```
#Install kaggle
!pip install -q kaggle


#Upload you API token kaggle.json:
from google.colab import files
files.upload()
```

```
Choose Files kaggle.json
• kaggle.json(application/json) - 69 bytes, last modified: 1/25/2025 - 100% done
Saving kaggle.json to kaggle.json
```

```
 #Create a directory kaggle , move the kaggle.json to kaggle directory , change permissions to the file :
!mkdir ~/.kaggle


!mv kaggle.json ~/.kaggle/


!chmod 600 ~/.kaggle/kaggle.json


#!/bin/bash
!kaggle datasets download -d kaggleashwin/vehicle-type-recognition
```

```
Dataset URL: https://www.kaggle.com/datasets/kaggleashwin/vehicle-type-recognition
License(s): apache-2.0
Downloading vehicle-type-recognition.zip to /content
 96% 153M/159M [00:01<00:00, 143MB/s]
100% 159M/159M [00:01<00:00, 149MB/s]
```

```
#!/bin/bash
!kaggle datasets download kaushalrimal619/lumpy-skin-disease-cow-images
```

```
Dataset URL: https://www.kaggle.com/datasets/kaushalrimal619/lumpy-skin-disease-cow-images
License(s): unknown
Downloading lumpy-skin-disease-cow-images.zip to /content
100% 4.27G/4.28G [00:58<00:00, 85.9MB/s]
100% 4.28G/4.28G [00:58<00:00, 78.4MB/s]
```

```
!unzip lumpy-skin-disease-cow-images.zip


import tensorflow as tf

# Check for GPU availability
print("Num GPUs Available: ", len(tf.config.list_physical_devices('GPU')))

if tf.test.gpu_device_name():
    print(f"Using GPU: {tf.test.gpu_device_name()}")
else:
    print("No GPU found. Make sure you've enabled GPU in Colab.")
```

```
Num GPUs Available:  1
Using GPU: /device:GPU:0
```

```
import tensorflow as tf
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Conv2D, MaxPooling2D, Flatten, Dense, Dropout, BatchNormalization
from tensorflow.keras.preprocessing.image import ImageDataGenerator
from tensorflow.keras.callbacks import EarlyStopping
import os
import shutil
import matplotlib.pyplot as plt



# Step 1: Organize Dataset
infected_dir = '/content/infected/infected'
normal_dir = '/content/normal/normal'

def create_dataset(infected_dir, normal_dir):
    dataset_dir = '/content/dataset'
    train_dir = os.path.join(dataset_dir, 'train')
```

```
    os.makedirs(train_dir, exist_ok=True)

    infected_train_dir = os.path.join(train_dir, 'infected')
    normal_train_dir = os.path.join(train_dir, 'normal')
    os.makedirs(infected_train_dir, exist_ok=True)
    os.makedirs(normal_train_dir, exist_ok=True)

    for file in os.listdir(infected_dir):
        shutil.copy(os.path.join(infected_dir, file), infected_train_dir)

    for file in os.listdir(normal_dir):
        shutil.copy(os.path.join(normal_dir, file), normal_train_dir)

    return dataset_dir

dataset_dir = create_dataset(infected_dir, normal_dir)



# Step 2: Data Generators
train_datagen = ImageDataGenerator(
    rescale=1.0 / 255,
    validation_split=0.2,
    rotation_range=20,
    width_shift_range=0.2,
    height_shift_range=0.2,
    zoom_range=0.2,
    horizontal_flip=True
)

train_generator = train_datagen.flow_from_directory(
    os.path.join(dataset_dir, 'train'),
    target_size=(128, 128),
    batch_size=32,
    class_mode='binary',
    subset='training'
)

val_generator = train_datagen.flow_from_directory(
    os.path.join(dataset_dir, 'train'),
    target_size=(128, 128),
    batch_size=32,
    class_mode='binary',
    subset='validation'
)
```

```
Found 3200 images belonging to 2 classes.
Found 800 images belonging to 2 classes.
```

```
# Step 3: Build the Model
model = Sequential([
    Conv2D(32, (3, 3), activation='relu', input_shape=(128, 128, 3)),
    BatchNormalization(),
    MaxPooling2D(pool_size=(2, 2)),

    Conv2D(64, (3, 3), activation='relu'),
    BatchNormalization(),
    MaxPooling2D(pool_size=(2, 2)),

    Conv2D(128, (3, 3), activation='relu'),
    BatchNormalization(),
    MaxPooling2D(pool_size=(2, 2)),

    Flatten(),
    Dense(256, activation='relu'),
    Dropout(0.5),
    Dense(1, activation='sigmoid')  # Output layer for binary classification
])
```

```
/usr/local/lib/python3.11/dist-packages/keras/src/layers/convolutional/base_conv.py:107: UserWarning: Do not pass an `input_shape`/`inpu
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
# Step 4: Compile the Model
model.compile(optimizer='adam', loss='binary_crossentropy', metrics=['accuracy'])
```

```
# Step 5: Train the Model
early_stop = EarlyStopping(monitor='val_loss', patience=5, restore_best_weights=True)

history = model.fit(
    train_generator,
    epochs=25,
    validation_data=val_generator,
    callbacks=[early_stop]
)
```

```
Epoch 1/25
/usr/local/lib/python3.11/dist-packages/keras/src/trainers/data_adapters/py_dataset_adapter.py:122: UserWarning: Your `PyDataset` class
  self._warn_if_super_not_called()
100/100 ━━━━━━━━━━━━━━━━━━━━ 157s 1s/step - accuracy: 0.8976 - loss: 1.5282 - val_accuracy: 0.5000 - val_loss: 70.8111
Epoch 2/25
100/100 ━━━━━━━━━━━━━━━━━━━━ 132s 1s/step - accuracy: 0.9831 - loss: 0.1825 - val_accuracy: 0.5000 - val_loss: 77.4527
Epoch 3/25
100/100 ━━━━━━━━━━━━━━━━━━━━ 134s 1s/step - accuracy: 0.9876 - loss: 0.2018 - val_accuracy: 0.5038 - val_loss: 29.1804
Epoch 4/25
100/100 ━━━━━━━━━━━━━━━━━━━━ 149s 1s/step - accuracy: 0.9862 - loss: 0.1574 - val_accuracy: 0.5487 - val_loss: 35.5958
Epoch 5/25
100/100 ━━━━━━━━━━━━━━━━━━━━ 124s 1s/step - accuracy: 0.9926 - loss: 0.0601 - val_accuracy: 0.7275 - val_loss: 11.4234
Epoch 6/25
100/100 ━━━━━━━━━━━━━━━━━━━━ 140s 1s/step - accuracy: 0.9950 - loss: 0.0513 - val_accuracy: 0.7400 - val_loss: 11.6773
Epoch 7/25
100/100 ━━━━━━━━━━━━━━━━━━━━ 132s 1s/step - accuracy: 0.9908 - loss: 0.0958 - val_accuracy: 0.8425 - val_loss: 3.9482
Epoch 8/25
100/100 ━━━━━━━━━━━━━━━━━━━━ 124s 1s/step - accuracy: 0.9939 - loss: 0.0628 - val_accuracy: 0.7850 - val_loss: 8.9398
Epoch 9/25
100/100 ━━━━━━━━━━━━━━━━━━━━ 140s 1s/step - accuracy: 0.9911 - loss: 0.1514 - val_accuracy: 0.8562 - val_loss: 6.1548
Epoch 10/25
100/100 ━━━━━━━━━━━━━━━━━━━━ 142s 1s/step - accuracy: 0.9947 - loss: 0.0572 - val_accuracy: 0.6775 - val_loss: 20.4675
Epoch 11/25
100/100 ━━━━━━━━━━━━━━━━━━━━ 132s 1s/step - accuracy: 0.9920 - loss: 0.0654 - val_accuracy: 0.7937 - val_loss: 7.1895
Epoch 12/25
100/100 ━━━━━━━━━━━━━━━━━━━━ 133s 1s/step - accuracy: 0.9988 - loss: 0.0072 - val_accuracy: 0.8388 - val_loss: 4.7486
```

```
# Step 6: Save the Model
model.save('cow_health_classifier.h5')
```

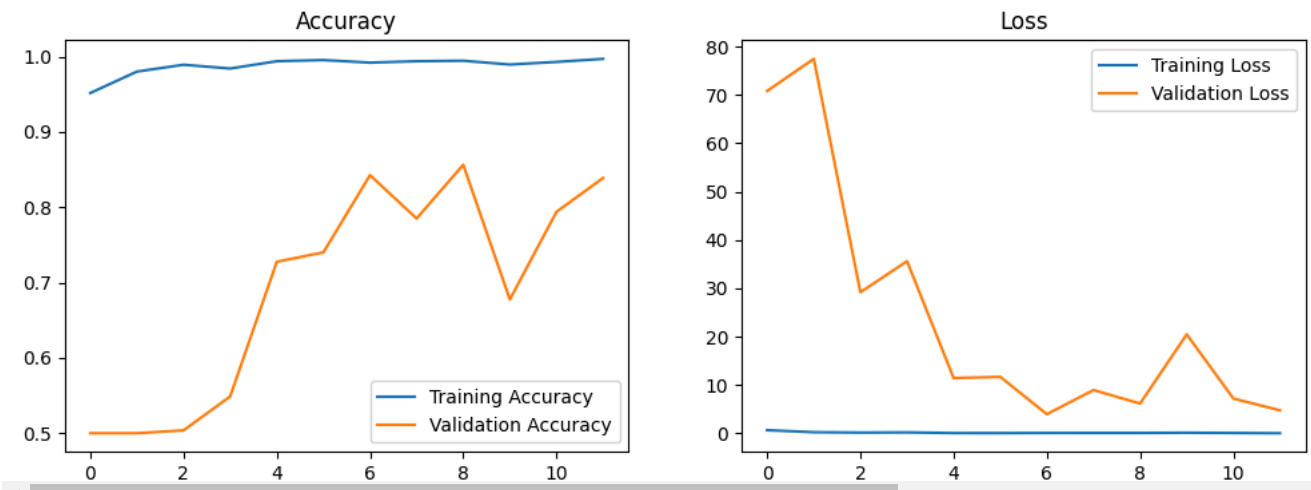
```
WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or `keras.saving.save_model(model)`. This file format is consi
```

```
# Step 7: Plot Training and Validation Accuracy and Loss
plt.figure(figsize=(12, 4))

plt.subplot(1, 2, 1)
plt.plot(history.history['accuracy'], label='Training Accuracy')
plt.plot(history.history['val_accuracy'], label='Validation Accuracy')
plt.legend()
plt.title('Accuracy')

plt.subplot(1, 2, 2)
plt.plot(history.history['loss'], label='Training Loss')
plt.plot(history.history['val_loss'], label='Validation Loss')
plt.legend()
plt.title('Loss')

plt.show()
```




```
from google.colab import files
files.download('cow_health_classifier.h5')
```

```
from tensorflow.keras.models import load_model

# Load the saved model
model = load_model('cow_health_classifier.h5')

# Display the model structure to confirm it loaded correctly
model.summary()
```

```
WARNING:absl:Compiled the loaded model, but the compiled metrics have yet to be built. `model.compile_metrics` will be empty until you t
Model: "sequential"
```

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 126, 126, 32)	896
batch_normalization (BatchNormalization)	(None, 126, 126, 32)	128
max_pooling2d (MaxPooling2D)	(None, 63, 63, 32)	0
conv2d_1 (Conv2D)	(None, 61, 61, 64)	18,496
batch_normalization_1 (BatchNormalization)	(None, 61, 61, 64)	256
max_pooling2d_1 (MaxPooling2D)	(None, 30, 30, 64)	0
conv2d_2 (Conv2D)	(None, 28, 28, 128)	73,856
batch_normalization_2 (BatchNormalization)	(None, 28, 28, 128)	512
max_pooling2d_2 (MaxPooling2D)	(None, 14, 14, 128)	0
flatten (Flatten)	(None, 25088)	0
dense (Dense)	(None, 256)	6,422,784
dropout (Dropout)	(None, 256)	0
dense_1 (Dense)	(None, 1)	257

```
Total params: 6,517,187 (24.86 MB)
Trainable params: 6,516,737 (24.86 MB)
```

```
import matplotlib.pyplot as plt
from PIL import Image

# Function to display an image from a file path
def display_image(image_path):
    # Open the image
```

```
    img = Image.open(image_path)

    # Display the image
    plt.imshow(img)
    plt.axis('off')  # Hide axes
    plt.show()


from tensorflow.keras.utils import load_img, img_to_array
import numpy as np

# Function to preprocess the image
def preprocess_image(image_path):
    img = load_img(image_path, target_size=(128, 128))  # Resize the image to (128, 128)
    img_array = img_to_array(img)  # Convert the image to a numpy array
    img_array = img_array / 255.0  # Normalize the pixel values to [0, 1]
    img_array = np.expand_dims(img_array, axis=0)  # Add a batch dimension
    return img_array

# Provide the path to the test image
image_path = '/content/unhealthy_1.jpeg'  # Replace with the path to your image
preprocessed_image = preprocess_image(image_path)

# Make a prediction
prediction = model.predict(preprocessed_image)

# Interpret the result
if prediction[0][0] > 0.5:
    print("Unhealthy Cow Detected (Infected)")
else:
    print("Healthy Cow Detected (Normal)")

display_image(image_path)
```

```
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 18ms/step
Unhealthy Cow Detected (Infected)
```