9.2. Data Science – Machine Learning – Linear Regression Example

Program Name: Loading salary dataset
demo1.py

```
import pandas as pd

dataset = pd.read_csv('Salary_Data.csv')

print(dataset.head())
```

Output

```
   YearsExperience    Salary
0              1.1   39343.0
1              1.3   46205.0
2              1.5   37731.0
3              2.0   43525.0
4              2.2   39891.0
```

Program Name: Preparing the data
demo2.py

```
import pandas as pd

dataset = pd.read_csv('Salary_Data.csv')

X = dataset.iloc[:, :-1].values
y = dataset.iloc[:, 1].values

print(X)
print(y)
```

Output

```
[[ 1.1]
 [ 1.3]
 [ 1.5]
 [ 2. ]
 [ 2.2]
 [ 2.9]
 [ 3. ]
 [ 3.2]
 [ 3.2]
 [ 3.7]
 [ 3.9]
 [ 4. ]
 [ 4. ]
 [ 4.1]
 [ 4.5]
 [ 4.9]
 [ 5.1]
 [ 5.3]
 [ 5.9]
 [ 6. ]
 [ 6.8]
 [ 7.1]
 [ 7.9]
 [ 8.2]
 [ 8.7]
 [ 9. ]
 [ 9.5]
 [ 9.6]
 [10.3]
 [10.5]]
[ 39343.  46205.  37731.  43525.  39891.  56642.  60150.  54445.  64445.
  57189.  63218.  55794.  56957.  57081.  61111.  67938.  66029.  83088.
  81363.  93940.  91738.  98273. 101302. 113812. 109431. 105582. 116969.
 112635. 122391. 121872.]
```

Program Name: Splitting the dataset
demo3.py

```
import pandas as pd
from sklearn.model_selection import train_test_split

dataset = pd.read_csv('Salary_Data.csv')

X = dataset.iloc[:, :-1].values
y = dataset.iloc[:, 1].values

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size =
1/3, random_state = 0)

print("X_train")
print(X_train)
print()

print("X_test")
print(X_test)
print()

print("y_train")
print(y_train)
print()

print("y_test")
print(y_test)
```

Output

```
X_train
[[ 2.9]
 [ 5.1]
 [ 3.2]
 [ 4.5]
 [ 8.2]
 [ 6.8]
 [ 1.3]
 [10.5]
 [ 3. ]
 [ 2.2]
 [ 5.9]
 [ 6. ]
 [ 3.7]
 [ 3.2]
 [ 9. ]
 [ 2. ]
 [ 1.1]
 [ 7.1]
 [ 4.9]
 [ 4. ]]

X_test
[[ 1.5]
 [10.3]
 [ 4.1]
 [ 3.9]
 [ 9.5]
 [ 8.7]
 [ 9.6]
 [ 4. ]
 [ 5.3]
 [ 7.9]]

y_train
[ 56642.  66029.  64445.  61111. 113812.  91738.  46205. 121872.  60150.
  39891.  81363.  93940.  57189.  54445. 105582.  43525.  39343.  98273.
  67938.  56957.]

y_test
[ 37731. 122391.  57081.  63218. 116969. 109431. 112635.  55794.  83088.
 101302.]
```

Program Name: Training the model
demo4.py

```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression

dataset = pd.read_csv('Salary_Data.csv')

X = dataset.iloc[:, :-1].values
y = dataset.iloc[:, 1].values

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size =
1/3, random_state = 0)

print("Training the model")

regressor = LinearRegression()
regressor.fit(X_train, y_train)
```

Output

```
Training the model
```

Program Name: Predicting the salaries

demo5.py

```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression

dataset = pd.read_csv('Salary_Data.csv')

X = dataset.iloc[:, :-1].values
y = dataset.iloc[:, 1].values

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size =
1/3, random_state = 0)

regressor = LinearRegression()
regressor.fit(X_train, y_train)

print("Predicting the salaries")

y_pred = regressor.predict(X_test)

print()
print(y_pred)
```

Output

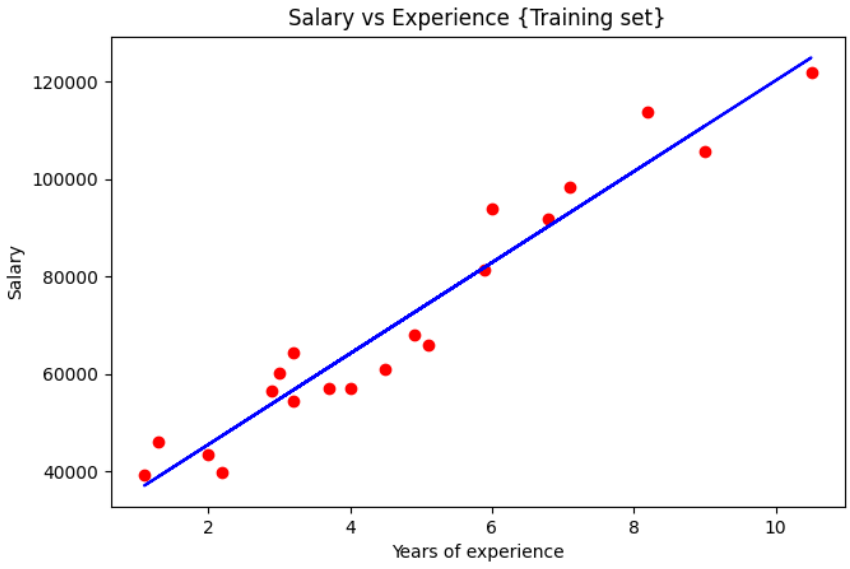
```
Predicting the salaries

[ 40835.10590871 123079.39940819  65134.55626083  63265.36777221
 115602.64545369 108125.8914992  116537.23969801  64199.96201652
  76349.68719258 100649.1375447 ]
```

Program Name: Plotting training dataset
demo6.py

```
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression

dataset = pd.read_csv('Salary_Data.csv')

X = dataset.iloc[:, :-1].values
y = dataset.iloc[:, 1].values

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size =
1/3, random_state = 0)

regressor = LinearRegression()
regressor.fit(X_train, y_train)

y_pred = regressor.predict(X_test)

print("Visualizing Training dataset results ")

plt.scatter(X_train, y_train, color = 'red')
plt.plot(X_train, regressor.predict(X_train), color = 'blue')

plt.title('Salary vs Experience {Training set}')
plt.xlabel('Years of experience')
plt.ylabel('Salary')

plt.show()
```

Output

Visualizing Training dataset results



Program Name: Plotting test dataset
demo7.py

```
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression

dataset = pd.read_csv('Salary_Data.csv')

X = dataset.iloc[:, :-1].values
y = dataset.iloc[:, 1].values

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size =
1/3, random_state = 0)

regressor = LinearRegression()
regressor.fit(X_train, y_train)

y_pred = regressor.predict(X_test)

print("Visualizing Training dataset results ")

plt.scatter(X_test, y_test, color = 'red')
plt.plot(X_train, regressor.predict(X_train), color = 'blue')

plt.title('Salary vs Experience {Test set}')
plt.xlabel('Years of experience')
plt.ylabel('Salary')

plt.show()
```

Output

Visualizing Training dataset results