Name: Akash Adarkar
Roll no.: 68
DL Experiment 2

Implementing XOR in Deep learning using python

Code:

```
import numpy as np
from keras.models import
Sequentialfrom keras.layers
import Dense
# XOR input data
X = np.array([[0, 0], [0, 1], [1, 0], [1, 1]])
# Corresponding XOR
output dataY =
np.array([[0], [1], [1], [0]])
# Create a sequential
modelmodel =
Sequential()
# Add a hidden layer with 8 neurons and 'relu' activation
functionmodel.add(Dense(8, input_dim=2,
activation='relu'))
# Add the output layer with 1 neuron and 'sigmoid' activation
functionmodel.add(Dense(1, activation='sigmoid'))
# Compile the model using binary cross-entropy loss and Adam optimizer
model.compile(loss='binary_crossentropy', optimizer='adam',
metrics=['accuracy'])# Train the model for 1000 epochs
model.fit(X, Y, epochs=1000,
verbose=0)# Evaluate the model
loss, accuracy = model.evaluate(X, Y)
print(f"Loss: {loss:.4f}, Accuracy:
{accuracy:.4f}")# Make predictions
predictions = model.predict(X)
rounded_predictions =
np.round(predictions)
print("Predictions:")
print(rounded_predictions)
```

Output:

Arpit Sutariya 59 CSE(DS)

```
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from keras.models import Sequential
from keras.layers import Dense
# XOR input data
X = np.array([[0, 0], [0, 1], [1, 0], [1, 1]])
# Corresponding XOR output data
Y = np.array([[0], [1], [1], [0]])
# Create a sequential model
model = Sequential()
# Add a hidden layer with 8 neurons and 'relu' activation function
model.add(Dense(8, input_dim=2, activation='relu'))
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model.compile(loss='binary_crossentropy', optimizer='adam',
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# Train the model for 1000 epochs
model.fit(X, Y, epochs=1000, verbose=0)
# Evaluate the model
loss, accuracy = model.evaluate(X, Y)
print(f"Loss: {loss:.4f}, Accuracy: {accuracy:.4f}")
# Make predictions
predictions = model.predict(X)
rounded_predictions = np.round(predictions)
print("Predictions:")
print(rounded_predictions)
```

```
1/1 [==============================] - 0s 156ms/step - loss: 0.2859 -
accuracy: 1.0000
Loss: 0.2859, Accuracy: 1.0000
1/1 [==============================] - 0s 63ms/step
Predictions:
[[0.]
 [1.]
 [1.]
 [0.]]
```