**CLL788 Assignment 2**

1. Perceptron

Best Weights**: array ([-5.64162927, 0.17295387, -0.02708792])**

Accuracy on training set: **71.01449275362319 %**

Cost Function with respect to iterations

Chart, histogram

Description automatically generated

Confusion Matrix

Chart

Description automatically generated

Decision Boundary

Chart, scatter chart

Description automatically generated

1. A) Multilayer Perceptron

Number of nodes in hidden layer=4

First Activation Function= Tanh

Weights**: {'W1': array ([[ 0.60687878, 0.03926949],**

**[ 0.6074358, 0.29322187],**

**[-0.40415882, -0.1332965],**

**[ 0.08265366, 0.03226165]]),**

**'b1': array ([[ 0.03128171],**

**[ 0.03362951],**

**[-0.01203264],**

**[-0.0031746]]),**

**'W2': array ([[ 0.64799433, 0.73281886, -0.44971269, 0.06277056]]),**

**'b2': array ([[0.03542853]])}**

Accuracy on training set: **82.6086956521739 %**

Cost Function with respect to iterations

Chart, line chart

Description automatically generated

Confusion Matrix

Chart

Description automatically generated

Decision Boundary

Chart, scatter chart

Description automatically generated

1. Multilayer Perceptron (Sklearn)

Number of nodes in hidden layer=4

First Activation Function= Tanh

Weights**: [array ([[-0.51549643, 1.06786246, -1.79547785, 0.26240305],**

**[-2.0240189, -0.18390299, -0.24005669, -0.48743185]]),**

**array ([[-1.40216207],**

**[ 1.90156296],**

**[-1.66920773],**

**[ 0.62396727]]),**

**array ([[1.14842685]])]**

Accuracy on training set: **82.85714285714286%**

Confusion Matrix

Chart, treemap chart

Description automatically generated

Decision Boundary

Chart, scatter chart

Description automatically generated

1. Logistic Regression

Weights**: [0.05476197 1.65037874 0.31334123]**

Accuracy on training set: **82.6086956521739 %**

Cost Function with respect to iterations

Chart

Description automatically generated

Confusion Matrix

Chart

Description automatically generated

Decision Boundary

Chart, scatter chart

Description automatically generated

1. Accuracy Comparison:

MLP Classifier(sklearn)> MLP>=Logistic Regression>Perceptron

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model** | True Negative | False Positive | False Negative | True Positive |
| **Perceptron** | 13 | 21 | 0 | 36 |
| **MLP** | 26 | 8 | 5 | 31 |
| **MLP (sklearn)** | 25 | 9 | 3 | 33 |
| **Logistic** | 26 | 8 | 5 | 31 |