```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 cifar100  # Import CIFAR-100
dataset

# Load the CIFAR-100 dataset
(x_train, _), (x_test, _) = cifar100.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_flat = x_train.reshape((len(x_train),
np.prod(x_train.shape[1:])))
x_test_flat = x_test.reshape((len(x_test), np.prod(x_test.shape[1:])))

# Define the autoencoder model
encoding_dim = 32  # Size of the encoded representations
input_img = Input(shape=(x_train_flat.shape[1],))
encoded = Dense(encoding_dim, activation='relu')(input_img)
decoded = Dense(x_train_flat.shape[1], activation='sigmoid')(encoded)

autoencoder = Model(input_img, decoded)

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

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

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

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

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

# Display original and reconstructed images
n = 10  # Number of samples 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])  # Assuming your dataset is in image format
    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(x_test.shape[1:]))  # Assuming
your dataset is in image format
    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-100-
python.tar.gz
169001437/169001437 [==============================] - 3s 0us/step
Epoch 1/50
196/196 [==============================] - 8s 34ms/step - loss: 0.6433
- val_loss: 0.6194
Epoch 2/50
196/196 [==============================] - 7s 36ms/step - loss: 0.6137
- val_loss: 0.6092
Epoch 3/50
196/196 [==============================] - 6s 31ms/step - loss: 0.6055
- val_loss: 0.6027
Epoch 4/50
196/196 [==============================] - 7s 36ms/step - loss: 0.6004
- val_loss: 0.5979
Epoch 5/50
196/196 [==============================] - 7s 37ms/step - loss: 0.5963
- val_loss: 0.5940
Epoch 6/50
196/196 [==============================] - 7s 36ms/step - loss: 0.5922
- val_loss: 0.5907
Epoch 7/50
196/196 [==============================] - 7s 36ms/step - loss: 0.5894
- val_loss: 0.5877
Epoch 8/50
196/196 [==============================] - 6s 31ms/step - loss: 0.5868
- val_loss: 0.5861
Epoch 9/50
196/196 [==============================] - 7s 36ms/step - loss: 0.5854
- val_loss: 0.5849
Epoch 10/50
196/196 [==============================] - 6s 31ms/step - loss: 0.5845
- val_loss: 0.5840
Epoch 11/50
196/196 [==============================] - 7s 36ms/step - loss: 0.5841
- val_loss: 0.5834
Epoch 12/50
196/196 [==============================] - 6s 30ms/step - loss: 0.5835
- val_loss: 0.5833
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Epoch 13/50
196/196 [==============================] - 7s 36ms/step - loss: 0.5834
- val_loss: 0.5835
Epoch 14/50
196/196 [==============================] - 6s 31ms/step - loss: 0.5834
- val_loss: 0.5834
Epoch 15/50
196/196 [==============================] - 7s 35ms/step - loss: 0.5832
- val_loss: 0.5840
Epoch 16/50
196/196 [==============================] - 6s 31ms/step - loss: 0.5832
- val_loss: 0.5831
Epoch 17/50
196/196 [==============================] - 7s 36ms/step - loss: 0.5831
- val_loss: 0.5828
Epoch 18/50
196/196 [==============================] - 6s 31ms/step - loss: 0.5830
- val_loss: 0.5840
Epoch 19/50
196/196 [==============================] - 7s 36ms/step - loss: 0.5829
- val_loss: 0.5828
Epoch 20/50
196/196 [==============================] - 6s 31ms/step - loss: 0.5828
- val_loss: 0.5826
Epoch 21/50
196/196 [==============================] - 7s 36ms/step - loss: 0.5829
- val_loss: 0.5851
Epoch 22/50
196/196 [==============================] - 6s 31ms/step - loss: 0.5828
- val_loss: 0.5827
Epoch 23/50
196/196 [==============================] - 7s 36ms/step - loss: 0.5826
- val_loss: 0.5826
Epoch 24/50
196/196 [==============================] - 6s 32ms/step - loss: 0.5826
- val_loss: 0.5829
Epoch 25/50
196/196 [==============================] - 7s 36ms/step - loss: 0.5826
- val_loss: 0.5839
Epoch 26/50
196/196 [==============================] - 6s 32ms/step - loss: 0.5826
- val_loss: 0.5823
Epoch 27/50
196/196 [==============================] - 7s 36ms/step - loss: 0.5824
- val_loss: 0.5823
Epoch 28/50
196/196 [==============================] - 6s 32ms/step - loss: 0.5822
- val_loss: 0.5820
Epoch 29/50
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196/196 [==============================] - 7s 36ms/step - loss: 0.5821
- val_loss: 0.5819
Epoch 30/50
196/196 [==============================] - 6s 31ms/step - loss: 0.5820
- val_loss: 0.5822
Epoch 31/50
196/196 [==============================] - 7s 35ms/step - loss: 0.5821
- val_loss: 0.5817
Epoch 32/50
196/196 [==============================] - 6s 31ms/step - loss: 0.5818
- val_loss: 0.5817
Epoch 33/50
196/196 [==============================] - 7s 35ms/step - loss: 0.5818
- val_loss: 0.5817
Epoch 34/50
196/196 [==============================] - 7s 35ms/step - loss: 0.5818
- val_loss: 0.5816
Epoch 35/50
196/196 [==============================] - 7s 33ms/step - loss: 0.5817
- val_loss: 0.5821
Epoch 36/50
196/196 [==============================] - 7s 33ms/step - loss: 0.5817
- val_loss: 0.5816
Epoch 37/50
196/196 [==============================] - 6s 33ms/step - loss: 0.5815
- val_loss: 0.5814
Epoch 38/50
196/196 [==============================] - 7s 37ms/step - loss: 0.5815
- val_loss: 0.5816
Epoch 39/50
196/196 [==============================] - 6s 32ms/step - loss: 0.5816
- val_loss: 0.5814
Epoch 40/50
196/196 [==============================] - 7s 37ms/step - loss: 0.5815
- val_loss: 0.5815
Epoch 41/50
196/196 [==============================] - 6s 32ms/step - loss: 0.5815
- val_loss: 0.5813
Epoch 42/50
196/196 [==============================] - 7s 37ms/step - loss: 0.5814
- val_loss: 0.5814
Epoch 43/50
196/196 [==============================] - 6s 33ms/step - loss: 0.5815
- val_loss: 0.5816
Epoch 44/50
196/196 [==============================] - 7s 37ms/step - loss: 0.5815
- val_loss: 0.5812
Epoch 45/50
196/196 [==============================] - 6s 31ms/step - loss: 0.5814
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- val_loss: 0.5815
Epoch 46/50
196/196 [==============================] - 7s 36ms/step - loss: 0.5814
- val_loss: 0.5812
Epoch 47/50
196/196 [==============================] - 6s 31ms/step - loss: 0.5814
- val_loss: 0.5814
Epoch 48/50
196/196 [==============================] - 7s 36ms/step - loss: 0.5814
- val_loss: 0.5816
Epoch 49/50
196/196 [==============================] - 6s 32ms/step - loss: 0.5814
- val_loss: 0.5813
Epoch 50/50
196/196 [==============================] - 7s 36ms/step - loss: 0.5814
- val_loss: 0.5814
313/313 [==============================] - 1s 2ms/step
313/313 [==============================] - 1s 3ms/step
```