TRIBHUVAN UNIVERSITY

Sagarmatha College of Science & Technology

Lab-Report On: Neural Network

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Qeustion 01

Write the Python program to predict the diabetes using MLP. Use the given dataset.

Source Code

```
# import necessary libraries/modules
import numpy as np
import pandas as pd
from sklearn.preprocessing import StandardScaler
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
from sklearn import metrics

# import dataset
diabetes = pd.read_csv("Diabetes.csv")

# split dataset into input and target
inputs = diabetes.iloc[0:, 0:8]
target = diabetes.iloc[0:, 8:9]

# construct the NN model
model = Sequential()
model.add(Dense(32, input_dim = 8, activation = 'relu')) # first hidden layer
model.add(Dense(16, activation = 'relu')) # second hidden layer
model.add(Dense(8, activation = 'relu')) # third hidden layer
model.add(Dense(1, activation = 'sigmoid')) # output layer
model.compile(loss = 'binary_crossentropy', optimizer = 'adam', metrics = ['accuracy'])
```

```
# train the model
model.fit(inputs, target, epochs = 1000, batch_size = 10, verbose = 0)

# make the prediction with the trained model
predictions = model.predict(inputs)
pred_round = []
for e in predictions:
    pred_round.append(np.round(e))

# display actual and predicted value
print("Actual output: ", *np.array(target))
print("\nRounded predicted output: ", *pred_round)

# accuracy, recall, precision and f1-score
print(f"Accuracy: {metrics.accuracy_score(target, pred_round)}")
print(f"Recall: {metrics.recall_score(target, pred_round)}")
print(f"Precision: {metrics.precision_score(target, pred_round)}")
print(f"F1-score: {metrics.f1_score(target, pred_round)}")
```

<u>Output</u>

```
Actual output:  [0] [1] [0] [1] [0] [1] [0] [1] [1] [0] [1] [0] [1] [1] [1] [1] [1] [0] [1] [0] [0] [1] [1] [1] [1]
[1] [0] [0] [0] [0] [1] [0] [0] [0] [0] [0] [1] [1] [1] [0] [0] [0] [1] [0] [1] [0] [0] [1] [0] [0] [0] [0] [1] [0] [0]
[1] [0] [0] [0] [0] [1] [0] [0] [1] [0] [1] [0] [0] [0] [1] [0] [1] [0] [0] [0] [0] [0] [1] [0] [0] [0] [0] [0] [1] [0]
[0] [0] [1] [0] [0] [0] [0] [1] [0] [0] [0] [0] [0] [1] [1] [0] [0] [0] [0] [0] [0] [0] [0] [1] [1] [1] ···············


Rounded predicted output:  [0.] [1.] [0.] [1.] [0.] [1.] [0.] [1.] [1.] [0.] [1.] [0.] [1.] [1.] [1.] [1.] [1.] [0.]
[1.] [0.] [0.] [1.] [0.] [1.] [1.] [1.] [0.] [0.] [0.] [0.] [1.] [0.] [0.] [0.] [0.] [1.] [1.] [1.] [1.] [0.] [1.] [0.] [1.] [0.]
[1.] [0.] [0.] [1.] [0.] [0.] [0.] [0.] [1.] [0.] [0.] [1.] [0.] [0.] [0.] [0.] [1.] [0.] [0.] [0.] [0.] [1.] [0.] [0.] [0.] [0.]
[0.] [1.] [0.] [0.] [0.] [0.] [0.] [1.] [0.] [0.] [0.] [0.] [0.] [0.] [0.] ·································
```

```
Accuracy: 0.9269882659713168
Recall: 0.8202247191011236
Precision: 0.9647577092511013
F1-score: 0.8866396761133603
```

Question 02

Write the Python program to predict housing price using MLP. Use the given dataset.

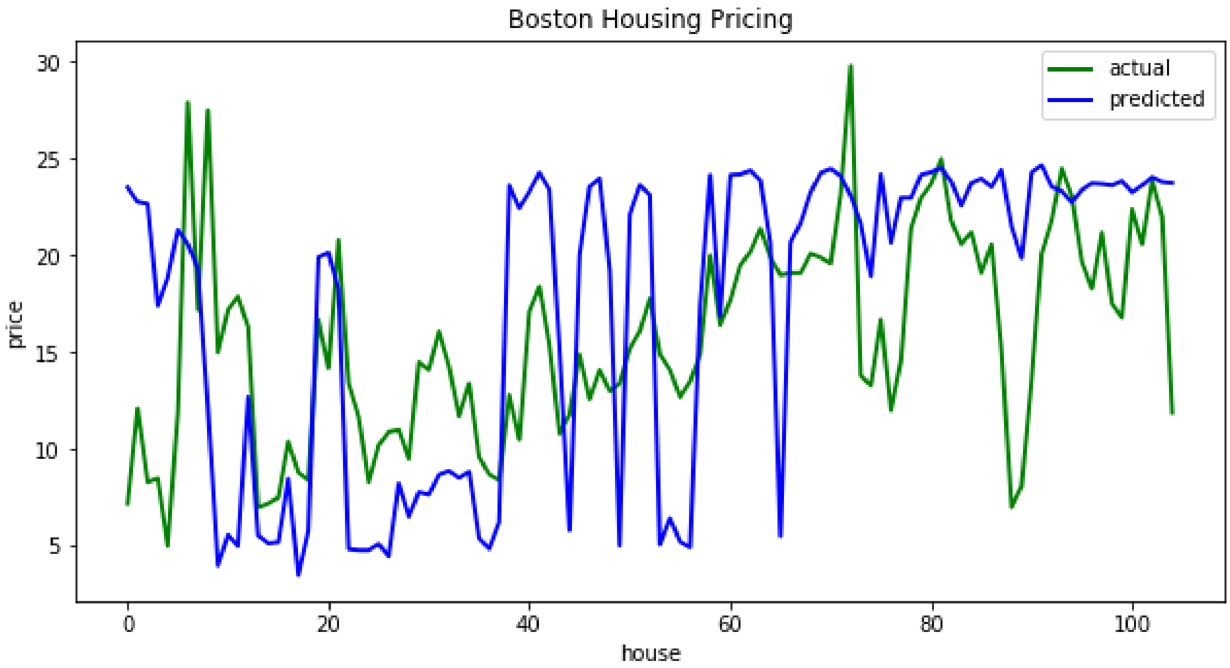
Source Code

```
# import necessary libraries/modules
import numpy as np
import pandas as pd
from sklearn.preprocessing import StandardScaler
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
from sklearn import metrics

# import dataset
bostonHouse = pd.read_csv("Housing.csv", delim_whitespace=True)

# split dataset into input and target
inputs = bostonHouse.iloc[:, 0:13]
target = bostonHouse.iloc[:, 13:14]

# training dataset
x_train = inputs.iloc[0:400]
y_train = target.iloc[0:400]

# testing dataset
x_test = inputs.iloc[400:]
y_test = target.iloc[400:]
```

```
# construct the NN model
model = Sequential()
model.add(Dense(13, input_dim = 13, kernel_initializer = 'normal', activation = 'relu'))
model.add(Dense(6, kernel_initializer = 'normal', activation = 'relu'))
model.add(Dense(1, kernel_initializer = 'normal'))
model.compile(loss = 'mean_squared_error', optimizer = 'adam',
          metrics = ['mean_absolute_percentage_error'])

# train the model
model.fit(x_train, y_train, epochs = 30, batch_size = 32, verbose = 0)

# predict using trained model
predictions = model.predict(x_test)
y_test = np.array(y_test)
print(f"MSE: {metrics.mean_squared_error(y_test, predictions)}")

# visualization of actual value and predicted value
y_test = np.array(y_test)
plt.figure(figsize = (10, 5))
plt.plot(y_test, color = "green", linewidth = 2.0)
plt.plot(predictions, color = "blue", linewidth = 2.0)
plt.title("Boston Housing Pricing")
plt.xlabel("house")
plt.ylabel("price")
plt.legend(["actual", "predicted"], loc = "upper left")
plt.show()
```

Ouptut

MSE: 48.30543111407888



Conclusion

Hence, we are able to implement MLP (Multi-Layer Perceptron) for prediction.