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  inflating: Dataset/training_set/G/132.png
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  inflating: Dataset/training_set/G/1337.png
  inflating: Dataset/training_set/G/1338.png
  inflating: Dataset/training_set/G/1339.png
  inflating: Dataset/training_set/G/134.png
  inflating: Dataset/training_set/G/1340.png
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  inflating: Dataset/training_set/G/1343.png
  inflating: Dataset/training_set/G/1344.png
```

Model Building

Import The Required Model Building Libraries

In [ ]:
```
#import imagedatagenerator
from keras.preprocessing.image import ImageDataGenerator
```

In [ ]:
```
#training datagen
train_datagen=ImageDataGenerator(rescale=1./255,shear_range=0.2,zoom_range=0.2,horizontal_flip=True)
```

In [ ]:
```
#testing datagen
test_datagen=ImageDataGenerator(rescale=1./255)
```

IMPORTING tensorflow

In [ ]:
```
import tensorflow as tf
import os
```

Initialize The Model

In [ ]:
```
#create model
from keras.models import Sequential
from keras.layers import Dense
from keras.layers import Convolution2D
from keras.layers import MaxPooling2D
from keras.layers import Dropout
from keras.layers import Flatten
from tensorflow.keras.preprocessing.image import ImageDataGenerator
```

In [ ]:
```
import numpy as np
import matplotlib.pyplot as plt #to view graph in colab itself
import IPython.display as display
from PIL import Image
import pathlib
```

Unzipping the dataset

In [ ]:
```
!unzip '/content/conversation engine for deaf and dumb (1).zip'
```

```
Streaming output truncated to the last 5000 lines.
 extracting: Dataset/training_set/G/1225.png
 extracting: Dataset/training_set/G/1226.png
 extracting: Dataset/training_set/G/1227.png
 extracting: Dataset/training_set/G/1228.png
 extracting: Dataset/training_set/G/1229.png
  inflating: Dataset/training_set/G/123.png
 extracting: Dataset/training_set/G/1230.png
 extracting: Dataset/training_set/G/1231.png
 extracting: Dataset/training_set/G/1232.png
  inflating: Dataset/training_set/G/1233.png
  inflating: Dataset/training_set/G/1234.png
  inflating: Dataset/training_set/G/1235.png
  inflating: Dataset/training_set/G/1236.png
  inflating: Dataset/training_set/G/1237.png
  inflating: Dataset/training_set/G/1238.png
  inflating: Dataset/training_set/G/1239.png
  inflating: Dataset/training_set/G/124.png
  inflating: Dataset/training_set/G/1240.png
  inflating: Dataset/training_set/G/1241.png
  inflating: Dataset/training_set/G/1242.png
  inflating: Dataset/training_set/G/1243.png
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  inflating: Dataset/training_set/G/1245.png
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  inflating: Dataset/training_set/G/1247.png
  inflating: Dataset/training_set/G/1248.png
  inflating: Dataset/training_set/G/1249.png
```

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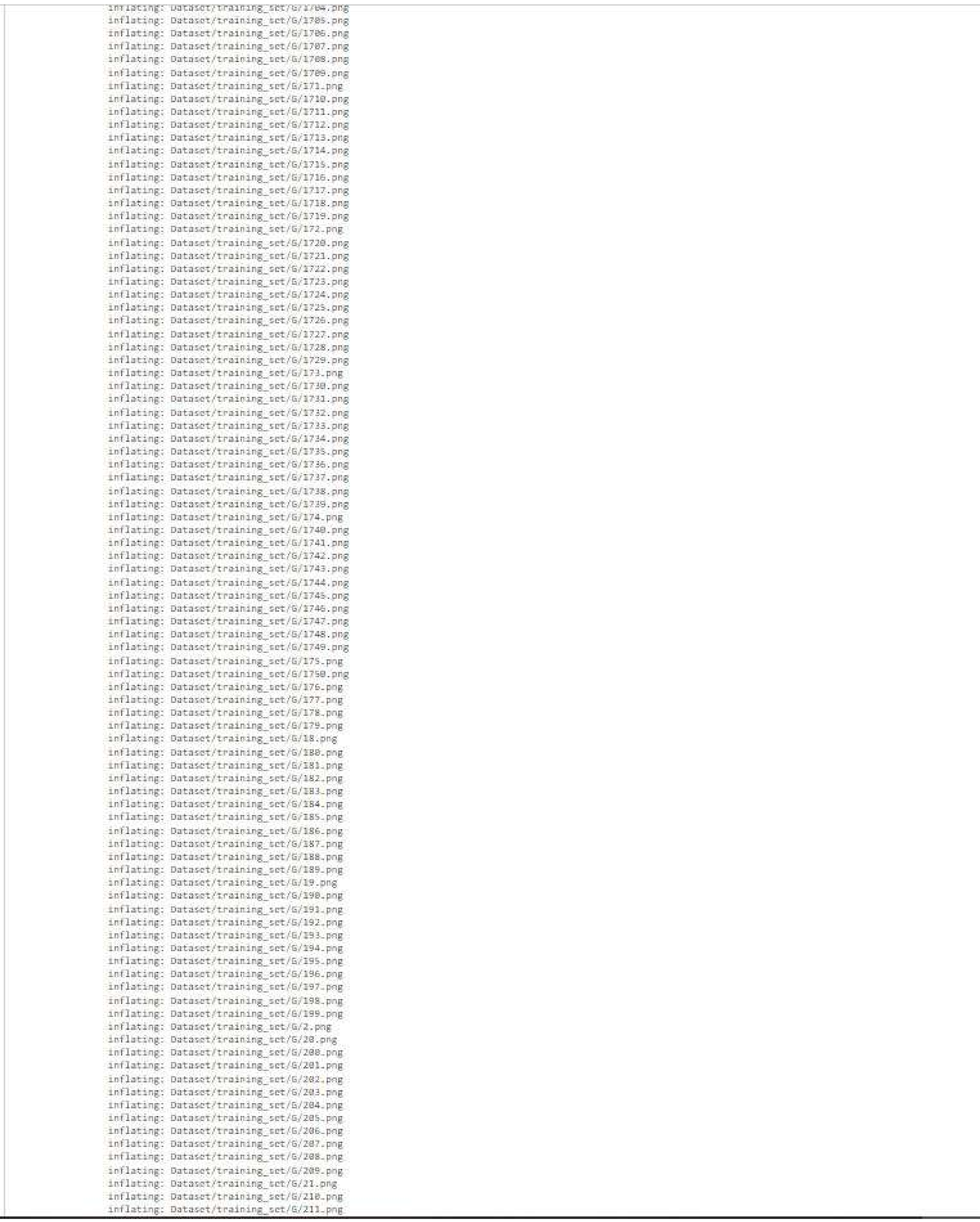
inflating: Dataset/training_set/G/1455.png
```



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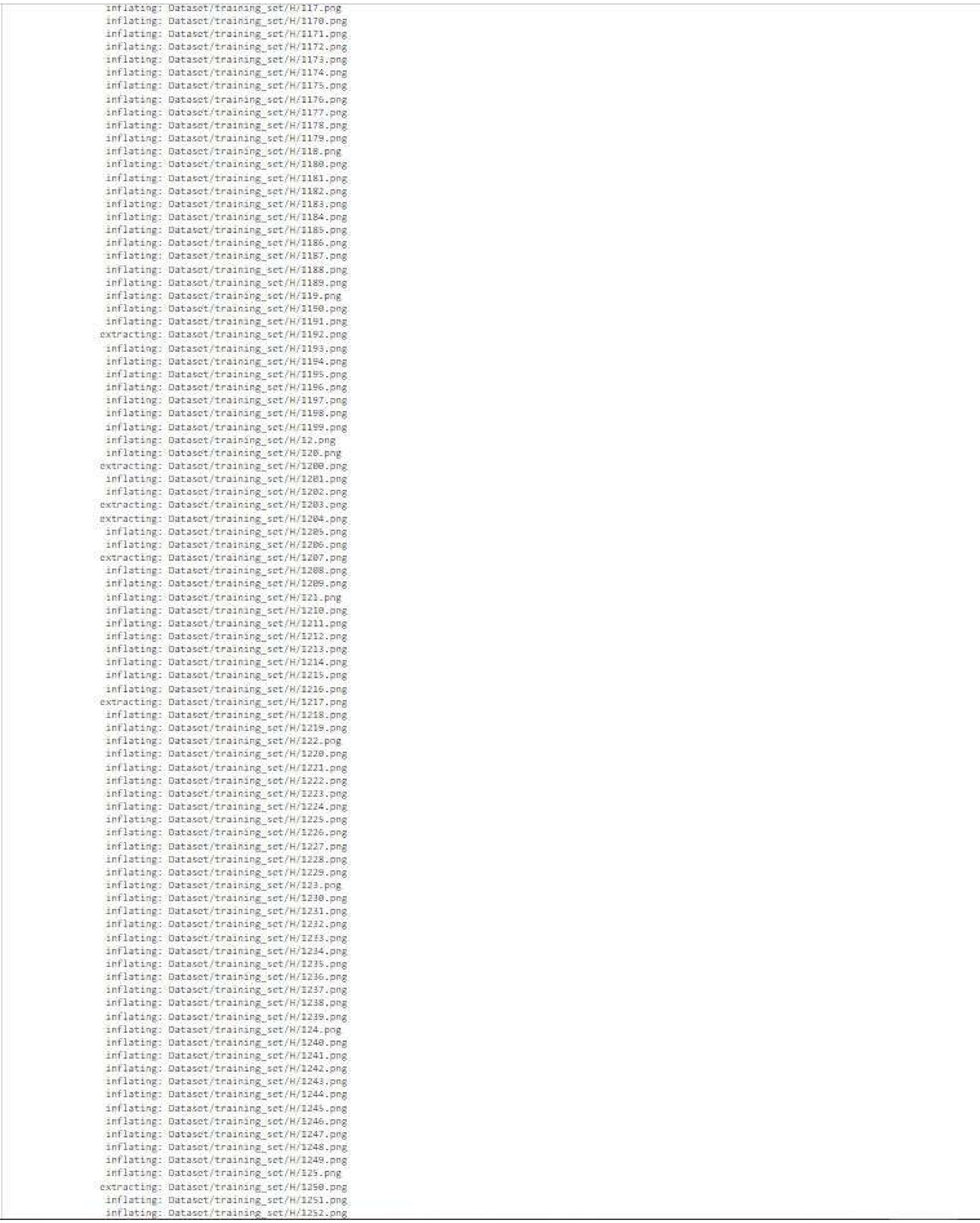
```



```
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  inflating: Dataset/training_set/H/1175.png
  inflating: Dataset/training_set/H/1176.png
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  inflating: Dataset/training_set/H/1245.png
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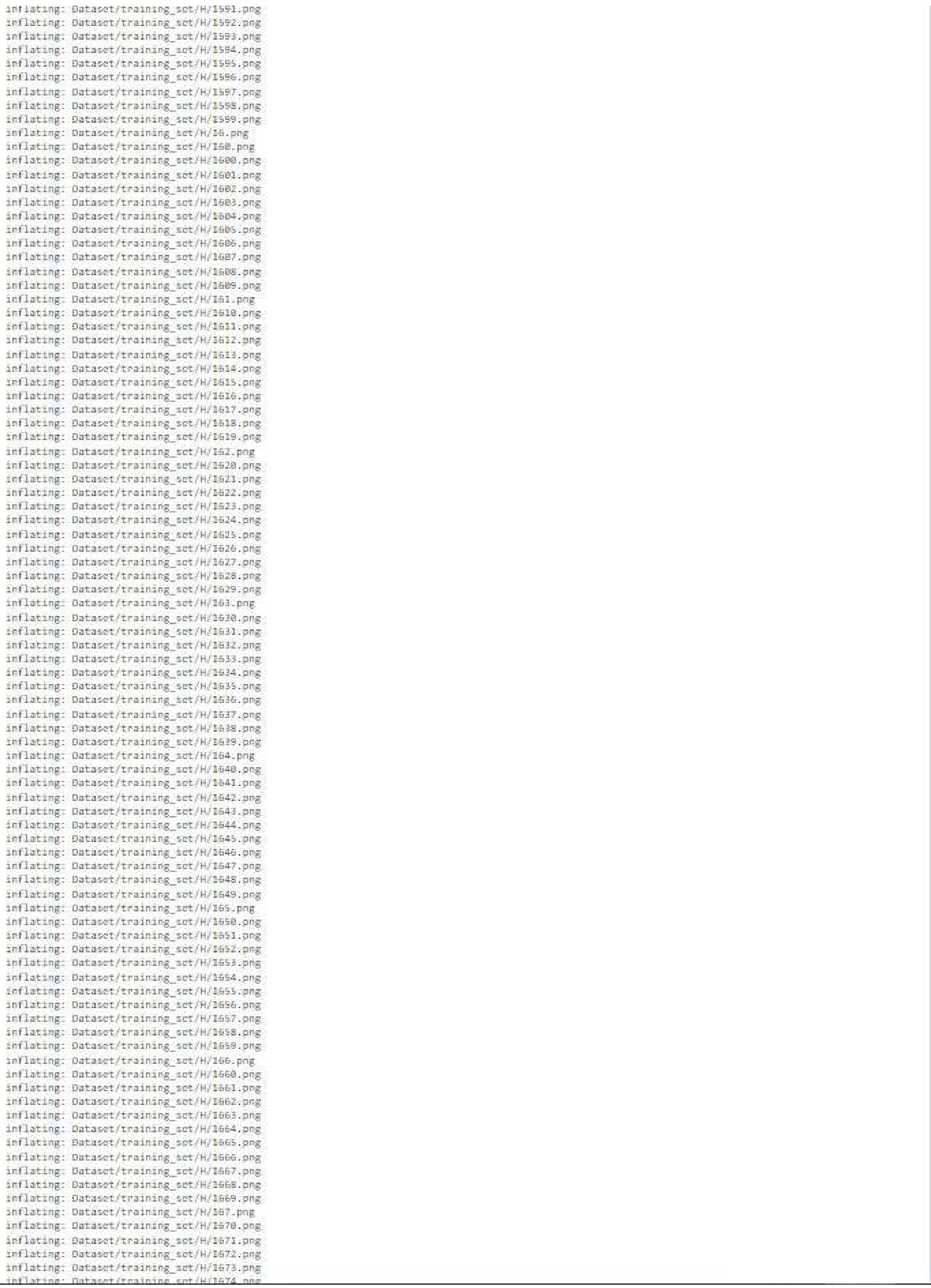
 extracting: Dataset/training_set/H/1250.png
  inflating: Dataset/training_set/H/1251.png
  inflating: Dataset/training_set/H/1252.png
```



```
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inflating: Dataset/training_set/H/1595.png
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```

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  inflating: Dataset/training_set/H/998.png
  inflating: Dataset/training_set/H/999.png
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  inflating: Dataset/training_set/I/1.png
  inflating: Dataset/training_set/I/10.png
  inflating: Dataset/training_set/I/100.png
  inflating: Dataset/training_set/I/1000.png
  inflating: Dataset/training_set/I/1001.png
  inflating: Dataset/training_set/I/1002.png
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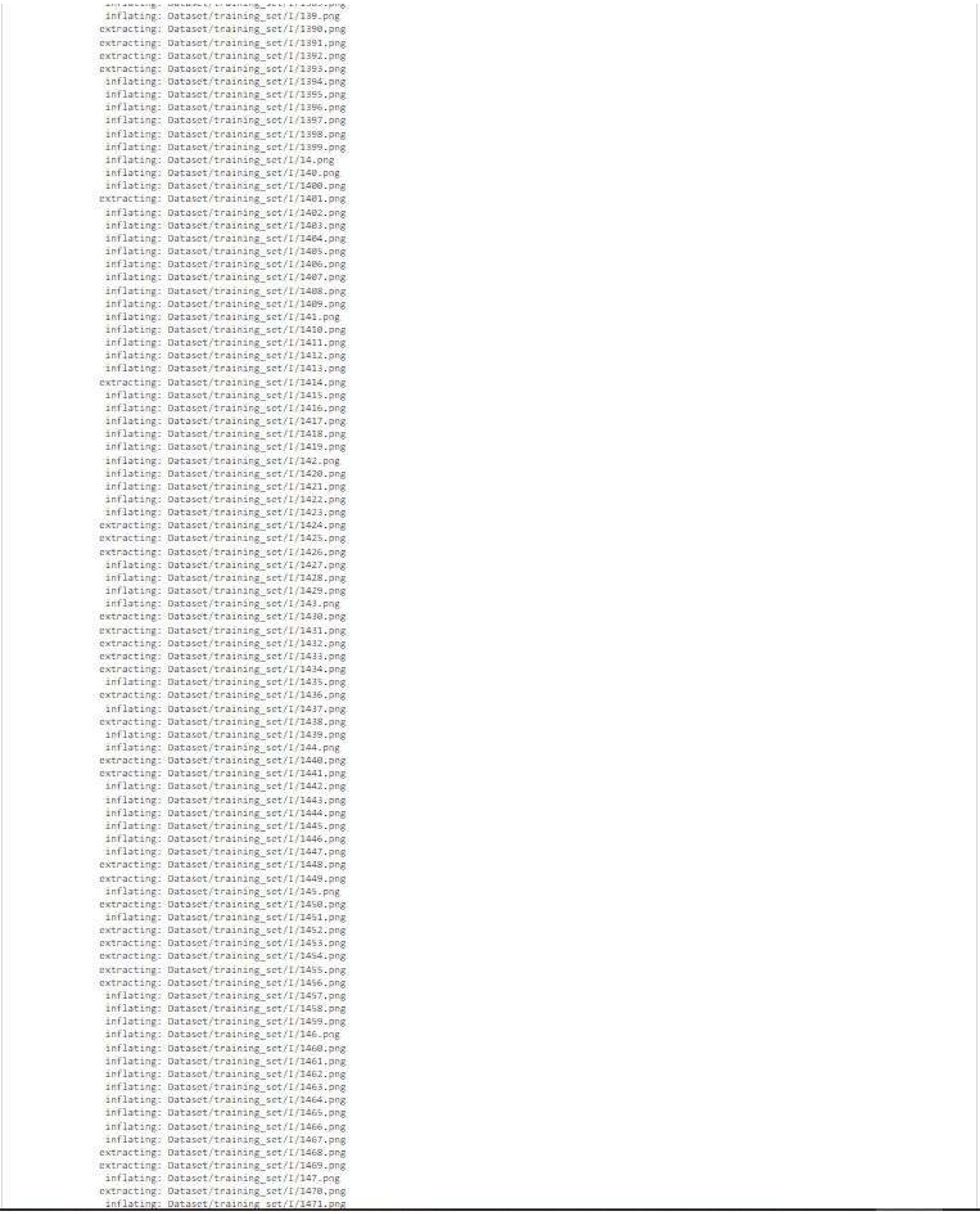
  inflating: Dataset/training_set/I/1004.png
  inflating: Dataset/training_set/I/1005.png
```



```
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 extracting: Dataset/training_set/I/1391.png
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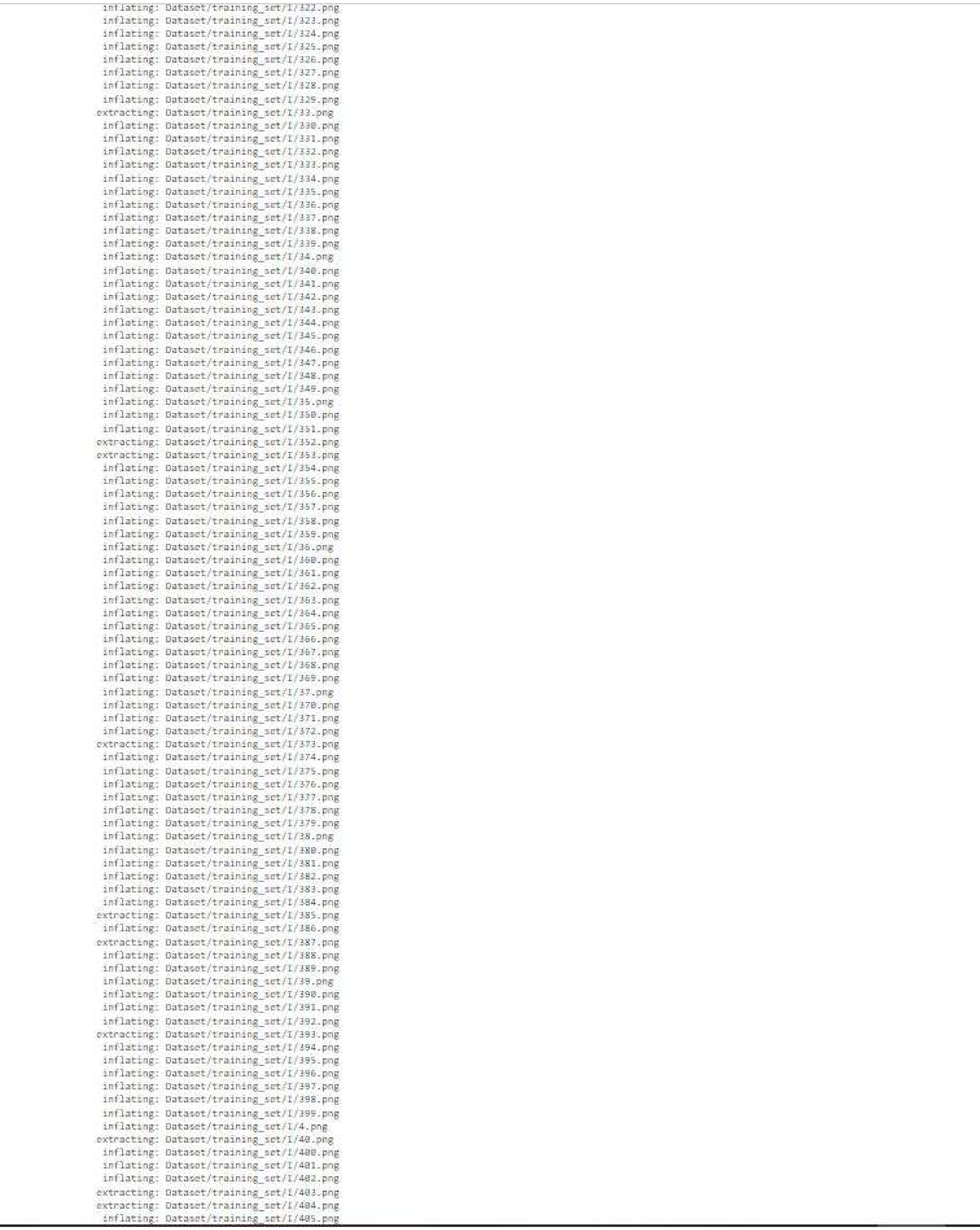
  inflating: Dataset/training_set/I/1471.png
```



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  inflating: Dataset/training_set/I/999.png
```

Applying ImageDataGenerator to training set

In [ ]:
```python
x_train=train_datagen.flow_from_directory('/content/Dataset/training_set',target_size=(64,64),batch_size=200,
                                          class_mode='categorical',color_mode="grayscale")
```

```
Found 15750 images belonging to 9 classes.
```

Applying ImageDataGenerator to test set

In [ ]:
```python
x_test=test_datagen.flow_from_directory('/content/Dataset/test_set',target_size=(64,64),batch_size=200,
                                          class_mode='categorical',color_mode="grayscale")
```

```
Found 2250 images belonging to 9 classes.
```

In [ ]:
```python
a=len(x_train)
b=len(x_test)
```

Length of training set

In [ ]:
```python
print(a)
```

```
79
```

Length of test set

In [ ]:
```python
print(b)
```

```
12
```

Add Layers

In [ ]:
```python
#create model
model=Sequential()
```

Add The Convolution Layer

In [ ]:
```python
model.add(Convolution2D(32,(3,3),input_shape=(64,64,1),activation='relu'))
```

Add Pooling Layer

In [ ]:
```python
model.add(MaxPooling2D(pool_size=(2,2)))
```

Adding The Dense Layers

In [ ]:
```
#1st hidden layer
model.add(Dense(units=512,activation='relu'))
#2nd hidden layer
model.add(Dense(units=261,activation='relu'))
```

In [ ]:
```
#output layer
model.add(Dense(units=9,activation='softmax'))
```

Compile The Model

In [ ]:
```
model.compile(loss='categorical_crossentropy',optimizer='adam',metrics=['accuracy'])
```

Fit The Model

In [ ]:
```
model.fit_generator(x_train,steps_per_epoch=len(x_train),epochs=10,validation_data=x_test,validation_steps=len(x_test))
```

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: UserWarning: `Model.fit_generator` is deprecated and will be removed in a future versi
on. Please use `Model.fit`, which supports generators.
  """Entry point for launching an IPython kernel.
Epoch 1/10
79/79 [==============================] - 98s 1s/step - loss: 0.3965 - accuracy: 0.8746 - val_loss: 0.2797 - val_accuracy: 0.9529
Epoch 2/10
79/79 [==============================] - 86s 1s/step - loss: 0.0419 - accuracy: 0.9884 - val_loss: 0.2846 - val_accuracy: 0.9751
Epoch 3/10
79/79 [==============================] - 84s 1s/step - loss: 0.0195 - accuracy: 0.9947 - val_loss: 0.3436 - val_accuracy: 0.9751
Epoch 4/10
79/79 [==============================] - 87s 1s/step - loss: 0.0083 - accuracy: 0.9982 - val_loss: 0.3722 - val_accuracy: 0.9751
Epoch 5/10
79/79 [==============================] - 83s 1s/step - loss: 0.0066 - accuracy: 0.9983 - val_loss: 0.4095 - val_accuracy: 0.9756
Epoch 6/10
79/79 [==============================] - 88s 1s/step - loss: 0.0072 - accuracy: 0.9979 - val_loss: 0.3874 - val_accuracy: 0.9756
Epoch 7/10
79/79 [==============================] - 86s 1s/step - loss: 0.0059 - accuracy: 0.9985 - val_loss: 0.3891 - val_accuracy: 0.9747
Epoch 8/10
79/79 [==============================] - 86s 1s/step - loss: 0.0027 - accuracy: 0.9992 - val_loss: 0.4429 - val_accuracy: 0.9756
Epoch 9/10
79/79 [==============================] - 84s 1s/step - loss: 0.0073 - accuracy: 0.9981 - val_loss: 0.4907 - val_accuracy: 0.9756
Epoch 10/10
79/79 [==============================] - 85s 1s/step - loss: 0.0048 - accuracy: 0.9987 - val_loss: 0.4866 - val_accuracy: 0.9782
```

Out[ ]:

Save The Model

In [ ]:
```
model.save('aslpng2.h5')
```

Import The Packages And Load The Saved Model

```
In [38]:
from tensorflow.keras.models import load_model
import numpy as np
import cv2
from tensorflow.keras.preprocessing import image
```

```
In [45]:
#load the model
model=load_model('aslpng2.h5')
```

```
In [46]:
img=image.load_img('/content/Dataset/test_set/A/10.png',target_size=(400,500))
img
```

Out[46]:

Load The Test Image, Pre-Process It And Predict

```
In [79]:
from skimage.transform import resize
def detect(frame):
  img=resize(frame,(64,64,1))
  img=np.expand_dims(img,axis=0)
  if(np.max(img)>1):
    prediction=model.predict(img)
    print(prediction)
    prediction=model.predict_classes(img)
    print(prediction)
```

```
In [73]:
arr= image.img_to_array(img)
```

```
In [67]:
frame=cv2.imread('/content/Dataset/test_set/A/10.png')
data=detect(frame)
from google.colab.patches import cv2_imshow
cv2_imshow(frame)
cv2.waitKey(0)
cv2.destroyAllWindows()
```