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```
import numpy as np
import matplotlib.pyplot as plt
from tensorflow import keras
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
```

```
# Prepare the dataset for OR gate
X_or = np.array([[0, 0],
 [0, 1],
 [1, 0],
 [1, 1]])
y_or = np.array([[0], [1], [1], [1]]) # OR gate outputs
```

```
# Prepare the dataset for NOR gate
X_nor = np.array([[0, 0],
 [0, 1],
 [1, 0],
 [1, 1]])
y_nor = np.array([[1], [0], [0], [0]]) # NOR gate outputs
```

```
# Function to create and train the model
def create_and_train_model(X, y):
 # Create the model
 model = Sequential()
 model.add(Dense(2, input_dim=2, activation='sigmoid')) # Hidden layer
 model.add(Dense(1, activation='sigmoid')) # Output layer
 # Compile the model
 model.compile(loss='binary_crossentropy', optimizer='adam', metrics=['accuracy'])
 # Train the model
 model.fit(X, y, epochs=5000, verbose=0)
 return model
```

```
# Train the OR gate model
or_model = create_and_train_model(X_or, y_or)
print("OR Gate Predictions:")
print(or_model.predict(X_or))
```

```
OR Gate Predictions:
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 90ms/step
[[0.08651506]
 [0.97627443]
 [0.9832183 ]
 [0.9959091 ]]
```

```
# Train the NOR gate model
nor_model = create_and_train_model(X_nor, y_nor)
print("\nNOR Gate Predictions:")
print(nor_model.predict(X_nor))
```

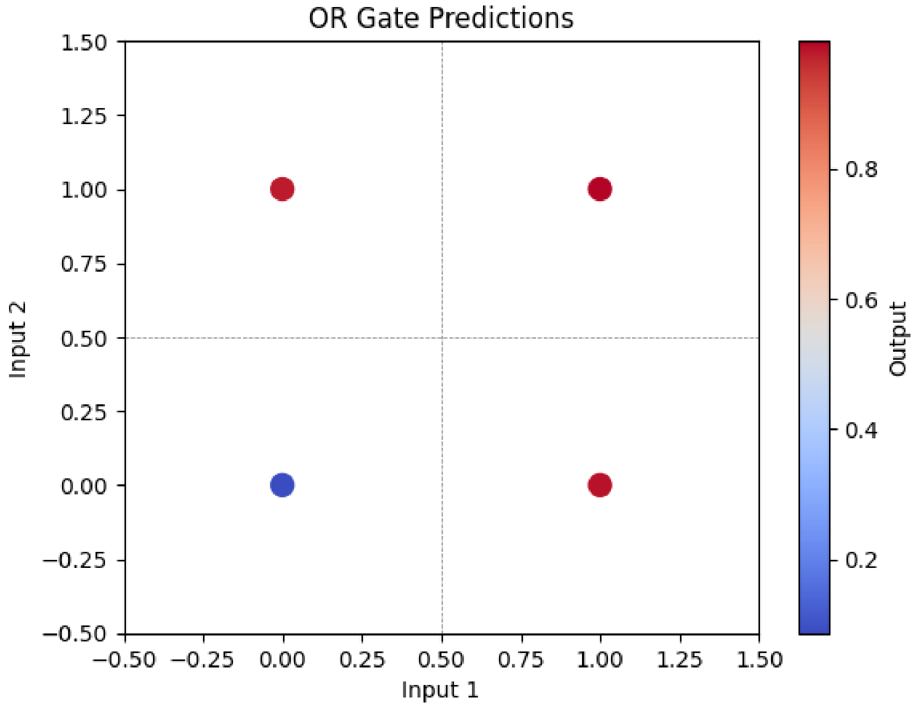
```

NOR Gate Predictions:
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 84ms/step
[[0.94726205]
 [0.02283663]
 [0.02140574]
 [0.00912826]]
```

```
# Visualize predictions
def plot_predictions(model, X, title):
 predictions = model.predict(X)
 plt.figure()
```

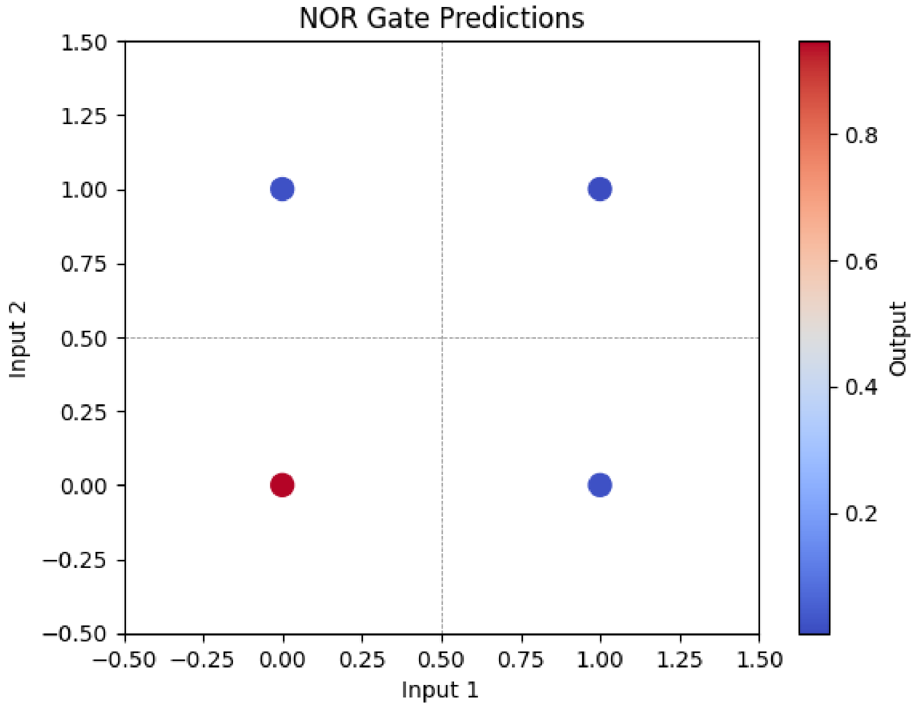
```
    plt.scatter(X[:, 0], X[:, 1], c=predictions.flatten(), cmap='coolwarm', s=100)
    plt.title(title)
    plt.xlabel('Input 1')
    plt.ylabel('Input 2')
    plt.colorbar(label='Output')
    plt.xlim(-0.5, 1.5)
    plt.ylim(-0.5, 1.5)
    plt.axhline(0.5, color='grey', lw=0.5, ls='--')
    plt.axvline(0.5, color='grey', lw=0.5, ls='--')
    plt.show()
```

```
# Plotting the predictions for both gates
plot_predictions(or_model, X_or, "OR Gate Predictions")
plot_predictions(nor_model, X_nor, "NOR Gate Predictions")
```

```
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 34ms/step
```



```
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 34ms/step
```


NOR Gate Predictions
Input 2
Input 1
Output