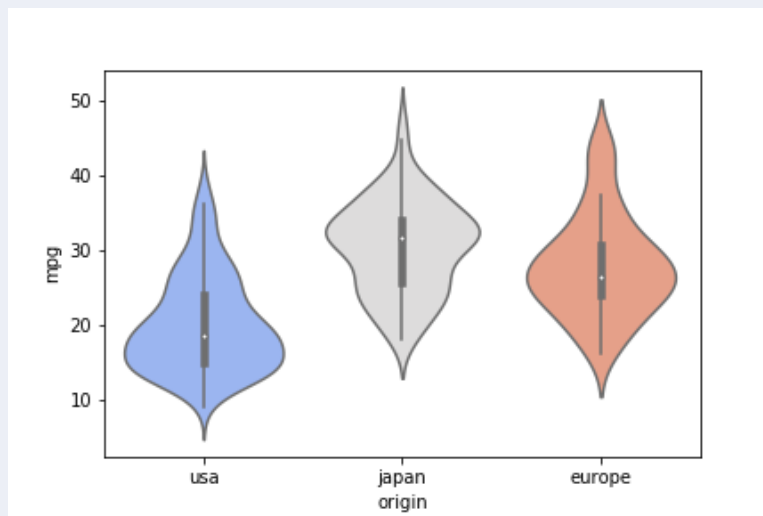
UNIT 3.

3.3. Seaborn visualization.

Seaborn Visualization Library (11/17)

| Array of Scatter plots.

```
In[1] : import seaborn as sns  
sns.violinplot(x='origin', y='mpg', data=dat, palette='coolwarm')  
plt.show()
```



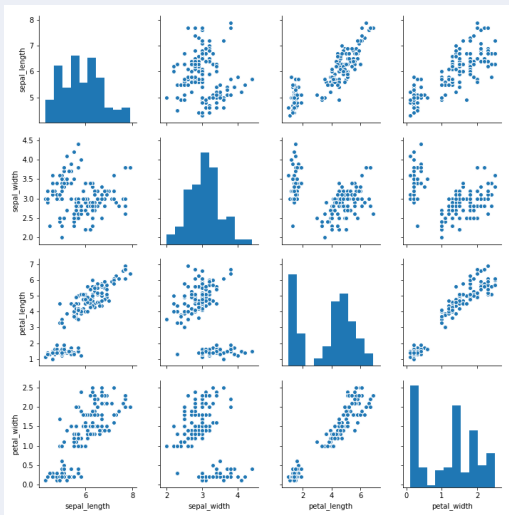
UNIT 3.

3.3. Seaborn visualization.

Seaborn Visualization Library (12/17)

| Array of Scatter plots.

```
In[1] : import seaborn as sns  
sns.pairplot(dat)  
plt.show()
```



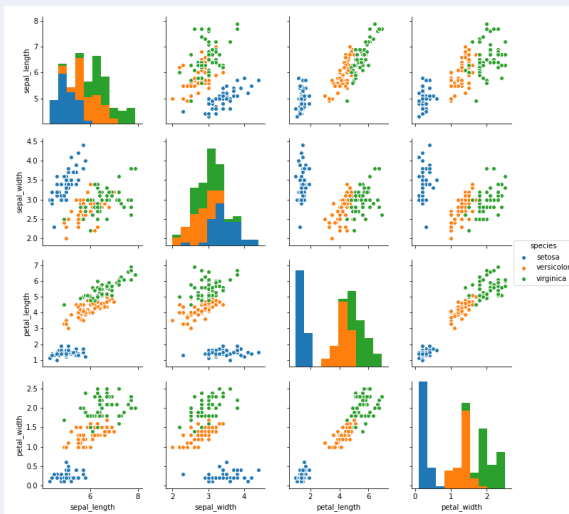
UNIT 3.

3.3. Seaborn visualization.

Seaborn Visualization Library (13/17)

| Array of Scatter plots.

```
In[1] : import seaborn as sns  
sns.pairplot(dat, hue='species' )  
plt.show()
```



UNIT 3.

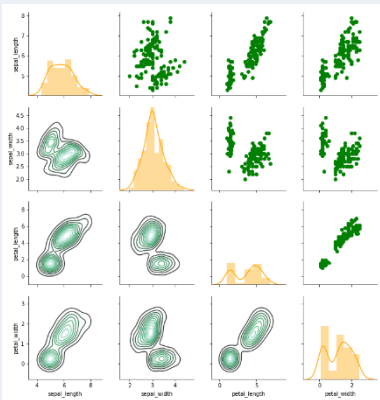
3.3. Seaborn visualization.

Seaborn Visualization Library (14/17)

| Array of mixed types.

```
In[1] : import seaborn as sns
        g=sns.PairGrid(dat)
        g.map_diag(sns.distplot, color='orange')
        g.map_upper(plt.scatter, color='green')
        g.map_lower(sns.kdeplot, color='blue')
        plt.show()
```

Diagonal = histogram.
Triangle up = scatterplot.
Triangle down = KDE.



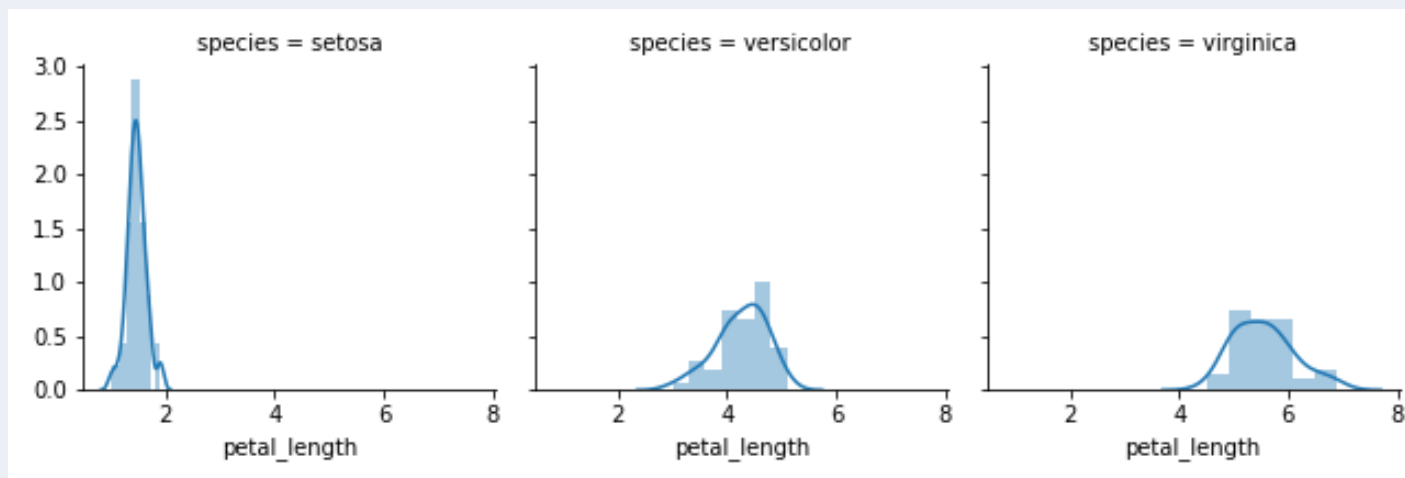
UNIT 3.

3.3. Seaborn visualization.

Seaborn Visualization Library (15/17)

Facet grid.

```
In[1] : import seaborn as sns  
g=sns.FacetGrid(data=dat, col='species')  
g.map(sns.distplot, 'petal_length')  
plt.show()
```



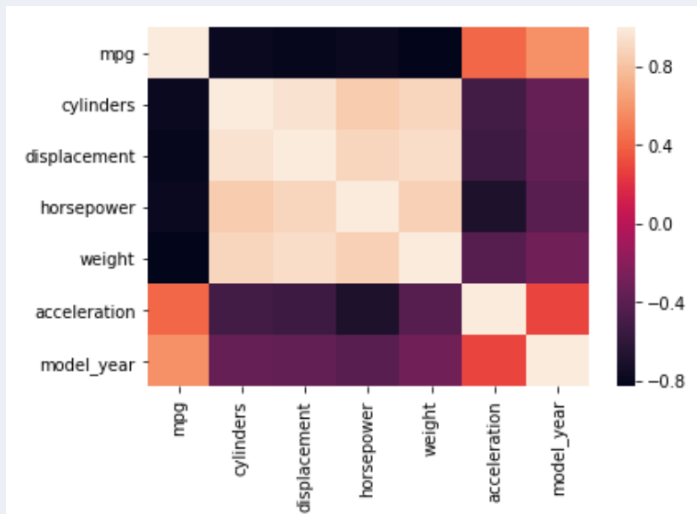
UNIT 3.

3.3. Seaborn visualization.

Seaborn Visualization Library (16/17)

Heatmap.

```
In[1] : import seaborn as sns  
sns.heatmap(x)  
plt.show()
```



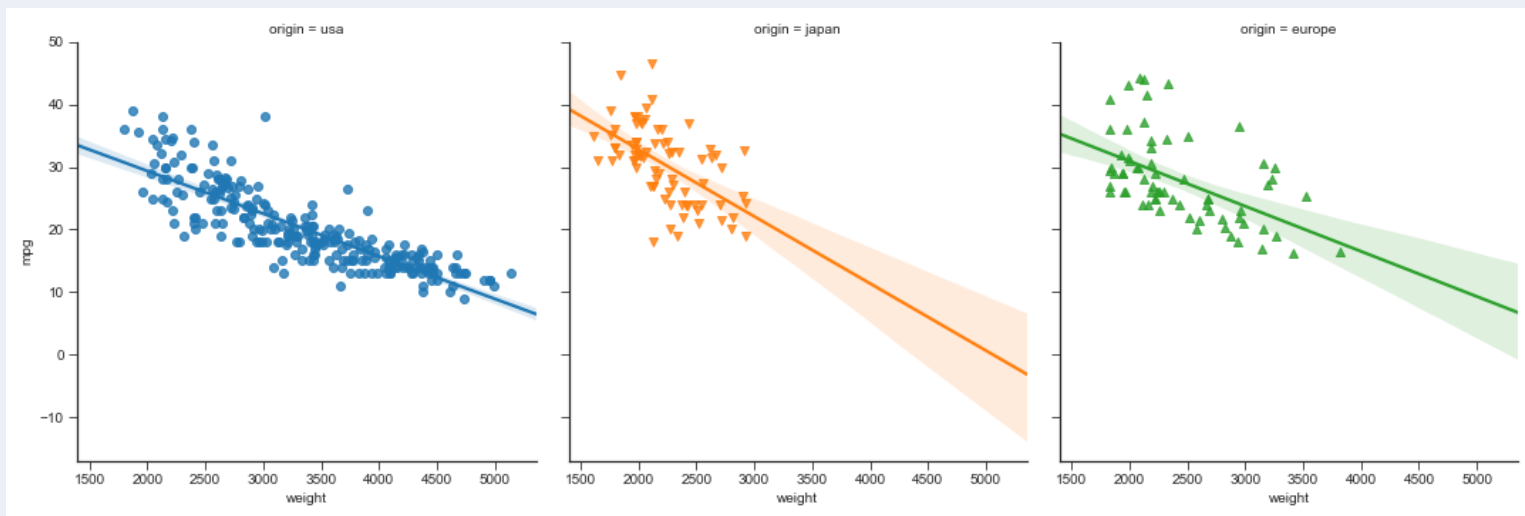
UNIT 3.

3.3. Seaborn visualization.

Seaborn Visualization Library (17/17)

Multiple Scatter plots + Regression lines.

```
In[1] : import seaborn as sns  
sns.lmplot(data=dat, x='weight', y='mpg', col = 'origin', hue = 'origin')  
plt.show()
```



UNIT 3.

3.3. Seaborn visualization.

Coding Exercise #0214

Follow practice steps on 'ex_0214.ipynb' file

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