

```
from google.colab import drive
drive.mount('/content/drive')
```

Mounted at /content/drive

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

```
# # Load MNIST dataset
# (train_images, _), (_, _) = tf.keras.datasets.mnist.load_data()
# train_images = train_images.reshape(train_images.shape[0], 28, 28, 1).astype('float32')
# train_images = (train_images - 127.5) / 127.5 # Normalize to [-1, 1]
```

```
# Path to the folder containing your images
images_folder = "/content/drive/MyDrive/glioma_tumor"
```

```
# Load images from the folder
def load_images_from_folder(folder):
    images = []
    for filename in os.listdir(folder):
        img = Image.open(os.path.join(folder, filename))
        if img is not None:
            images.append(img)
    return images
```

```
# Preprocess images
def preprocess_images(images):
    processed_images = []
    for img in images:
        # Resize image to 28x28 and convert to grayscale
        img = img.resize((28, 28)).convert('L')
        img_array = np.array(img)
        img_array = img_array.reshape((28, 28, 1))
        img_array = img_array.astype('float32')
        img_array = (img_array - 127.5) / 127.5 # Normalize to [-1, 1]
        processed_images.append(img_array)
    return np.array(processed_images)
```

```
# Load images from folder
images = load_images_from_folder(images_folder)
```

```
# Preprocess images
images = preprocess_images(images)
```

```

# Generator model
def build_generator():
    model = models.Sequential()
    model.add(layers.Dense(7 * 7 * 256, input_shape=(100,)))
    model.add(layers.Reshape((7, 7, 256)))
    model.add(layers.Conv2DTranspose(128, (5, 5), strides=(1, 1), padding='same'))
    model.add(layers.BatchNormalization())
    model.add(layers.LeakyReLU(alpha=0.2))
    model.add(layers.Conv2DTranspose(64, (5, 5), strides=(2, 2), padding='same'))
    model.add(layers.BatchNormalization())
    model.add(layers.LeakyReLU(alpha=0.2))
    model.add(layers.Conv2DTranspose(1, (5, 5), strides=(2, 2), padding='same', activation='tanh'))
    return model

# Discriminator model
def build_discriminator():
    model = models.Sequential()
    model.add(layers.Conv2D(64, (5, 5), strides=(2, 2), padding='same', input_shape=(28, 28, 1)))
    model.add(layers.LeakyReLU(alpha=0.2))
    model.add(layers.Dropout(0.3))
    model.add(layers.Conv2D(128, (5, 5), strides=(2, 2), padding='same'))
    model.add(layers.LeakyReLU(alpha=0.2))
    model.add(layers.Dropout(0.3))
    model.add(layers.Flatten())
    model.add(layers.Dense(1, activation='sigmoid'))
    return model

# Build and compile the discriminator
discriminator = build_discriminator()
discriminator.compile(loss='binary_crossentropy', optimizer=tf.keras.optimizers.Adam(learning_rate=0.0002, be

# Build the generator
generator = build_generator()

# Build and compile the combined model (generator and discriminator)
discriminator.trainable = False
gan_input = tf.keras.Input(shape=(100,))
x = generator(gan_input)
gan_output = discriminator(x)
gan = models.Model(gan_input, gan_output)
gan.compile(loss='binary_crossentropy', optimizer=tf.keras.optimizers.Adam(learning_rate=0.0002, beta_1=0.5))

# Training loop
epochs = 10000
batch_size = 64

```

```

for epoch in range(epochs):
    # Train discriminator
    noise = np.random.normal(0, 1, size=(batch_size, 100))
    generated_images = generator.predict(noise)
    real_images = images[np.random.randint(0, images.shape[0], batch_size)] # Use images loaded from folder
    labels_real = np.ones((batch_size, 1))
    labels_fake = np.zeros((batch_size, 1))

    d_loss_real = discriminator.train_on_batch(real_images, labels_real)
    d_loss_fake = discriminator.train_on_batch(generated_images, labels_fake)
    d_loss = 0.5 * np.add(d_loss_real, d_loss_fake)

    # Train generator
    noise = np.random.normal(0, 1, size=(batch_size, 100))
    labels_gan = np.ones((batch_size, 1))
    g_loss = gan.train_on_batch(noise, labels_gan)

    # Print progress
    if epoch % 100 == 0:
        print(f"Epoch {epoch}/{epochs} [D loss: {d_loss[0]} | D accuracy: {100 * d_loss[1]}] [G loss: {g_loss}

    # Save generated images at specific intervals
    if epoch % 500 == 0:
        samples = generator.predict(np.random.normal(0, 1, size=(16, 100)))
        samples = (samples + 1) / 2.0 # Rescale to [0, 1]
        fig, axs = plt.subplots(4, 4)
        cnt = 0
        for i in range(4):
            for j in range(4):
                axs[i, j].imshow(samples[cnt, :, :, 0], cmap='gray')
                axs[i, j].axis('off')
                cnt += 1
        plt.show()

```

4/129

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

```
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
Epoch 300/10000 [D loss: 0.5747427940368652 | D accuracy: 75.0] [G loss: 2.828107833862]
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
```

```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
```

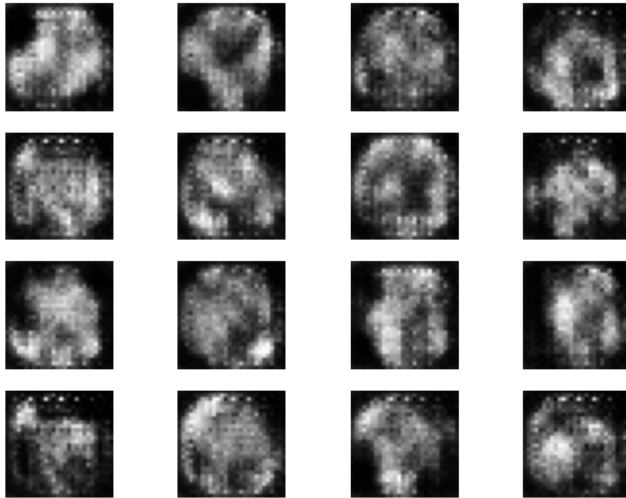


```

2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
Epoch 400/10000 [D loss: 0.6566779613494873 | D accuracy: 60.15625] [G loss: 0.574911952]
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 13ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step

```

```
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
Epoch 500/10000 [D loss: 0.7565619945526123 | D accuracy: 30.46875] [G loss: 0.638446331]
1/1 [=====] - 0s 21ms/step
```



```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
```

```

2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
Epoch 600/10000 [D loss: 0.748831033706665 | D accuracy: 25.0] [G loss: 0.67142379283905]
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step

```

```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
Epoch 700/10000 [D loss: 0.7069417834281921 | D accuracy: 38.28125] [G loss: 0.713418602]
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
```

```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 10ms/step
```

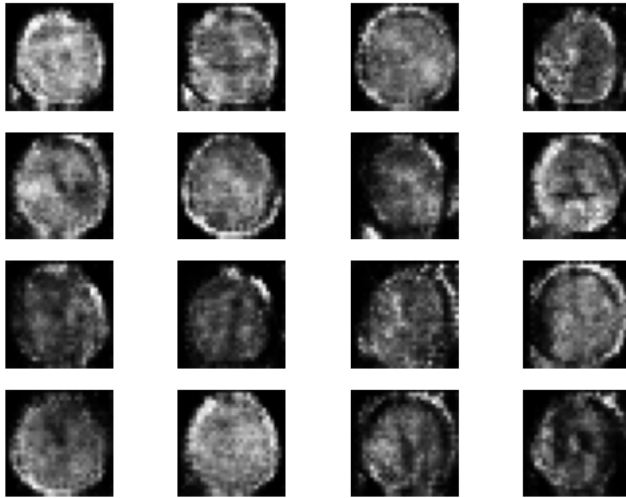
```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 14ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 5ms/step
Epoch 800/10000 [D loss: 0.7032021284103394 | D accuracy: 44.53125] [G loss: 0.712712645]
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
```

```

2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
Epoch 900/10000 [D loss: 0.6983278691768646 | D accuracy: 47.65625] [G loss: 0.72466695:
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 14ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step

```

```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
Epoch 1000/10000 [D loss: 0.6846426129341125 | D accuracy: 53.90625] [G loss: 0.72701728
1/1 [=====] - 0s 17ms/step
```



```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
```



```

2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
Epoch 1100/10000 [D loss: 0.673014223575592 | D accuracy: 58.59375] [G loss: 0.721814393]
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step

```

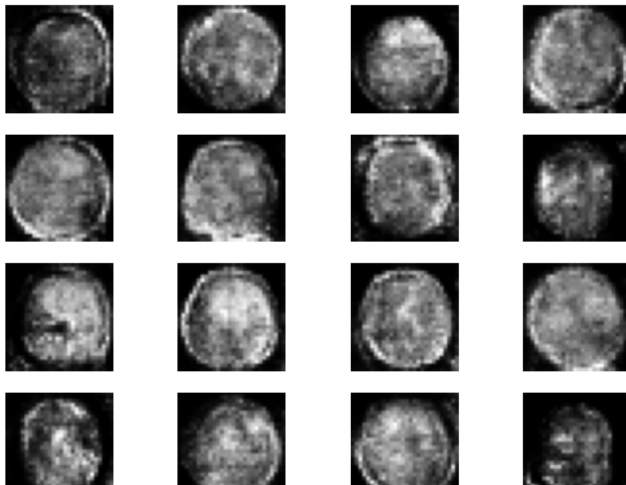
```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
```

```
4/4 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
Epoch 1200/10000 [D loss: 0.6850899457931519 | D accuracy: 60.9375] [G loss: 0.729446585
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
```

```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
Epoch 1300/10000 [D loss: 0.6806632876396179 | D accuracy: 62.5] [G loss: 0.715969324111
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
```

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 7ms/step
Epoch 1500/10000 [D loss: 0.6754721105098724 | D accuracy: 60.15625] [G loss: 0.72490972]
1/1 [=====] - 0s 18ms/step
```



```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 10ms/step
```

```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
Epoch 1600/10000 [D loss: 0.6835058331489563 | D accuracy: 56.25] [G loss: 0.71076542135
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
```



```
4/4 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 15ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
Epoch 1700/10000 [D loss: 0.6749250888824463 | D accuracy: 66.40625] [G loss: 0.71179753
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 11ms/step
```

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

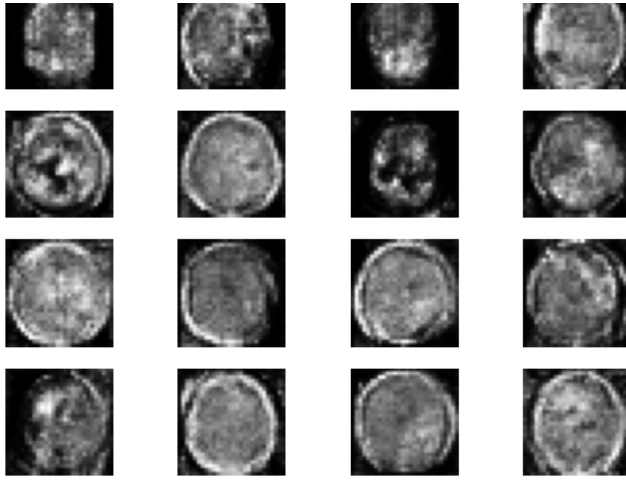
```

2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
Epoch 1900/10000 [D loss: 0.6728114783763885 | D accuracy: 63.28125] [G loss: 0.71081387]
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step

```

```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
Epoch 2000/10000 [D loss: 0.6720178723335266 | D accuracy: 57.03125] [G loss: 0.73119831
1/1 [=====] - 0s 27ms/step
```





```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 13ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
```

```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 7ms/step
Epoch 2100/10000 [D loss: 0.664717435836792 | D accuracy: 67.1875] [G loss: 0.7334188222]
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 16ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
```

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

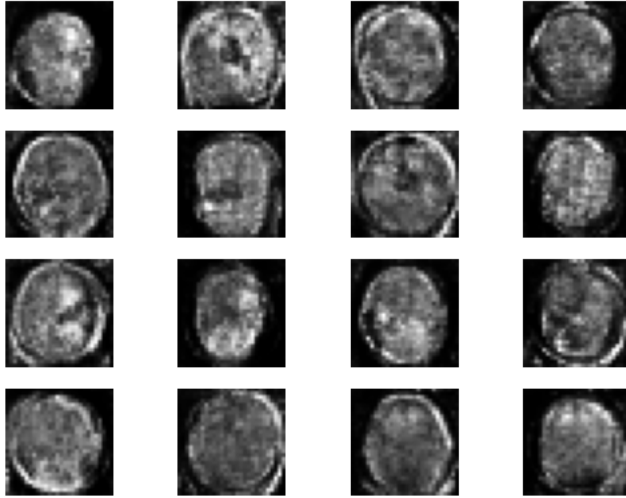
[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)



[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=jQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=jQVnYUNkr7_O&printMode=true)

```
Epoch 2400/10000 [D loss: 0.6558224260807037 | D accuracy: 64.0625] [G loss: 0.726452356
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
```

```
4/4 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
Epoch 2500/10000 [D loss: 0.6538751721382141 | D accuracy: 71.09375] [G loss: 0.76708841
1/1 [=====] - 0s 17ms/step
```



```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
```

```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 14ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
```

Epoch 2600/10000 [D loss: 0.6541244685649872 | D accuracy: 64.84375] [G loss: 0.75433486]

```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
Epoch 2700/10000 [D loss: 0.6518959701061249 | D accuracy: 66.40625] [G loss: 0.78513276
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
```

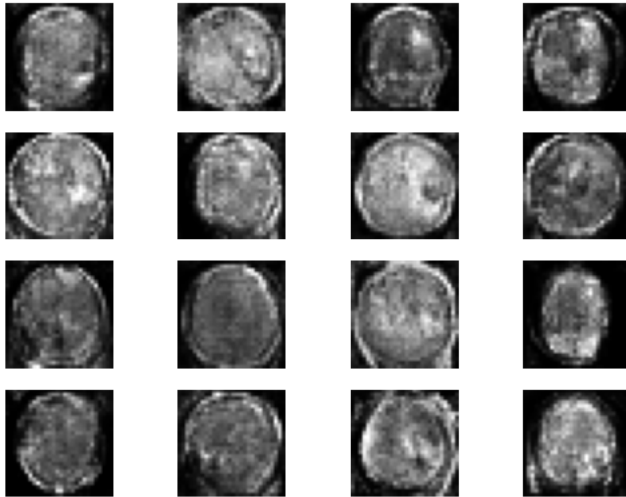
```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
```

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=jQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=jQVnYUNkr7_O&printMode=true)



```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 15ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
Epoch 3000/10000 [D loss: 0.6281962394714355 | D accuracy: 67.96875] [G loss: 0.82421654
1/1 [=====] - 0s 35ms/step
```



```
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
```

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

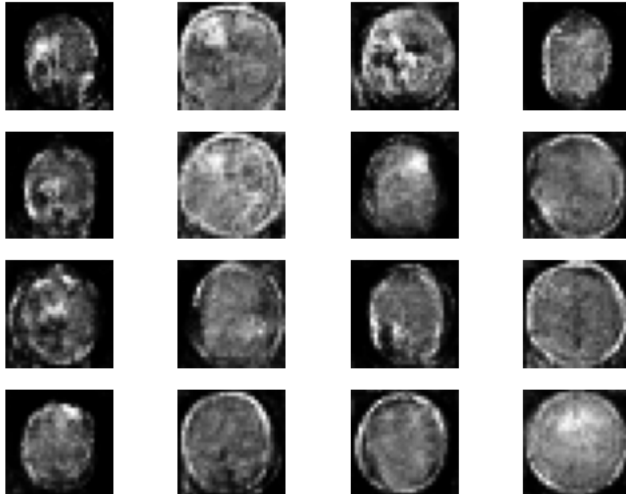
```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
```

```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
Epoch 3200/10000 [D loss: 0.6055653691291809 | D accuracy: 73.4375] [G loss: 0.831240594
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
```

```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
Epoch 3300/10000 [D loss: 0.5639771223068237 | D accuracy: 79.6875] [G loss: 0.883887525
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 13ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 17ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
```

```
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
Epoch 3400/10000 [D loss: 0.5737378299236298 | D accuracy: 74.21875] [G loss: 0.88131684
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 15ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
```

```
4/4 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
Epoch 3500/10000 [D loss: 0.553117916107178 | D accuracy: 78.90625] [G loss: 0.92698681
1/1 [=====] - 0s 28ms/step
```



```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
```

lab research google.com/drive/1BH4kee\_VykV54u9vpOE



[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

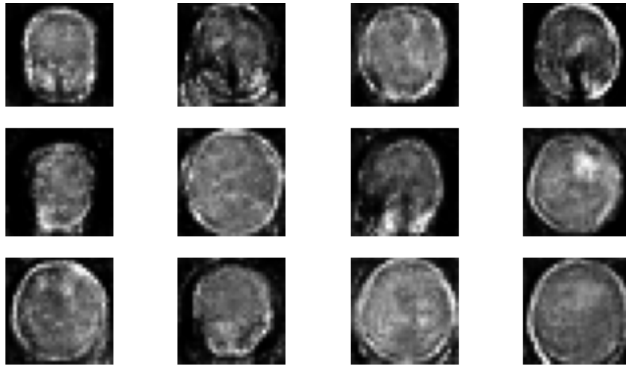
```
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
Epoch 3700/10000 [D loss: 0.5079774856567383 | D accuracy: 87.5] [G loss: 0.989050149917
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 15ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
```

```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
Epoch 3800/10000 [D loss: 0.5636551678180695 | D accuracy: 71.875] [G loss: 1.0135319232]
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 4ms/step
```

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
Epoch 4000/10000 [D loss: 0.5195123255252838 | D accuracy: 79.6875] [G loss: 0.999182224
1/1 [=====] - 0s 20ms/step
```





```

2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 13ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step

```

```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
Epoch 4100/10000 [D loss: 0.513679251074791 | D accuracy: 82.03125] [G loss: 1.033393144
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
```

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=jQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=jQVnYUNkr7_O&printMode=true)



```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
Epoch 4300/10000 [D loss: 0.47090692818164825 | D accuracy: 82.8125] [G loss: 1.14269018
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
```

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

60/129

```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 13ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
Epoch 4600/10000 [D loss: 0.48483484983444214 | D accuracy: 78.90625] [G loss: 1.1292465
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
```

```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 9ms/step
Epoch 4700/10000 [D loss: 0.4672625809907913 | D accuracy: 81.25] [G loss: 1.2702965736:
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
```

```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
```

Epoch 4800/10000 [D loss: 0.44893456995487213 | D accuracy: 81.25] [G loss: 1.2175257205

lab research google.com/drive/1BH4kee\_VykV54u9vpOE

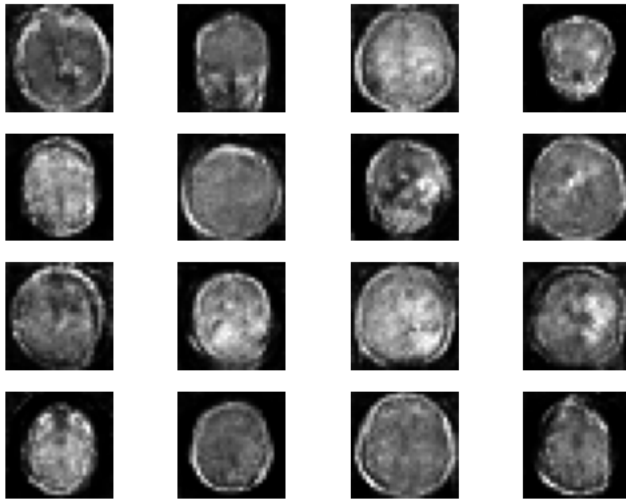


```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
Epoch 4900/10000 [D loss: 0.4367572069168091 | D accuracy: 85.15625] [G loss: 1.32967656
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 13ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 14ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
```

```

2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
Epoch 5000/10000 [D loss: 0.4268532246351242 | D accuracy: 81.25] [G loss: 1.38585948944]
1/1 [=====] - 0s 18ms/step

```



```

2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step

```

```
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
Epoch 5100/10000 [D loss: 0.4199850261211395 | D accuracy: 77.34375] [G loss: 1.27309405]
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
```

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=jQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=jQVnYUNkr7_O&printMode=true)

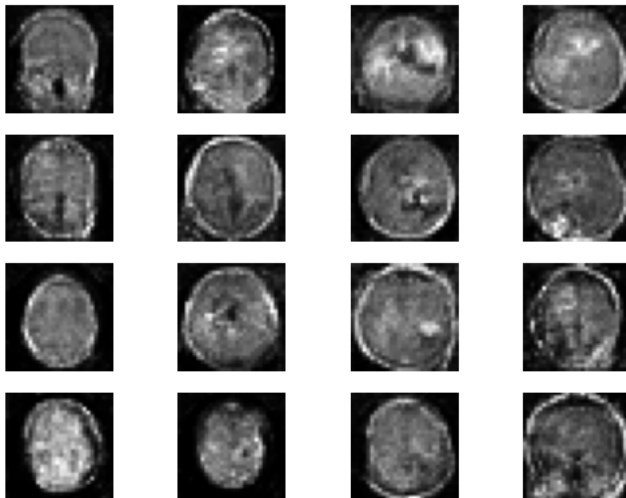
[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
Epoch 5400/10000 [D loss: 0.3603394627571106 | D accuracy: 84.375] [G loss: 1.3497650623
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
```

```

2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
Epoch 5500/10000 [D loss: 0.35272449254989624 | D accuracy: 88.28125] [G loss: 1.4012204
1/1 [=====] - 0s 18ms/step

```



```

2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step

```



[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=jQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=jQVnYUNkr7_O&printMode=true)

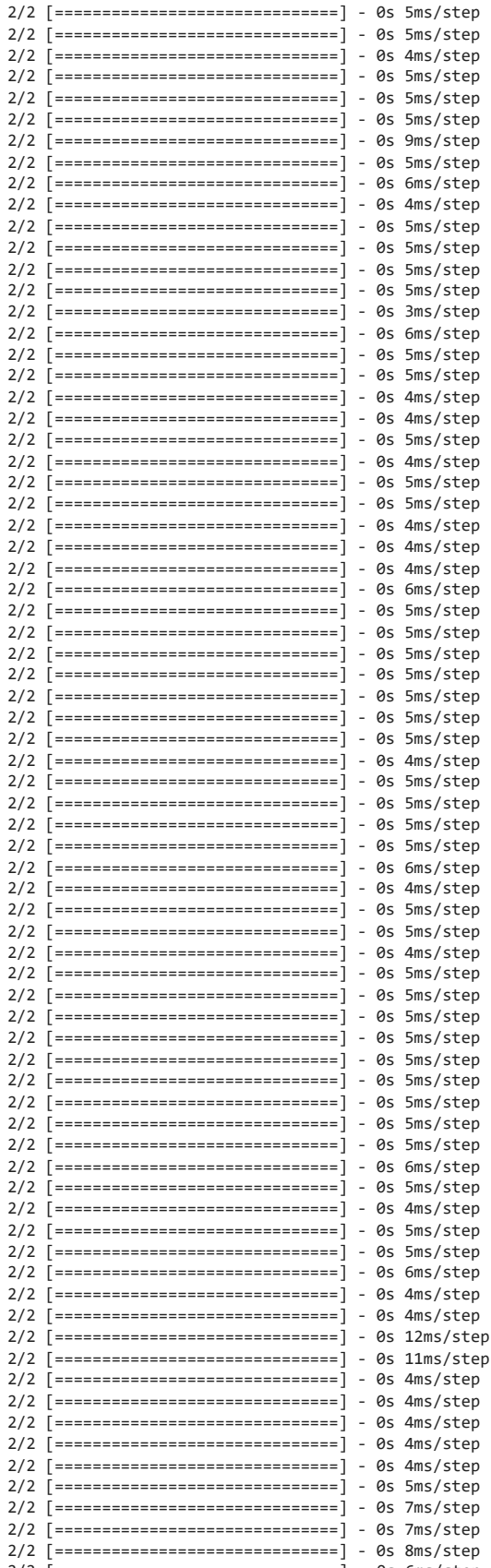
```

2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
Epoch 5800/10000 [D loss: 0.4079809635877609 | D accuracy: 83.59375] [G loss: 1.45276486
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 3ms/step

```

```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
Epoch 5900/10000 [D loss: 0.353109672665596 | D accuracy: 85.15625] [G loss: 1.596775054
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
```





```
2/2 [=====] - 0s 0ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
Epoch 6100/10000 [D loss: 0.35387521982192993 | D accuracy: 89.0625] [G loss: 1.48862606
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
```



```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
Epoch 6200/10000 [D loss: 0.3644702434539795 | D accuracy: 85.15625] [G loss: 1.63458812
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
```

```

2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
Epoch 6300/10000 [D loss: 0.3498831242322922 | D accuracy: 83.59375] [G loss: 1.58507645]
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step

```

```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
Epoch 6400/10000 [D loss: 0.36245517432689667 | D accuracy: 87.5] [G loss: 1.56022834777]
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 9ms/step
```

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

85/129

```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 9ms/step
Epoch 6600/10000 [D loss: 0.328778401017189 | D accuracy: 86.71875] [G loss: 1.956408615
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
```

```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
Epoch 6700/10000 [D loss: 0.3077414631843567 | D accuracy: 89.0625] [G loss: 1.865691661
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
```

```

2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 13ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
Epoch 6800/10000 [D loss: 0.34988462924957275 | D accuracy: 86.71875] [G loss: 1.8200746
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 14ms/step

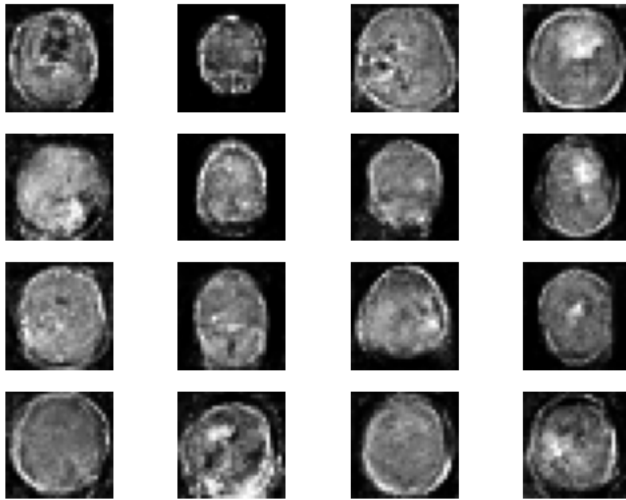
```



[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=jQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=jQVnYUNkr7_O&printMode=true)

```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
Epoch 6900/10000 [D loss: 0.27278129011392593 | D accuracy: 88.28125] [G loss: 1.9586443
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
```

```
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
Epoch 7000/10000 [D loss: 0.31684666872024536 | D accuracy: 85.9375] [G loss: 1.7577382:
1/1 [=====] - 0s 18ms/step
```



```
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
```

```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
Epoch 7100/10000 [D loss: 0.250040203332901 | D accuracy: 92.1875] [G loss: 2.1281871795
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
```

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

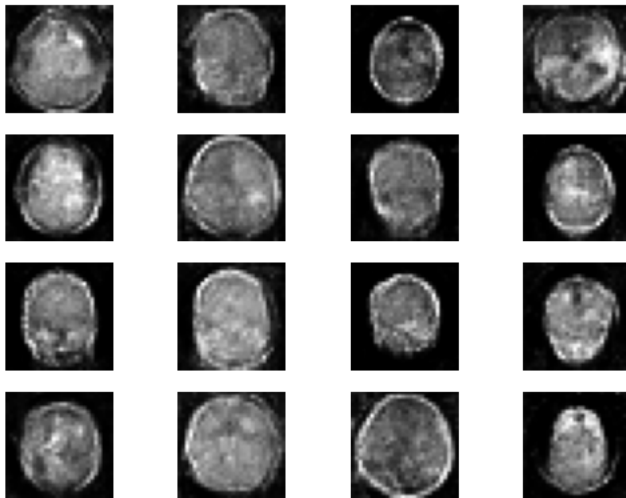
[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
Epoch 7300/10000 [D loss: 0.23775382339954376 | D accuracy: 92.96875] [G loss: 1.7791721
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
```

```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
Epoch 7400/10000 [D loss: 0.23975449055433273 | D accuracy: 92.1875] [G loss: 2.06681704
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 13ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 7ms/step
```



```
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
Epoch 7500/10000 [D loss: 0.24011631309986115 | G accuracy: 93.75] [G loss: 1.9486482143
1/1 [=====] - 0s 17ms/step
```



```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
```

```
4/4 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 16ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
```

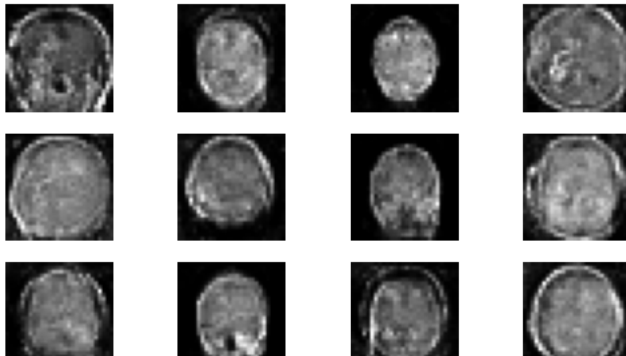
```
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
Epoch 7600/10000 [D loss: 0.2469208538532257 | D accuracy: 92.96875] [G loss: 2.0332677:]
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 13ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
```

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=jQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=jQVnYUNkr7_O&printMode=true)

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
Epoch 8000/10000 [D loss: 0.22661707550287247 | D accuracy: 90.625] [G loss: 2.157523155
1/1 [=====] - 0s 23ms/step
```



[illegible]



```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
Epoch 8100/10000 [D loss: 0.28645700216293335 | D accuracy: 89.84375] [G loss: 2.1278816
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
```

```

2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 14ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
Epoch 8200/10000 [D loss: 0.2659447491168976 | D accuracy: 89.0625] [G loss: 2.152184963]
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step

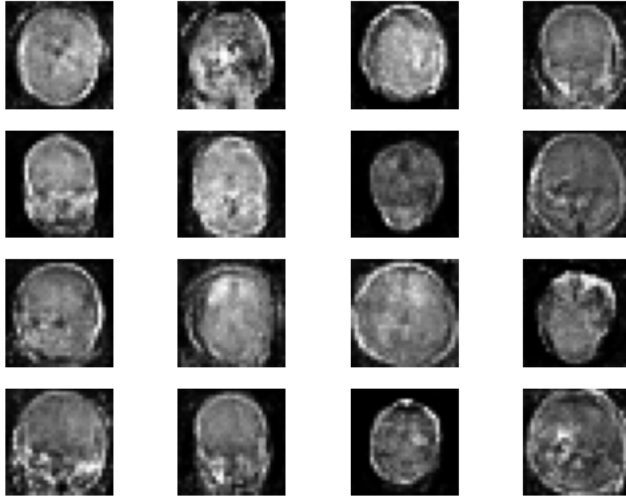
```

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
Epoch 8400/10000 [D loss: 0.22964486479759216 | D accuracy: 90.625] [G loss: 2.225928306
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
```

```
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 17ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
```

```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
Epoch 8500/10000 [D loss: 0.18627259135246277 | D accuracy: 95.3125] [G loss: 2.51632094
1/1 [=====] - 0s 19ms/step
```



```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
```

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

```

2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 15ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 13ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 14ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 5ms/step

```

Epoch 8700/10000 [D loss: 0.33737123012542725 | D accuracy: 84.375] [G loss: 2.168693786

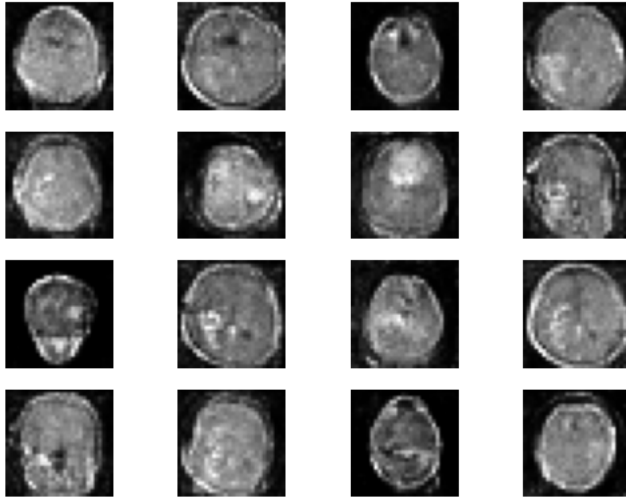


```
-- -- -- -- --
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
Epoch 8800/10000 [D loss: 0.2148868590593338 | D accuracy: 96.09375] [G loss: 2.40353441]
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
```

```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
```

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=jQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=jQVnYUNkr7_O&printMode=true)

```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
Epoch 9000/10000 [D loss: 0.2208108752965927 | D accuracy: 92.1875] [G loss: 2.24312949]
1/1 [=====] - 0s 17ms/step
```



```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
```

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
Epoch 9200/10000 [D loss: 0.3271699994802475 | D accuracy: 86.71875] [G loss: 2.24313712
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
```



```
4/4 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
Epoch 9300/10000 [D loss: 0.1690262258052826 | D accuracy: 94.53125] [G loss: 2.50586891
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 16ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 11ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
```

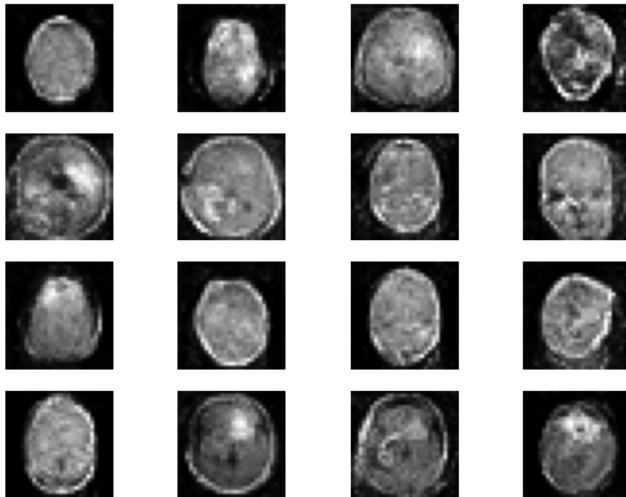


```
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
Epoch 9400/10000 [D loss: 0.2284260392189026 | D accuracy: 91.40625] [G loss: 2.59333225
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
```

```

2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
Epoch 9500/10000 [D loss: 0.21248763799667358 | D accuracy: 93.75] [G loss: 2.3476805686
1/1 [=====] - 0s 20ms/step

```



```

2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step

```

```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
Epoch 9600/10000 [D loss: 0.16267922520637512 | D accuracy: 92.96875] [G loss: 2.7367835]
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
```

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

[https://colab.research.google.com/drive/1BH4kee\\_VykV54u9voOPqNXYQTjv\\_jng5#scrollTo=iQVnYUNkr7\\_O&printMode=true](https://colab.research.google.com/drive/1BH4kee_VykV54u9voOPqNXYQTjv_jng5#scrollTo=iQVnYUNkr7_O&printMode=true)

```
4/4 [=====] - 0s 10ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 14ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
Epoch 9800/10000 [D loss: 0.1941637471318245 | D accuracy: 92.96875] [G loss: 2.50254106
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 13ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 8ms/step
```

```
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 12ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
Epoch 9900/10000 [D loss: 0.2372918277978897 | D accuracy: 91.40625] [G loss: 2.64681226
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
```

```
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 10ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 3ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 8ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 9ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 7ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 6ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 4ms/step
2/2 [=====] - 0s 5ms/step
2/2 [=====] - 0s 5ms/step
```



```
import tensorflow as tf
from tensorflow.keras import layers, models

# Define the CNN model
def create_cnn_model(input_shape, num_classes):
    model = models.Sequential()

    # Add convolutional layers
    model.add(layers.Conv2D(32, (3, 3), activation='relu', input_shape=input_shape))
```