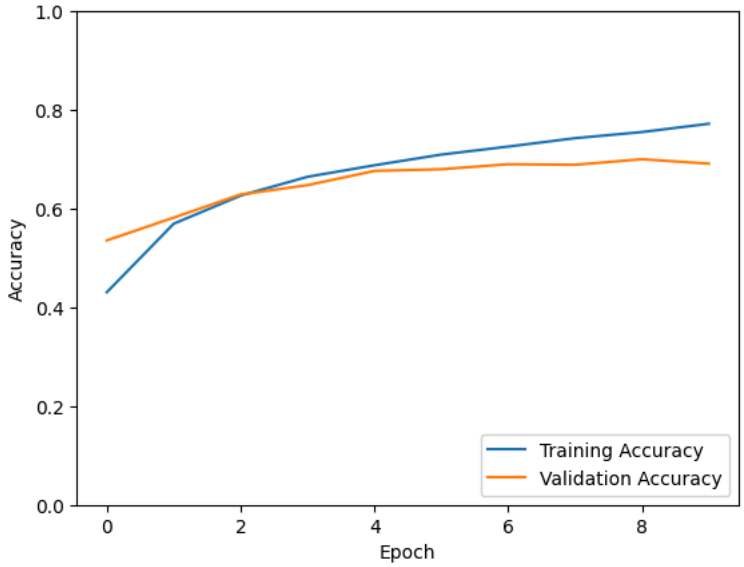
```
 import tensorflow as tf
from tensorflow.keras import datasets, layers, models
import matplotlib.pyplot as plt
import numpy as np

# Load and preprocess the CIFAR-10 dataset
(train_images, train_labels), (test_images, test_labels) = datasets.cifar10.load_data()

# Normalize the images to a range of 0 to 1
train_images, test_images = train_images / 255.0, test_images / 255.0

# Define the class names in CIFAR-10
class_names = ['airplane', 'car', 'bird', 'cat', 'deer', 'dog', 'frog', 'horse', 'ship', 'truck']

# Build the CNN model
model = models.Sequential([
    layers.Conv2D(32, (3, 3), activation='relu', input_shape=(32, 32, 3)),
    layers.MaxPooling2D((2, 2)),
    layers.Conv2D(64, (3, 3), activation='relu'),
    layers.MaxPooling2D((2, 2)),
    layers.Conv2D(64, (3, 3), activation='relu'),
    layers.Flatten(),
    layers.Dense(64, activation='relu'),
    layers.Dense(10)
])

# Compile the model
model.compile(optimizer='adam',
              loss=tf.keras.losses.SparseCategoricalCrossentropy(from_logits=True),
              metrics=['accuracy'])

# Train the model
history = model.fit(train_images, train_labels, epochs=10,
                    validation_data=(test_images, test_labels))

# Evaluate the model
test_loss, test_acc = model.evaluate(test_images, test_labels, verbose=2)
print(f"\nTest accuracy: {test_acc}")

# Plot training history
plt.plot(history.history['accuracy'], label='Training Accuracy')
plt.plot(history.history['val_accuracy'], label='Validation Accuracy')
plt.xlabel('Epoch')
plt.ylabel('Accuracy')
plt.ylim([0, 1])
plt.legend(loc='lower right')
plt.show()

# Make predictions on test images
predictions = model.predict(test_images)

# Function to plot images and predictions
def plot_image(i, predictions_array, true_label, img):
    predictions_array, true_label, img = predictions_array[i], true_label[i], img[i]
    plt.grid(False)
    plt.xticks([])
    plt.yticks([])

    plt.imshow(img, cmap=plt.cm.binary)

    predicted_label = np.argmax(predictions_array)
    if predicted_label == true_label:
        color = 'blue'
    else:
        color = 'red'

    plt.xlabel(f"{class_names[predicted_label]} {100 * np.max(predictions_array):2.0f}% ({class_names[true_label[0]]})", color=color)

def plot_value_array(i, predictions_array, true_label):
    predictions_array, true_label = predictions_array[i], true_label[i]
    plt.grid(False)
    plt.xticks(range(10))
    plt.yticks([])
    thisplot = plt.bar(range(10), predictions_array, color="#777777")
    plt.ylim([0, 1])
    predicted_label = np.argmax(predictions_array)

    thisplot[predicted_label].set_color('red')
    thisplot[true_label[0]].set_color('blue')

# Display prediction for the first image
```

```
i = 0
plt.figure(figsize=(6,3))
plt.subplot(1,2,1)
plot_image(i, predictions, test_labels, test_images)
plt.subplot(1,2,2)
plot_value_array(i, predictions, test_labels)
plt.show()
```

```
Epoch 1/10
1563/1563 ━━━━━━━━━━━━━━━━━━━━ 72s 45ms/step - accuracy: 0.3294 - loss: 1.7995 - val_accuracy: 0.5357 - val_loss: 1.2763
Epoch 2/10
1563/1563 ━━━━━━━━━━━━━━━━━━━━ 82s 45ms/step - accuracy: 0.5549 - loss: 1.2399 - val_accuracy: 0.5819 - val_loss: 1.1650
Epoch 3/10
1563/1563 ━━━━━━━━━━━━━━━━━━━━ 81s 44ms/step - accuracy: 0.6190 - loss: 1.0737 - val_accuracy: 0.6288 - val_loss: 1.0511
Epoch 4/10
1563/1563 ━━━━━━━━━━━━━━━━━━━━ 70s 45ms/step - accuracy: 0.6624 - loss: 0.9623 - val_accuracy: 0.6476 - val_loss: 1.0047
Epoch 5/10
1563/1563 ━━━━━━━━━━━━━━━━━━━━ 80s 43ms/step - accuracy: 0.6872 - loss: 0.8871 - val_accuracy: 0.6764 - val_loss: 0.9245
Epoch 6/10
1563/1563 ━━━━━━━━━━━━━━━━━━━━ 84s 45ms/step - accuracy: 0.7118 - loss: 0.8232 - val_accuracy: 0.6799 - val_loss: 0.9345
Epoch 7/10
1563/1563 ━━━━━━━━━━━━━━━━━━━━ 80s 44ms/step - accuracy: 0.7284 - loss: 0.7753 - val_accuracy: 0.6900 - val_loss: 0.9038
Epoch 8/10
1563/1563 ━━━━━━━━━━━━━━━━━━━━ 69s 44ms/step - accuracy: 0.7448 - loss: 0.7240 - val_accuracy: 0.6889 - val_loss: 0.9199
Epoch 9/10
1563/1563 ━━━━━━━━━━━━━━━━━━━━ 83s 45ms/step - accuracy: 0.7611 - loss: 0.6860 - val_accuracy: 0.7001 - val_loss: 0.8789
Epoch 10/10
1563/1563 ━━━━━━━━━━━━━━━━━━━━ 71s 45ms/step - accuracy: 0.7766 - loss: 0.6426 - val_accuracy: 0.6912 - val_loss: 0.9150
313/313 - 3s - 10ms/step - accuracy: 0.6912 - loss: 0.9150

Test accuracy: 0.6912000179290771
```




```
313/313 ━━━━━━━━━━━━━━━━━━━━ 4s 12ms/step
```