```python
import numpy as np
import matplotlib.pyplot as plt
from tensorflow.keras.layers import Input, Dense
from tensorflow.keras.models import Model
from tensorflow.keras.datasets import cifar10  # Changed dataset

# Load the CIFAR-10 dataset
(x_train, _), (x_test, _) = cifar10.load_data()

# Normalize pixel values to be between 0 and 1
x_train = x_train.astype('float32') / 255.0
x_test = x_test.astype('float32') / 255.0

# Flatten the images for the autoencoder
x_train = x_train.reshape((len(x_train), np.prod(x_train.shape[1:])))
x_test = x_test.reshape((len(x_test), np.prod(x_test.shape[1:])))

# Define the autoencoder model
encoding_dim = 128  # Changed encoding dimension
input_img = Input(shape=(3072,))  # Changed input shape
encoded = Dense(encoding_dim, activation='relu')(input_img)
decoded = Dense(3072, activation='sigmoid')(encoded)  # Output shape
matches input shape

autoencoder = Model(input_img, decoded)

# Compile the autoencoder
autoencoder.compile(optimizer='adam', loss='binary_crossentropy')

# Train the autoencoder
autoencoder.fit(x_train, x_train, epochs=50, batch_size=256,
shuffle=True, validation_data=(x_test, x_test))

# Create a separate encoder model
encoder = Model(input_img, encoded)

# Encode the test images
encoded_imgs = encoder.predict(x_test)

# Decode the encoded images
decoded_imgs = autoencoder.predict(x_test)

# Display original and reconstructed images
n = 10  # Number of images to display
plt.figure(figsize=(20, 4))
for i in range(n):
    # Original images
    ax = plt.subplot(2, n, i + 1)
    plt.imshow(x_test[i].reshape(32, 32, 3))  # Reshape for CIFAR-10
    plt.gray()
    ax.get_xaxis().set_visible(False)
    ax.get_yaxis().set_visible(False)

    # Reconstructed images
    ax = plt.subplot(2, n, i + 1 + n)
    plt.imshow(decoded_imgs[i].reshape(32, 32, 3))  # Reshape for
CIFAR-10
    plt.gray()
    ax.get_xaxis().set_visible(False)
    ax.get_yaxis().set_visible(False)

plt.show()
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Downloading data from https://www.cs.toronto.edu/~kriz/cifar-10-
python.tar.gz
170498071/170498071 [==============================] - 2s 0us/step
Epoch 1/50
196/196 [==============================] - 15s 65ms/step - loss:
0.6380 - val_loss: 0.6165
Epoch 2/50
196/196 [==============================] - 12s 59ms/step - loss:
0.6095 - val_loss: 0.6043
Epoch 3/50
196/196 [==============================] - 12s 61ms/step - loss:
0.6009 - val_loss: 0.6028
Epoch 4/50
196/196 [==============================] - 12s 61ms/step - loss:
0.5950 - val_loss: 0.5932
Epoch 5/50
196/196 [==============================] - 12s 61ms/step - loss:
0.5908 - val_loss: 0.5906
Epoch 6/50
196/196 [==============================] - 12s 59ms/step - loss:
0.5882 - val_loss: 0.5871
Epoch 7/50
196/196 [==============================] - 12s 61ms/step - loss:
0.5861 - val_loss: 0.5854
Epoch 8/50
196/196 [==============================] - 11s 58ms/step - loss:
0.5845 - val_loss: 0.5846
Epoch 9/50
196/196 [==============================] - 13s 66ms/step - loss:
0.5840 - val_loss: 0.5839
Epoch 10/50
196/196 [==============================] - 12s 60ms/step - loss:
0.5833 - val_loss: 0.5834
Epoch 11/50
196/196 [==============================] - 11s 56ms/step - loss:
0.5828 - val_loss: 0.5835
Epoch 12/50
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196/196 [==============================] - 11s 54ms/step - loss:
0.5827 - val_loss: 0.5830
Epoch 13/50
196/196 [==============================] - 12s 59ms/step - loss:
0.5821 - val_loss: 0.5825
Epoch 14/50
196/196 [==============================] - 12s 62ms/step - loss:
0.5822 - val_loss: 0.5834
Epoch 15/50
196/196 [==============================] - 12s 59ms/step - loss:
0.5820 - val_loss: 0.5824
Epoch 16/50
196/196 [==============================] - 11s 58ms/step - loss:
0.5820 - val_loss: 0.5844
Epoch 17/50
196/196 [==============================] - 12s 59ms/step - loss:
0.5816 - val_loss: 0.5821
Epoch 18/50
196/196 [==============================] - 12s 62ms/step - loss:
0.5817 - val_loss: 0.5825
Epoch 19/50
196/196 [==============================] - 12s 61ms/step - loss:
0.5816 - val_loss: 0.5829
Epoch 20/50
196/196 [==============================] - 12s 59ms/step - loss:
0.5815 - val_loss: 0.5822
Epoch 21/50
196/196 [==============================] - 11s 57ms/step - loss:
0.5814 - val_loss: 0.5822
Epoch 22/50
196/196 [==============================] - 11s 56ms/step - loss:
0.5813 - val_loss: 0.5819
Epoch 23/50
196/196 [==============================] - 11s 58ms/step - loss:
0.5818 - val_loss: 0.5827
Epoch 24/50
196/196 [==============================] - 12s 61ms/step - loss:
0.5812 - val_loss: 0.5819
Epoch 25/50
196/196 [==============================] - 12s 62ms/step - loss:
0.5815 - val_loss: 0.5850
Epoch 26/50
196/196 [==============================] - 12s 62ms/step - loss:
0.5813 - val_loss: 0.5833
Epoch 27/50
196/196 [==============================] - 12s 60ms/step - loss:
0.5812 - val_loss: 0.5820
Epoch 28/50
196/196 [==============================] - 12s 63ms/step - loss:
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0.5813 - val_loss: 0.5833
Epoch 29/50
196/196 [==============================] - 12s 59ms/step - loss:
0.5814 - val_loss: 0.5830
Epoch 30/50
196/196 [==============================] - 12s 59ms/step - loss:
0.5813 - val_loss: 0.5820
Epoch 31/50
196/196 [==============================] - 12s 60ms/step - loss:
0.5812 - val_loss: 0.5818
Epoch 32/50
196/196 [==============================] - 12s 59ms/step - loss:
0.5812 - val_loss: 0.5818
Epoch 33/50
196/196 [==============================] - 11s 58ms/step - loss:
0.5812 - val_loss: 0.5821
Epoch 34/50
196/196 [==============================] - 11s 56ms/step - loss:
0.5813 - val_loss: 0.5818
Epoch 35/50
196/196 [==============================] - 11s 56ms/step - loss:
0.5814 - val_loss: 0.5818
Epoch 36/50
196/196 [==============================] - 12s 60ms/step - loss:
0.5810 - val_loss: 0.5817
Epoch 37/50
196/196 [==============================] - 11s 58ms/step - loss:
0.5811 - val_loss: 0.5817
Epoch 38/50
196/196 [==============================] - 11s 58ms/step - loss:
0.5812 - val_loss: 0.5817
Epoch 39/50
196/196 [==============================] - 11s 57ms/step - loss:
0.5811 - val_loss: 0.5818
Epoch 40/50
196/196 [==============================] - 11s 56ms/step - loss:
0.5811 - val_loss: 0.5824
Epoch 41/50
196/196 [==============================] - 11s 55ms/step - loss:
0.5810 - val_loss: 0.5817
Epoch 42/50
196/196 [==============================] - 11s 55ms/step - loss:
0.5812 - val_loss: 0.5820
Epoch 43/50
196/196 [==============================] - 12s 60ms/step - loss:
0.5811 - val_loss: 0.5816
Epoch 44/50
196/196 [==============================] - 12s 60ms/step - loss:
0.5810 - val_loss: 0.5819
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Epoch 45/50
196/196 [==============================] - 12s 60ms/step - loss:
0.5811 - val_loss: 0.5819
Epoch 46/50
196/196 [==============================] - 12s 59ms/step - loss:
0.5810 - val_loss: 0.5817
Epoch 47/50
196/196 [==============================] - 12s 59ms/step - loss:
0.5810 - val_loss: 0.5825
Epoch 48/50
196/196 [==============================] - 12s 60ms/step - loss:
0.5811 - val_loss: 0.5817
Epoch 49/50
196/196 [==============================] - 11s 57ms/step - loss:
0.5810 - val_loss: 0.5816
Epoch 50/50
196/196 [==============================] - 11s 57ms/step - loss:
0.5810 - val_loss: 0.5819
313/313 [==============================] - 1s 2ms/step
313/313 [==============================] - 1s 4ms/step
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