EX NO : 11 PROJECT Convolutional Neural Network Using (MNIST Dataset)

Program:

```
Import tensorflow as tf

from tensorflow.keras.datasets import mnist

from tensorflow.keras.models import Sequential

from tensorflow.keras.layers import Conv2D, MaxPooling2D, Flatten, Dense

from tensorflow.keras.utils import to_categorical

# Load and preprocess data

(x_train, y_train), (x_test, y_test) = mnist.load_data()

# Reshape to (samples, height, width, channels)

x_train = x_train.reshape(-1, 28, 28, 1).astype("float32") / 255.0

x_test = x_test.reshape(-1, 28, 28, 1).astype("float32") / 255.0

# One-hot encode labels

y_train = to_categorical(y_train, 10)

y_test = to_categorical(y_test, 10)

# Build CNN model
```

```
model = Sequential([
        Conv2D(32, kernel_size=(3, 3), activation='relu', input_shape=(28, 28, 1)),
  MaxPooling2D(pool_size=(2, 2)),
  Flatten(),
  Dense(128, activation='relu'),
  Dense(10, activation='softmax')
])
# Compile model
model.compile(optimizer='adam',
          loss='categorical_crossentropy',
          metrics=['accuracy'])
# Train model
model.fit(x_train, y_train,
        epochs=5,
        batch_size=128,
        validation_split=0.1)
# Evaluate model
test_loss, test_acc = model.evaluate(x_test, y_test)
print(f"Test Accuracy: {test_acc:.4f}")
```