import tensorflow as tf

from tensorflow.keras.models import Sequential #type:ignore

from tensorflow.keras.layers import Conv2D, MaxPooling2D, Flatten, Dense, Dropout #type:ignore

from tensorflow.keras.datasets import cifar10 #type:ignore

from tensorflow.keras.utils import to\_categorical #type:ignore

# Load and preprocess the CIFAR-10 dataset

(x\_train, y\_train), (x\_test, y\_test) = cifar10.load\_data()

x\_train = x\_train.astype('float32') / 255.0

x\_test = x\_test.astype('float32') / 255.0

# One-hot encode the labels

y\_train = to\_categorical(y\_train, 10)

y\_test = to\_categorical(y\_test, 10)

# Build the CNN model

model = Sequential([

Conv2D(32, (3, 3), activation='relu', input\_shape=(32, 32, 3)), # Convolutional layer

MaxPooling2D((2, 2)), # Max pooling layer

Conv2D(64, (3, 3), activation='relu'),

MaxPooling2D((2, 2)),

Conv2D(128, (3, 3), activation='relu'),

Flatten(), # Flatten feature maps to a vector

Dense(256, activation='relu'), # Fully connected layer

Dropout(0.5), # Dropout for regularization

Dense(10, activation='softmax') # Output layer for 10 classes (CIFAR-10 categories)

])

# Compile the model

model.compile(optimizer='adam',

loss='categorical\_crossentropy',

metrics=['accuracy'])

# Train the model

history = model.fit(

x\_train, y\_train,

epochs=5,

batch\_size=64,

validation\_split=0.2,

verbose=1

)

# Evaluate the model on the test data

test\_loss, test\_accuracy = model.evaluate(x\_test, y\_test, verbose=0)

print(f"Test Accuracy: {test\_accuracy \* 100:.2f}%")

#OUTPUT

To enable the following instructions: AVX2 FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.

Epoch 1/5

625/625 ━━━━━━━━━━━━━━━━━━━━ 17s 24ms/step - accuracy: 0.2958 - loss: 1.8718 - val\_accuracy: 0.4793 - val\_loss: 1.4097

Epoch 2/5

625/625 ━━━━━━━━━━━━━━━━━━━━ 15s 23ms/step - accuracy: 0.5207 - loss: 1.3346 - val\_accuracy: 0.5972 - val\_loss: 1.1519

Epoch 3/5

625/625 ━━━━━━━━━━━━━━━━━━━━ 15s 24ms/step - accuracy: 0.5965 - loss: 1.1417 - val\_accuracy: 0.6344 - val\_loss: 1.0330

Epoch 4/5

625/625 ━━━━━━━━━━━━━━━━━━━━ 15s 24ms/step - accuracy: 0.6390 - loss: 1.0247 - val\_accuracy: 0.6609 - val\_loss: 0.9658

Epoch 5/5

625/625 ━━━━━━━━━━━━━━━━━━━━ 16s 25ms/step - accuracy: 0.6766 - loss: 0.9269 - val\_accuracy: 0.6819 - val\_loss: 0.9102

Test Accuracy: 67.93%