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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

23AMB201 - MACHINE LEARNING

II YEAR IV SEM

UNIT II – SUPERVISED LEARNING ALGORITHMS

TOPIC 9 – Implementing Linear and Logistic regression using Scikit Learn Library

Linear Regression

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
df=pd.read_csv('salary_data.csv')
print("Original Data:")
print(df.head())
```

```
Original Data:
   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
```

```
[ ]  x = df.iloc[:,:-1].values
     y = df.iloc[:,1].values
     y
```

```
array([ 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.])
```

Linear Regression

```
from sklearn.linear_model import LinearRegression
regressor = LinearRegression()
regressor.fit(x_train,y_train)
```

```
LinearRegression
LinearRegression()
```

```
[ ]  viz_train = plt
     viz_train.scatter(x_train, y_train, color='red')
     viz_train.plot(x_train, regressor.predict(x_train), color='blue')
     viz_train.title('Salary Vs Experience (Training set)')
     viz_train.xlabel('Year of Experience')
     viz_train.ylabel('Salary')
     viz_train.show()
```

Linear Regression-Prediction of salary for 20 year of experience

```
viz_test = plt
viz_test.scatter(x_test, y_test, color='red')
viz_test.plot(x_test, regressor.predict(x_test), color='blue')
viz_test.title('Salary VS Experience (Test set)')
viz_test.xlabel('Year of Experience')
viz_test.ylabel('Salary')
viz_test.show()
```


```
[ ] y_pred=regressor.predict([[20]])
    y_pred
```

```
array([214618.91713627])
```

Logistic Regression

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
data = {
    "Age": [25, 32, 47, 50, 35, 60, 28, 55, 40, 45],
    "BloodPressure": [120, 130, 140, 135, 128, 145, 118, 150, 138, 132],
    "Glucose": [85, 90, 160, 150, 88, 170, 80, 180, 140, 110],
    "Diabetic": [0, 0, 1, 1, 0, 1, 0, 1, 1, 0]
}
df = pd.DataFrame(data)
df
```

Logistic Regression

	Age	BloodPressure	Glucose	Diabetic
0	25	120	85	0
1	32	130	90	0
2	47	140	160	1
3	50	135	150	1
4	35	128	88	0
5	60	145	170	1
6	28	118	80	0
7	55	150	180	1
8	40	138	140	1
9	45	132	110	0

```
X = df[["Age", "BloodPressure", "Glucose"]]  # Input Features
y = df["Diabetic"]  # Output Label
X
```

	Age	BloodPressure	Glucose
0	25	120	85
1	32	130	90
2	47	140	160
3	50	135	150
4	35	128	88
5	60	145	170
6	28	118	80
7	55	150	180
8	40	138	140
9	45	132	110

Logistic Regression

```
[ ] X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2)
    X_test
```

	Age	BloodPressure	Glucose
3	50	135	150
2	47	140	160

```
model = LogisticRegression()
model.fit(X_train, y_train)

single_patient = np.array([[25, 120, 85]])
single_prediction = model.predict(single_patient)
```

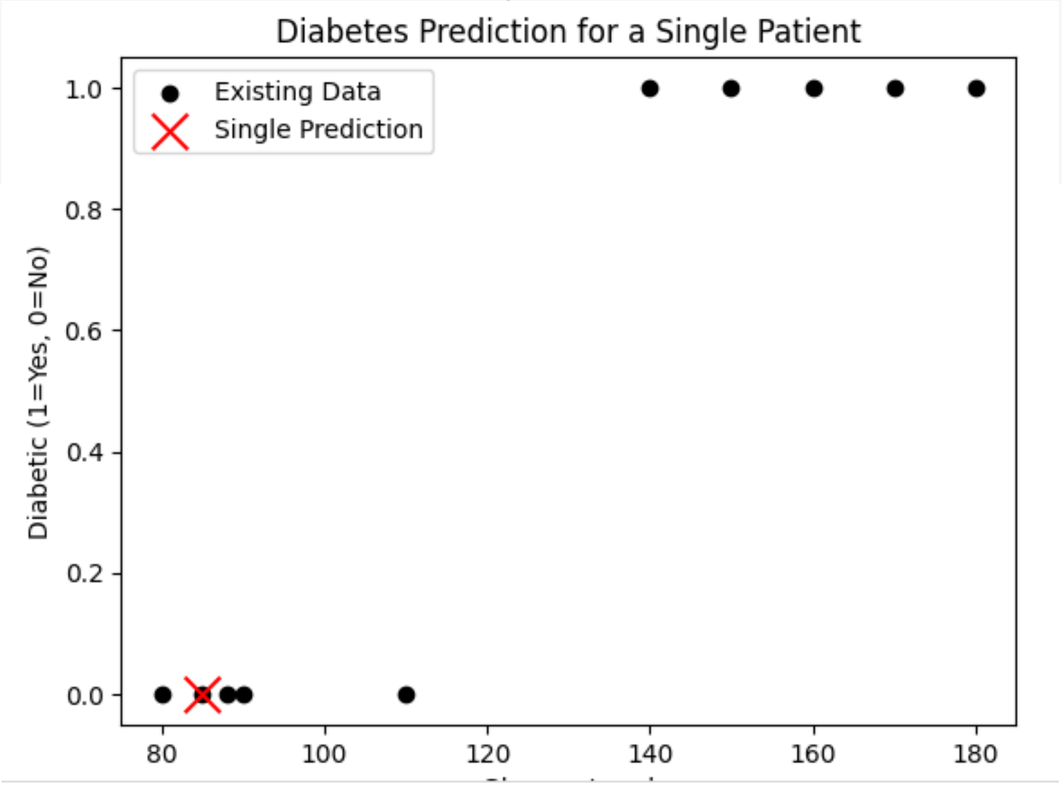
Logistic Regression- Prediction

```
result = "Diabetic" if single_prediction == 1 else "Non-Diabetic"
print(f"📌 Prediction for Single Patient:")
print(f"Age: {single_patient[0][0]}, BP: {single_patient[0][1]}, Glucose: {single_patient[0][2]}")
print(f"Prediction: {result}")
```

```
📌 Prediction for Single Patient:
Age: 25, BP: 120, Glucose: 85
Prediction: Non-Diabetic
```

Logistic Regression- Visualization

```
# Visualization: Showing the single patient prediction
plt.scatter(X["Glucose"], y, color="black", label="Existing Data")
plt.scatter(single_patient[:, 2], single_prediction, color="red", label="Single Prediction", marker="x", s=200)
plt.xlabel("Glucose Level")
plt.ylabel("Diabetic (1=Yes, 0=No)")
plt.legend()
plt.title("Diabetes Prediction for a Single Patient")
plt.show()
```



References

1. Tom M. Mitchell, “Machine Learning”, McGraw-Hill Education (India) Private Limited, 2013.
2. Sebastian Raschka , Yuxi (Hayden) Liu Machine Learning with PyTorch and Scikit-Learn: Developmachine learning and deep learning models with Python Packt Publishing Limited (23 December 2022).