```
!pip install kaggle
```

```
Requirement already satisfied: kaggle in
/usr/local/lib/python3.11/dist-packages (1.6.17)
Requirement already satisfied: six>=1.10 in
/usr/local/lib/python3.11/dist-packages (from kaggle) (1.17.0)
Requirement already satisfied: certifi>=2023.7.22 in
/usr/local/lib/python3.11/dist-packages (from kaggle) (2025.1.31)
Requirement already satisfied: python-dateutil in
/usr/local/lib/python3.11/dist-packages (from kaggle) (2.8.2)
Requirement already satisfied: requests in
/usr/local/lib/python3.11/dist-packages (from kaggle) (2.32.3)
Requirement already satisfied: tqdm in /usr/local/lib/python3.11/dist-
packages (from kaggle) (4.67.1)
Requirement already satisfied: python-slugify in
/usr/local/lib/python3.11/dist-packages (from kaggle) (8.0.4)
Requirement already satisfied: urllib3 in
/usr/local/lib/python3.11/dist-packages (from kaggle) (2.3.0)
Requirement already satisfied: bleach in
/usr/local/lib/python3.11/dist-packages (from kaggle) (6.2.0)
Requirement already satisfied: webencodings in
/usr/local/lib/python3.11/dist-packages (from bleach->kaggle) (0.5.1)
Requirement already satisfied: text-unidecode>=1.3 in
/usr/local/lib/python3.11/dist-packages (from python-slugify->kaggle)
(1.3)
Requirement already satisfied: charset-normalizer<4,>=2 in
/usr/local/lib/python3.11/dist-packages (from requests->kaggle)
(3.4.1)
Requirement already satisfied: idna<4,>=2.5 in
/usr/local/lib/python3.11/dist-packages (from requests->kaggle) (3.10)
```

```
from google.colab import files
files.upload()
```

```
<IPython.core.display.HTML object>
```

```
Saving kaggle (1).json to kaggle (1).json
```

```
{'kaggle (1).json':
b'{"username":"makkmak12","key":"ba881d87c5dab3c0547e8ba888bedfff"}'}
```

```
!mkdir -p ~/.kaggle
!cp kaggle.json ~/.kaggle/
!chmod 600 ~/.kaggle/kaggle.json
```

```
cp: cannot stat 'kaggle.json': No such file or directory
chmod: cannot access '/root/.kaggle/kaggle.json': No such file or
directory
```

```
!kaggle datasets download -d shreyapmaher/fruits-dataset-images
```

```
Warning: Looks like you're using an outdated API Version, please
consider updating (server 1.7.4.2 / client 1.6.17)
Dataset URL: https://www.kaggle.com/datasets/shreyapmaher/fruits-
dataset-images
License(s): other
Downloading fruits-dataset-images.zip to /content
100% 204M/205M [00:10<00:00, 24.8MB/s]
100% 205M/205M [00:10<00:00, 21.2MB/s]
```

```
!unzip fruits-dataset-images.zip -d fruits_dataset
```

```
Archive:  fruits-dataset-images.zip
  inflating: fruits_dataset/images/apple fruit/Image_1.jpg
  inflating: fruits_dataset/images/apple fruit/Image_10.jpg
  inflating: fruits_dataset/images/apple fruit/Image_11.jpg
  inflating: fruits_dataset/images/apple fruit/Image_12.jpg
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  inflating: fruits_dataset/images/apple fruit/Image_40.jpeg
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  inflating: fruits_dataset/images/orange fruit/Image_1.jpg
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  inflating: fruits_dataset/images/strawberry fruit/Image_24.png
  inflating: fruits_dataset/images/strawberry fruit/Image_25.jpg
  inflating: fruits_dataset/images/strawberry fruit/Image_26.jpg
  inflating: fruits_dataset/images/strawberry fruit/Image_27.jpg
  inflating: fruits_dataset/images/strawberry fruit/Image_28.jpg
  inflating: fruits_dataset/images/strawberry fruit/Image_29.jpg
  inflating: fruits_dataset/images/strawberry fruit/Image_3.jpg
  inflating: fruits_dataset/images/strawberry fruit/Image_30.jpg
  inflating: fruits_dataset/images/strawberry fruit/Image_31.png
  inflating: fruits_dataset/images/strawberry fruit/Image_32.jpg
  inflating: fruits_dataset/images/strawberry fruit/Image_33.jpg
  inflating: fruits_dataset/images/strawberry fruit/Image_34.jpeg
  inflating: fruits_dataset/images/strawberry fruit/Image_35.jpg
  inflating: fruits_dataset/images/strawberry fruit/Image_36.jpg
  inflating: fruits_dataset/images/strawberry fruit/Image_37.jpg
  inflating: fruits_dataset/images/strawberry fruit/Image_38.jpg
  inflating: fruits_dataset/images/strawberry fruit/Image_39.jpg
  inflating: fruits_dataset/images/strawberry fruit/Image_4.jpg
  inflating: fruits_dataset/images/strawberry fruit/Image_40.jpg
  inflating: fruits_dataset/images/strawberry fruit/Image_5.jpg
  inflating: fruits_dataset/images/strawberry fruit/Image_6.jpg
  inflating: fruits_dataset/images/strawberry fruit/Image_7.jpg
  inflating: fruits_dataset/images/strawberry fruit/Image_8.jpg
  inflating: fruits_dataset/images/strawberry fruit/Image_9.jpg
```

```
!ls fruits-dataset-images
```

```
ls: cannot access 'fruits-dataset-images': No such file or directory
```

```
import tensorflow as tf
from tensorflow import keras
from tensorflow.keras import layers
from tensorflow.keras.preprocessing.image import ImageDataGenerator

IMG_SIZE=224
BATCH_SIZE=32

train_datagen=ImageDataGenerator(rescale=1./255,validation_split=0.2)

train_generator=train_datagen.flow_from_directory(
    '/content/fruits_dataset/images',
    target_size=(IMG_SIZE,IMG_SIZE),
    batch_size=BATCH_SIZE,
    class_mode='categorical',
    subset='training'
)
```

```
Found 288 images belonging to 9 classes.
```

```
val_generator=train_datagen.flow_from_directory(
    '/content/fruits_dataset/images',
    target_size=(IMG_SIZE,IMG_SIZE),
    batch_size=BATCH_SIZE,
    class_mode='categorical', # Changed from 'categorical' to 'sparse'
    subset='validation'
)
```

```
Found 71 images belonging to 9 classes.
```

```
class_indices=train_generator.class_indices
class_names=list(class_indices.keys())
print(class_indices)
```

```
{'apple fruit': 0, 'banana fruit': 1, 'cherry fruit': 2, 'chickoo
fruit': 3, 'grapes fruit': 4, 'kiwi fruit': 5, 'mango fruit': 6,
'orange fruit': 7, 'strawberry fruit': 8}
```

```
model=keras.Sequential([
    layers.Conv2D(32,(3,3),activation='relu',
input_shape=(IMG_SIZE,IMG_SIZE,3)),
    layers.MaxPooling2D((2,2)),
    layers.Conv2D(64,(3,3),activation='relu'),
    layers.MaxPooling2D((2,2)),
    layers.Conv2D(128,(3,3),activation='relu'),
    layers.MaxPooling2D((2,2)),
    layers.Flatten(),
    layers.Dense(128,activation='relu'),
    layers.Dense(9,activation='softmax')
])
```

```
/usr/local/lib/python3.11/dist-packages/keras/src/layers/
convolutional/base_conv.py:107: UserWarning: Do not pass an
`input_shape`/`input_dim` argument to a layer. When using Sequential
models, prefer using an `Input(shape)` object as the first layer in
the model instead.
  super().__init__(activity_regularizer=activity_regularizer,
**kwargs)
```

```
model.summary()
```

```
Model: "sequential"
```

```
┏━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━┳━━━━━━━━━━━━━━━━━━━━━━━━━━━━━┳━━━━━━━━━━━━━━━━━
┓
┃ Layer (type)                         ┃ Output Shape                ┃
Param # ┃
┡━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━━━━━━━━
┩
```

```
| conv2d (Conv2D)                      | (None, 222, 222, 32)        |
896 |
├──────────────────────────────────────┼─────────────────────────────┼
──────────────────┤
| max_pooling2d (MaxPooling2D)         | (None, 111, 111, 32)        |
0 |
├──────────────────────────────────────┼─────────────────────────────┼
──────────────────┤
| conv2d_1 (Conv2D)                    | (None, 109, 109, 64)        |
18,496 |
├──────────────────────────────────────┼─────────────────────────────┼
──────────────────┤
| max_pooling2d_1 (MaxPooling2D)       | (None, 54, 54, 64)          |
0 |
├──────────────────────────────────────┼─────────────────────────────┼
──────────────────┤
| conv2d_2 (Conv2D)                    | (None, 52, 52, 128)         |
73,856 |
├──────────────────────────────────────┼─────────────────────────────┼
──────────────────┤
| max_pooling2d_2 (MaxPooling2D)       | (None, 26, 26, 128)         |
0 |
├──────────────────────────────────────┼─────────────────────────────┼
──────────────────┤
| flatten (Flatten)                    | (None, 86528)               |
0 |
├──────────────────────────────────────┼─────────────────────────────┼
──────────────────┤
| dense (Dense)                        | (None, 128)                 |
11,075,712 |
├──────────────────────────────────────┼─────────────────────────────┼
──────────────────┤
| dense_1 (Dense)                      | (None, 9)                   |
1,161 |
└──────────────────────────────────────┴─────────────────────────────┴
──────────────────┘

 Total params: 11,170,121 (42.61 MB)

 Trainable params: 11,170,121 (42.61 MB)

 Non-trainable params: 0 (0.00 B)
```

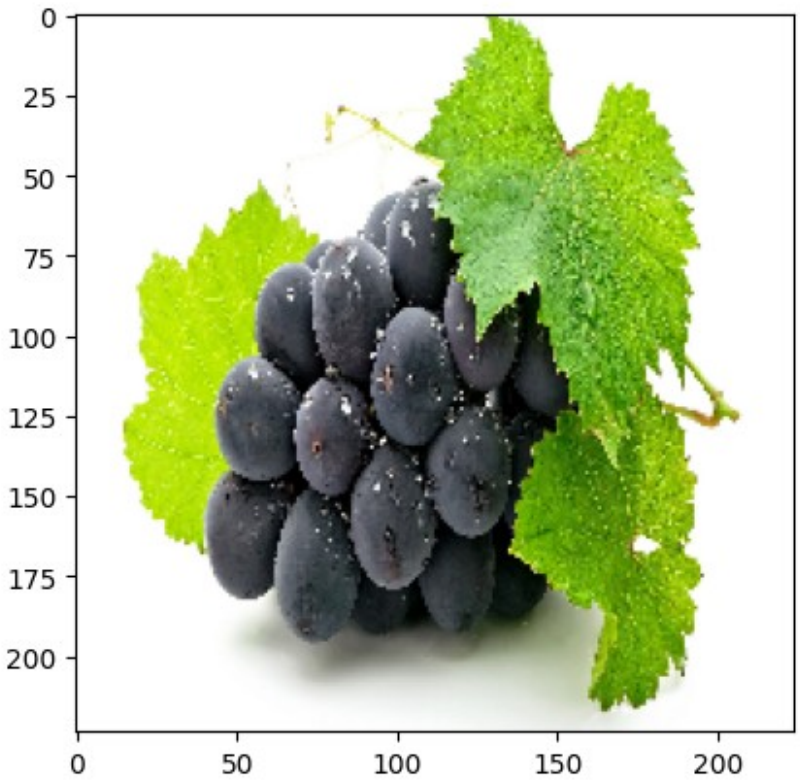
```
model.compile(optimizer='adam',loss='categorical_crossentropy',metrics
=['accuracy'])

model.fit(train_generator,epochs=9,validation_data=val_generator,batch
_size=BATCH_SIZE)
```

```
/usr/local/lib/python3.11/dist-packages/keras/src/trainers/
data_adapters/py_dataset_adapter.py:121: UserWarning: Your `PyDataset`
```

```
class should call `super().__init__(**kwargs)` in its constructor.
`**kwargs` can include `workers`, `use_multiprocessing`,
`max_queue_size`. Do not pass these arguments to `fit()`, as they will
be ignored.
  self._warn_if_super_not_called()

Epoch 1/9
9/9 ━━━━━━━━━━━━━━━━━━━━ 0s 751ms/step - accuracy: 0.1187 - loss:
3.8404

/usr/local/lib/python3.11/dist-packages/keras/src/trainers/
data_adapters/py_dataset_adapter.py:121: UserWarning: Your `PyDataset`
class should call `super().__init__(**kwargs)` in its constructor.
`**kwargs` can include `workers`, `use_multiprocessing`,
`max_queue_size`. Do not pass these arguments to `fit()`, as they will
be ignored.
  self._warn_if_super_not_called()

 9/9 ━━━━━━━━━━━━━━━━━━━━ 22s 2s/step - accuracy: 0.1176 - loss:
3.7793 - val_accuracy: 0.1831 - val_loss: 2.1573
Epoch 2/9
9/9 ━━━━━━━━━━━━━━━━━━━━ 11s 1s/step - accuracy: 0.1454 - loss: 2.1285
- val_accuracy: 0.2254 - val_loss: 1.9740
Epoch 3/9
9/9 ━━━━━━━━━━━━━━━━━━━━ 10s 1s/step - accuracy: 0.2431 - loss: 1.9845
- val_accuracy: 0.3944 - val_loss: 1.7240
Epoch 4/9
9/9 ━━━━━━━━━━━━━━━━━━━━ 12s 1s/step - accuracy: 0.4695 - loss: 1.5620
- val_accuracy: 0.4930 - val_loss: 1.5065
Epoch 5/9
9/9 ━━━━━━━━━━━━━━━━━━━━ 11s 1s/step - accuracy: 0.5593 - loss: 1.2962
- val_accuracy: 0.5070 - val_loss: 1.3385
Epoch 6/9
9/9 ━━━━━━━━━━━━━━━━━━━━ 9s 995ms/step - accuracy: 0.6621 - loss:
1.0262 - val_accuracy: 0.4930 - val_loss: 1.4159
Epoch 7/9
9/9 ━━━━━━━━━━━━━━━━━━━━ 10s 1s/step - accuracy: 0.7562 - loss: 0.6997
- val_accuracy: 0.5211 - val_loss: 1.8130
Epoch 8/9
9/9 ━━━━━━━━━━━━━━━━━━━━ 10s 1s/step - accuracy: 0.8135 - loss: 0.5731
- val_accuracy: 0.5211 - val_loss: 1.7913
Epoch 9/9
9/9 ━━━━━━━━━━━━━━━━━━━━ 10s 1s/step - accuracy: 0.8525 - loss: 0.4487
- val_accuracy: 0.5352 - val_loss: 1.8578

<keras.src.callbacks.history.History at 0x79e495def1d0>

model.save('/content/fruits_dataset/images_model.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 considered legacy. We recommend using instead the native Keras
format, e.g. `model.save('my_model.keras')` or
`keras.saving.save_model(model, 'my_model.keras')`.
```

```
from tensorflow.keras.preprocessing import image
import matplotlib.pyplot as plt
import numpy as np

test_image_path="/content/fruits_dataset/images/grapes
fruit/Image_1.jpg"
img=image.load_img(test_image_path,target_size=(224,224))
plt.imshow(img)
plt.axis()
plt.show()
```




```
img_array=image.img_to_array(img)
img_array=np.expand_dims(img_array,axis=0)
img_array/=255

prediction=model.predict(img_array)
print(prediction)
ind=np.argmax(prediction)
print(class_names[ind])
```

```
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 42ms/step
[[2.8775871e-06 2.6343189e-06 2.8723630e-01 2.6008688e-04 7.1238673e-
01
  8.3289058e-05 2.7726781e-05 1.9341767e-10 3.6498338e-07]]
grapes fruit
```