What This Code Teaches You: CIFAR-10 Image Classification with CNN

1. Dataset Handling

- The code loads the CIFAR-10 dataset, which includes 60,000 32x32 color images in 10 classes.
- It normalizes pixel values (0-255) to the range [0, 1] to help the neural network learn effectively.

2. Class Names

- The class labels ('airplane', 'automobile', etc.) help interpret predictions and visualize results meaningfully.

3. CNN Model Architecture (Convolutional Neural Network)

- The CNN consists of 3 convolutional layers (with ReLU activations and max pooling) followed by dense layers.
- It captures spatial patterns in the images, such as edges and shapes, making it well-suited for image classification.

4. Model Compilation & Training

- The model uses the Adam optimizer and sparse categorical crossentropy loss for multi-class classification.
- It trains for 10 epochs with validation on the test dataset to monitor performance.

5. Prediction & Evaluation

- The model makes predictions on test images, returning class probabilities.
- Predicted labels are compared with true labels to evaluate performance.

6. Visualization of Predictions

- The first 10 test images are shown with predicted and true labels.

- Correct predictions are shown in green; incorrect ones in red.

- This visualization helps you qualitatively assess model behavior and see which classes are confused.

Overall Learning Outcome:

You learn how to load and preprocess image data, build and train a CNN, evaluate its accuracy, and visualize the results.

This is foundational knowledge in computer vision and deep learning using TensorFlow and Keras.