

Experiment No. 01

Aim: Implement Multilayer Perceptron algorithm to simulate XOR gate.

Code:

```
import numpy as np
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'))

# Add the output layer with 1 neuron and 'sigmoid' activation function
model.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:

```
1/1 [=====] - 0s 185ms/step - loss: 0.1964 - accuracy: 1.0000  
Loss: 0.1964, Accuracy: 1.0000  
1/1 [=====] - 0s 89ms/step  
Predictions:  
[[0.]  
 [1.]  
 [1.]  
 [0.]]
```

Conclusion: