Task

On

Machine Learning

**Course**: Artificial Intelligence

(Machine Learning & Deep Learning)

Name: Abbas Shafi

Father Name: Dr Muhammad Shafi

Week: 10

Submitted to: Sir Syed Nazir Afridi



National Vocational & Technical Training Commission

National Center For Big Data & Cloud Computing

University of Engineering & Technology

Peshawar

[1]:

# Logistic Regression

## Importing the libraries

**import numpy as np**

**import matplotlib.pyplot as plt import pandas as pd**

[2]:

## Importing the dataset

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[6]:

## Splitting the dataset into the Training set and Test set

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[11]:

## Feature Scaling

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| [ 2.1661655 | -1.03167271] |
| [-0.30964085 | 1.11381995] |
| [-1.6960924 | 0.07006676] |
| [-0.01254409 | 0.04107362] |
| [ 0.08648817 | 1.05583366] |
| [-0.11157634 | -0.3648304 ] |
| [-1.20093113 | 0.07006676] |
| [-0.30964085 | -1.3505973 ] |
| [ 1.57197197 | 1.11381995] |
| [-0.80480212 | -1.52455616] |
| [ 0.08648817 | 1.8676417 ] |
| [-0.90383437 | -0.77073441] |
| [-0.50770535 | -0.77073441] |
| [-0.30964085 | -0.91570013] |
| [ 0.28455268 | -0.71274813] |
| [ 0.28455268 | 0.07006676] |
| [ 0.08648817 | 1.8676417 ] |
| [-1.10189888 | 1.95462113] |
| [-1.6960924 | -1.5535493 ] |
| [-1.20093113 | -1.089659 ] |
| [-0.70576986 | -0.1038921 ] |
| [ 0.08648817 | 0.09905991] |
| [ 0.28455268 | 0.27301877] |
| [ 0.8787462 | -0.5677824 ] |
| [ 0.28455268 | -1.14764529] |
| [-0.11157634 | 0.67892279] |
| [ 2.1661655 | -0.68375498] |
| [-1.29996338 | -1.37959044] |
| [-1.00286662 | -0.94469328] |
| [-0.01254409 | -0.42281668] |
| [-0.21060859 | -0.45180983] |
| [-1.79512465 | -0.97368642] |
| [ 1.77003648 | 0.99784738] |
| [ 0.18552042 | -0.3648304 ] |
| [ 0.38358493 | 1.11381995] |
| [-1.79512465 | -1.3505973 ] |
| [ 0.18552042 | -0.13288524] |
| [ 0.8787462 | -1.43757673] |
| [-1.99318916 | 0.47597078] |
| [-0.30964085 | 0.27301877] |
| [ 1.86906873 | -1.06066585] |

|  |  |
| --- | --- |
| [-0.4086731 | 0.07006676] |
| [ 1.07681071 | -0.88670699] |
| [-1.10189888 | -1.11865214] |
| [-1.89415691 | 0.01208048] |
| [ 0.08648817 | 0.27301877] |
| [-1.20093113 | 0.33100506] |
| [-1.29996338 | 0.30201192] |
| [-1.00286662 | 0.44697764] |
| [ 1.67100423 | -0.88670699] |
| [ 1.17584296 | 0.53395707] |
| [ 1.07681071 | 0.53395707] |
| [ 1.37390747 | 2.331532 ] |
| [-0.30964085 | -0.13288524] |
| [ 0.38358493 | -0.45180983] |
| [-0.4086731 | -0.77073441] |
| [-0.11157634 | -0.50979612] |
| [ 0.97777845 | -1.14764529] |
| [-0.90383437 | -0.77073441] |
| [-0.21060859 | -0.50979612] |
| [-1.10189888 | -0.45180983] |
| [-1.20093113 | 1.40375139]] |

[13]:

|  |  |
| --- | --- |
| [[-0.54748976 | 0.5130727 ] |
| [ 0.15442019 | -0.61825566] |
| [-0.10879604 | 0.14615539] |
| [-0.54748976 | 0.26846116] |
| [-0.10879604 | -0.61825566] |
| [-0.81070599 | -1.53554892] |
| [-0.45975102 | -1.68843113] |
| [-0.0210573 | 2.25592989] |
| [-1.60035469 | -0.0678797 ] |
| [ 0.94406888 | -0.83229075] |
| [-0.54748976 | -0.6488321 ] |
| [-0.72296725 | -0.46537345] |
| [ 0.06668145 | -0.46537345] |
| [ 0.24215893 | 0.20730828] |
| [-1.4248772 | 0.48249625] |
| [-0.37201227 | 1.43036596] |
| [ 0.06668145 | 0.20730828] |
| [-1.51261594 | 0.45191981] |
| [ 1.64597884 | 1.8278597 ] |
| [-0.10879604 | -1.47439603] |
| [-0.10879604 | -0.70998498] |
| [ 0.94406888 | 2.25592989] |
| [ 0.41763642 | -0.58767922] |
| [ 0.94406888 | 1.06344865] |

|  |  |
| --- | --- |
| [-1.16166097 | -1.29093738] |
| [ 1.11954637 | 2.16420057] |
| [-0.72296725 | 0.5130727 ] |
| [-0.63522851 | 0.2990376 ] |
| [ 0.06668145 | -0.25133835] |
| [-0.37201227 | 0.48249625] |
| [-1.33713846 | 0.54364914] |
| [ 0.06668145 | 0.26846116] |
| [ 1.82145632 | -0.31249124] |
| [ 0.06668145 | -0.52652633] |
| [-1.07392223 | -0.37364412] |
| [-1.60035469 | -0.55710277] |
| [-1.24939971 | 0.32961404] |
| [-0.19653479 | -0.83229075] |
| [-0.45975102 | -1.10747873] |
| [ 1.11954637 | -1.04632585] |
| [-0.81070599 | 0.54364914] |
| [ 0.41763642 | -0.55710277] |
| [-0.81070599 | 0.42134337] |
| [-0.10879604 | -1.53554892] |
| [ 0.59311391 | 1.27748375] |
| [-0.81070599 | -0.37364412] |
| [ 0.06668145 | 0.2990376 ] |
| [ 1.3827626 | 0.60480202] |
| [-0.89844474 | -1.2297845 ] |
| [ 1.11954637 | 0.48249625] |
| [ 1.82145632 | 1.58324817] |
| [-0.19653479 | -1.38266671] |
| [-0.10879604 | -0.40422056] |
| [-0.19653479 | 1.36921307] |
| [ 1.99693381 | 0.54364914] |
| [ 0.7685914 | -1.16863161] |
| [-0.63522851 | 0.39076693] |
| [-0.89844474 | 0.2990376 ] |
| [ 1.11954637 | -1.29093738] |
| [-1.16166097 | -1.53554892] |
| [-0.37201227 | -1.5967018 ] |
| [ 2.08467255 | -0.86286719] |
| [-1.51261594 | 0.17673183] |
| [-0.0210573 | 0.87999 ] |
| [-1.51261594 | -1.35209027] |
| [ 2.08467255 | 0.39076693] |
| [-1.07392223 | 0.57422558] |
| [-0.81070599 | -0.37364412] |
| [ 0.32989768 | -0.70998498] |
| [ 0.50537516 | -0.00672682] |
| [-0.37201227 | 2.43938854] |
| [-0.10879604 | 0.20730828] |

|  |  |
| --- | --- |
| [-1.24939971 | -0.22076191] |
| [ 0.7685914 | -1.47439603] |
| [-0.81070599 | 0.57422558] |
| [-1.60035469 | 0.36019049] |
| [ 0.50537516 | 0.26846116] |
| [ 0.32989768 | -0.31249124] |
| [ 1.47050135 | -1.10747873] |
| [ 0.94406888 | 1.12460154] |
| [ 1.90919507 | 2.25592989] |
| [ 1.99693381 | 0.39076693] |
| [-1.07392223 | -0.46537345] |
| [-0.89844474 | -1.07690229] |
| [ 1.90919507 | -0.98517296] |
| [ 0.50537516 | 0.2990376 ] |
| [ 0.32989768 | 0.14615539] |
| [ 1.99693381 | 1.8278597 ] |
| [ 0.85633014 | -0.89344364] |
| [ 0.41763642 | -0.31249124] |
| [ 0.50537516 | -0.19018547] |
| [ 0.06668145 | 2.31708278] |
| [-1.16166097 | -0.67940854] |
| [-0.98618348 | -1.13805517] |
| [-1.07392223 | 0.42134337] |
| [-0.81070599 | 0.78826068] |
| [-1.16166097 | -0.22076191] |
| [ 1.03180763 | -1.13805517] |
| [ 1.03180763 | 0.60480202] |
| [ 0.50537516 | 1.03287221]] |

[14]:

## Training the Logistic Regression model on the Training set

[14]: LogisticRegression(random\_state=0)

## Predicting a new result

[15]:

[0]

[16]:

## Predicting the Test set results

|  |  |
| --- | --- |
| [[0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [1 | 1] |
| [0 | 0] |
| [1 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [1 | 1] |
| [0 | 0] |
| [0 | 0] |
| [1 | 1] |
| [0 | 0] |
| [1 | 1] |
| [0 | 0] |
| [1 | 1] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 1] |
| [1 | 1] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [1 | 1] |
| [0 | 0] |
| [0 | 0] |

|  |  |
| --- | --- |
| [0 | 0] |
| [0 | 0] |
| [1 | 1] |
| [0 | 0] |
| [0 | 0] |
| [1 | 1] |
| [0 | 0] |
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| [1 | 1] |
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| [1 | 1] |
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| [1 | 1] |
| [1 | 1] |
| [0 | 0] |
| [1 | 1] |
| [0 | 1] |
| [0 | 0] |

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| --- | --- |
| [0 | 0] |
| [1 | 1] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 1] |
| [0 | 0] |
| [0 | 1] |
| [1 | 1] |
| [1 | 1]] |

[17]:

## Making the Confusion Matrix

[[63 5]

[ 8 24]]

[17]: 0.87

# K-Nearest Neighbour (KNN)

[18]:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| [18]: |  | Age | | EstimatedSalary | Purchased | |
|  | 0 | 19 | | 19000 | 0 | |
|  | 1 | 35 | | 20000 | 0 | |
|  | 2 | 26 | | 43000 | 0 | |
|  | 3 | 27 | | 57000 | 0 | |
|  | 4 | 19 | | 76000 | 0 | |
| .. … | | |  | … | … |  |
| 395 | | | 46 | 41000 |  | 1 |
| 396 | | | 51 | 23000 |  | 1 |
| 397 | | | 50 | 20000 |  | 1 |
| 398 | | | 36 | 33000 |  | 0 |
| 399 | | | 49 | 36000 |  | 1 |

[400 rows x 3 columns]

[19]:

[20]:

[21]:

[22]:

[22]: KNeighborsClassifier()

[23]:

[1]

[24]:

[[63 5]

[ 8 24]]

[24]: 0.87

# Naive Bayes

[27]:

[27]: Age EstimatedSalary Purchased

|  |  |  |
| --- | --- | --- |
| 395 46 | 41000 | 1 |
| 396 51 | 23000 | 1 |
| 397 50 | 20000 | 1 |
| 398 36 | 33000 | 0 |
| 399 49 | 36000 | 1 |

[400 rows x 3 columns]

[28]:

[29]:

[30]:

[31]:

[31]: GaussianNB()

[32]:

|  |  |
| --- | --- |
| [[0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [1 | 1] |
| [0 | 0] |
| [1 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [1 | 0] |
| [0 | 0] |
| [0 | 0] |

|  |  |
| --- | --- |
| [1 | 1] |
| [0 | 0] |
| [0 | 0] |
| [1 | 1] |
| [0 | 0] |
| [1 | 1] |
| [0 | 0] |
| [1 | 1] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 1] |
| [1 | 1] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [1 | 1] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
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| [1 | 1] |
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| [1 | 1] |
| [0 | 0] |
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| [1 | 0] |
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| [1 | 1] |
| [0 | 0] |
| [0 | 0] |
| [1 | 1] |
| [0 | 0] |
| [0 | 1] |
| [0 | 0] |
| [1 | 1] |

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| [0 | 0] |
| [0 | 0] |
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| [1 | 1] |
| [0 | 0] |
| [0 | 0] |
| [1 | 1] |
| [0 | 0] |
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| [1 | 1] |
| [1 | 1] |
| [1 | 1] |
| [1 | 0] |
| [0 | 0] |
| [0 | 0] |
| [1 | 1] |
| [0 | 1] |
| [0 | 0] |
| [1 | 1] |
| [1 | 1] |
| [0 | 0] |
| [0 | 0] |
| [1 | 1] |
| [0 | 0] |
| [0 | 0] |
| [0 | 0] |
| [0 | 1] |
| [0 | 0] |
| [1 | 1] |
| [1 | 1] |
| [1 | 1]] |

[33]:

[[64 4]

[ 5 27]]

[33]: 0.91

[34]:

# Decision Tree Regressor

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| [34]: |  | Age | | EstimatedSalary | Purchased | |
|  | 0 | 19 | | 19000 | 0 | |
|  | 1 | 35 | | 20000 | 0 | |
|  | 2 | 26 | | 43000 | 0 | |
|  | 3 | 27 | | 57000 | 0 | |
|  | 4 | 19 | | 76000 | 0 | |
| .. … | | |  | … | … |  |
| 395 | | | 46 | 41000 |  | 1 |
| 396 | | | 51 | 23000 |  | 1 |
| 397 | | | 50 | 20000 |  | 1 |
| 398 | | | 36 | 33000 |  | 0 |
| 399 | | | 49 | 36000 |  | 1 |

[400 rows x 3 columns]

[35]:

[36]:

[36]: DecisionTreeRegressor(random\_state=0)

[40]:

[40]: array([0.])

# Decision Tree Classifier

[47]:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| [47]: |  | company | job | degree | salary\_more\_then\_100k |
|  | 0 | google | sales executive | bachelors | 0 |
|  | 1 | google | sales executive | masters | 0 |
|  | 2 | google | business manager | bachelors | 1 |
|  | 3 | google | business manager | masters | 1 |
|  | 4 | google | computer programmer | bachelors | 0 |
|  | 5 | google | computer programmer | masters | 1 |

|  |  |  |  |
| --- | --- | --- | --- |
| 6 abc pharma | sales executive | masters | 0 |
| 7 abc pharma | computer programmer | bachelors | 0 |
| 8 abc pharma | business manager | bachelors | 0 |
| 9 abc pharma | business manager | masters | 1 |
| 10 facebook | sales executive | bachelors | 1 |
| 11 facebook | sales executive | masters | 1 |
| 12 facebook | business manager | bachelors | 1 |
| 13 facebook | business manager | masters | 1 |
| 14 facebook | computer programmer | bachelors | 1 |
| 15 facebook | computer programmer | masters | 1 |

[48]:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| [48]: |  | company | job | degree |
|  | 0 | google | sales executive | bachelors |
|  | 1 | google | sales executive | masters |
|  | 2 | google | business manager | bachelors |
|  | 3 | google | business manager | masters |
|  | 4 | google | computer programmer | bachelors |
|  | 5 | google | computer programmer | masters |
|  | 6 | abc pharma | sales executive | masters |
|  | 7 | abc pharma | computer programmer | bachelors |
|  | 8 | abc pharma | business manager | bachelors |
|  | 9 | abc pharma | business manager | masters |
|  | 10 | facebook | sales executive | bachelors |
|  | 11 | facebook | sales executive | masters |
|  | 12 | facebook | business manager | bachelors |
|  | 13 | facebook | business manager | masters |
|  | 14 | facebook | computer programmer | bachelors |
|  | 15 | facebook | computer programmer | masters |

[52]:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| [52]: | array([2, 2, 2, 2, 2, 2, 0, 0, 0, 0, | 1, | 1, | 1, | 1, | 1, | 1]) |
| [53]: | enc1=LabelEncoder() enc1.fit\_transform(data["job"]) |  |  |  |  |  |  |
| [53]: | array([2, 2, 0, 0, 1, 1, 2, 1, 0, 0, | 2, | 2, | 0, | 0, | 1, | 1]) |
| [54]: | enc2=LabelEncoder() enc2.fit\_transform(data["degree"]) |  |  |  |  |  |  |
| [54]: | array([0, 1, 0, 1, 0, 1, 1, 0, 0, 1, | 0, | 1, | 0, | 1, | 0, | 1]) |

[55]:

[56]:

[57]:

[58]:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [58]: |  |  | company | job | degree | companylabel | joblabel | \ |
|  | 0 |  | google | sales executive | bachelors | 2 | 2 |  |
|  | 1 |  | google | sales executive | masters | 2 | 2 |  |
|  | 2 |  | google | business manager | bachelors | 2 | 0 |  |
|  | 3 |  | google | business manager | masters | 2 | 0 |  |
|  | 4 |  | google | computer programmer | bachelors | 2 | 1 |  |
|  | 5 |  | google | computer programmer | masters | 2 | 1 |  |
|  | 6 | abc | pharma | sales executive | masters | 0 | 2 |  |
|  | 7 | abc | pharma | computer programmer | bachelors | 0 | 1 |  |
|  | 8 | abc | pharma | business manager | bachelors | 0 | 0 |  |
|  | 9 | abc | pharma | business manager | masters | 0 | 0 |  |
| 10 facebook | | | | sales executive | bachelors | 1 | 2 | |
| 11 facebook | | | | sales executive | masters | 1 | 2 | |
| 12 facebook | | | | business manager | bachelors | 1 | 0 | |
| 13 facebook | | | | business manager | masters | 1 | 0 | |
| 14 facebook | | | | computer programmer | bachelors | 1 | 1 | |
| 15 facebook | | | | computer programmer | masters | 1 | 1 | |
| degreelabel | | | |  |  |  |  | |

[59]:

[60]:

0 0

1 1

2 0

3 1

4 0

5 1

6 1

7 0

8 0

9 1

10 0

11 1

12 0

13 1

14 0

15 1

[61]:

[61]: DecisionTreeClassifier(random\_state=0)

[68]:

[68]: array([0], dtype=int64)