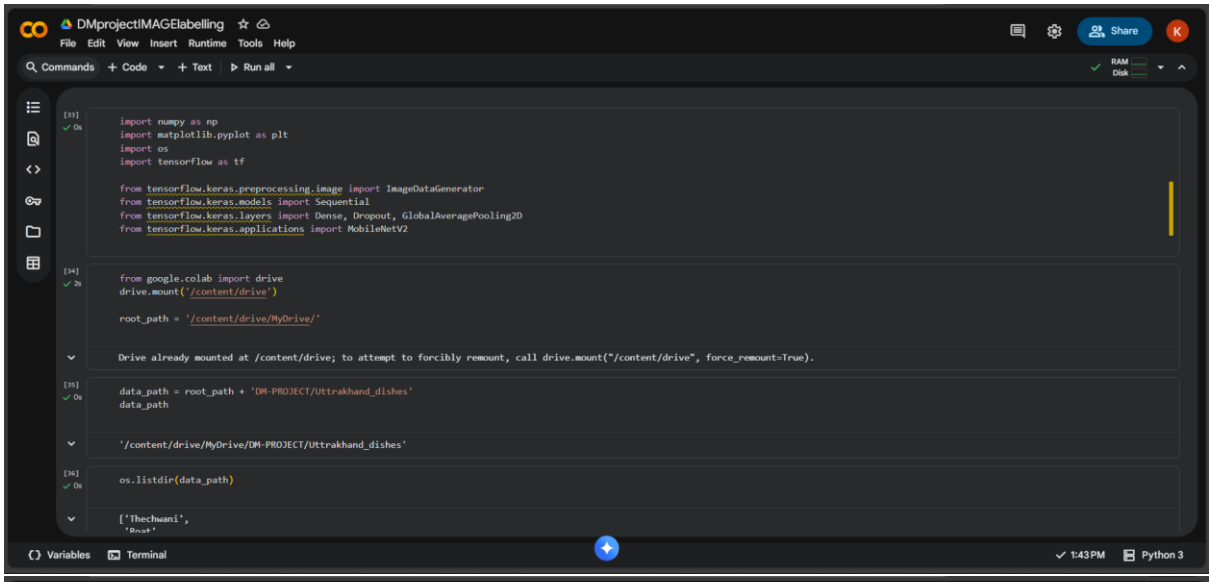
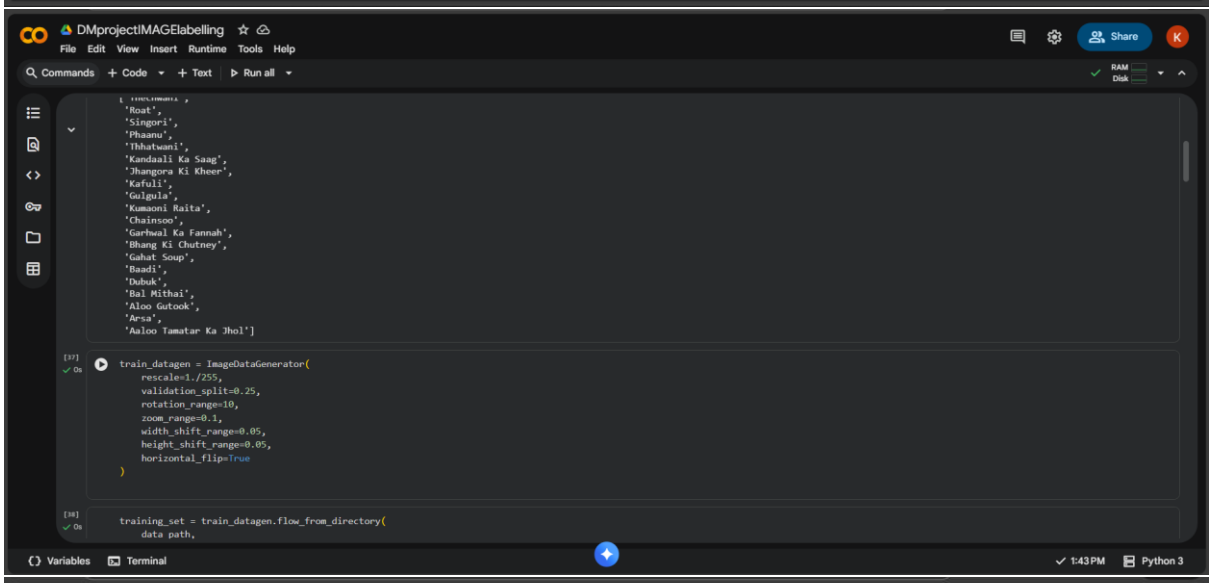
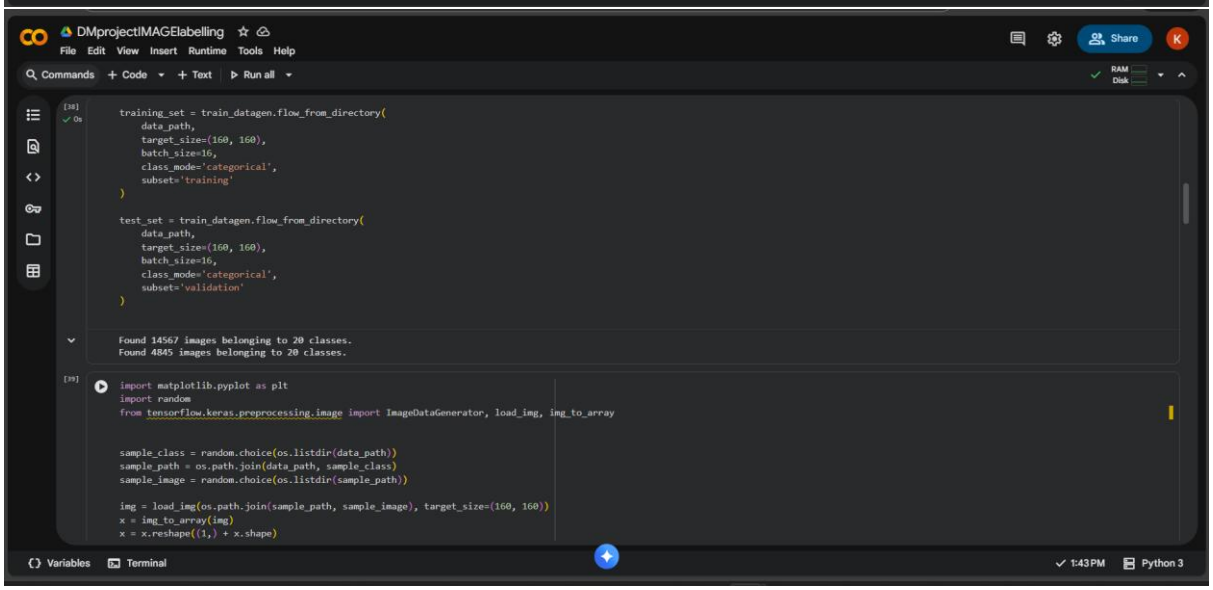
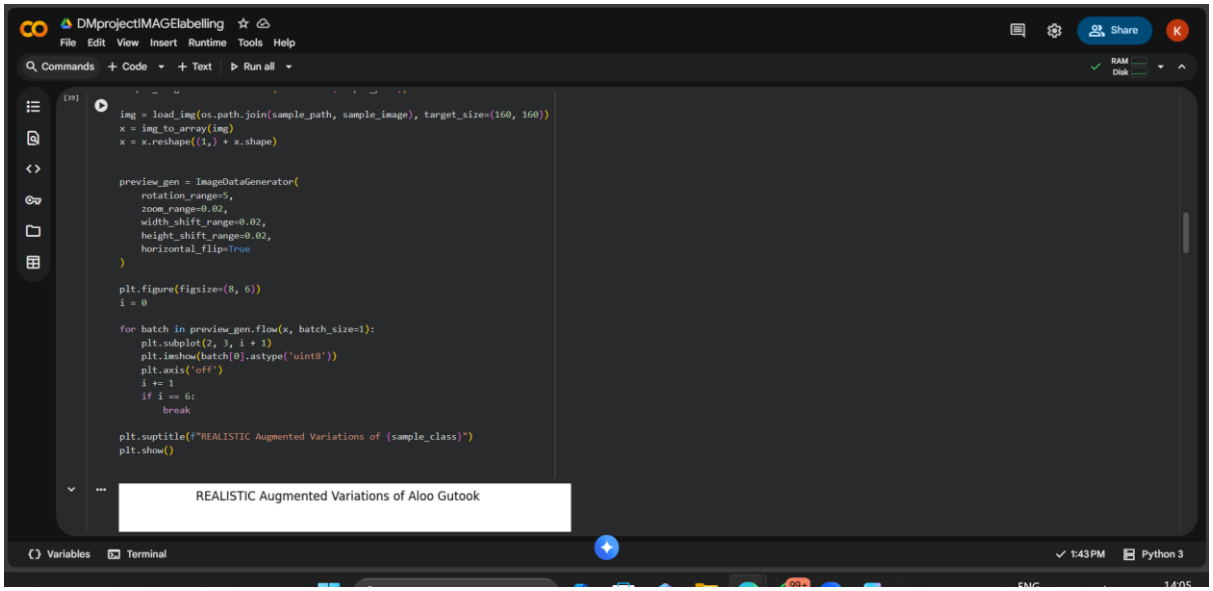
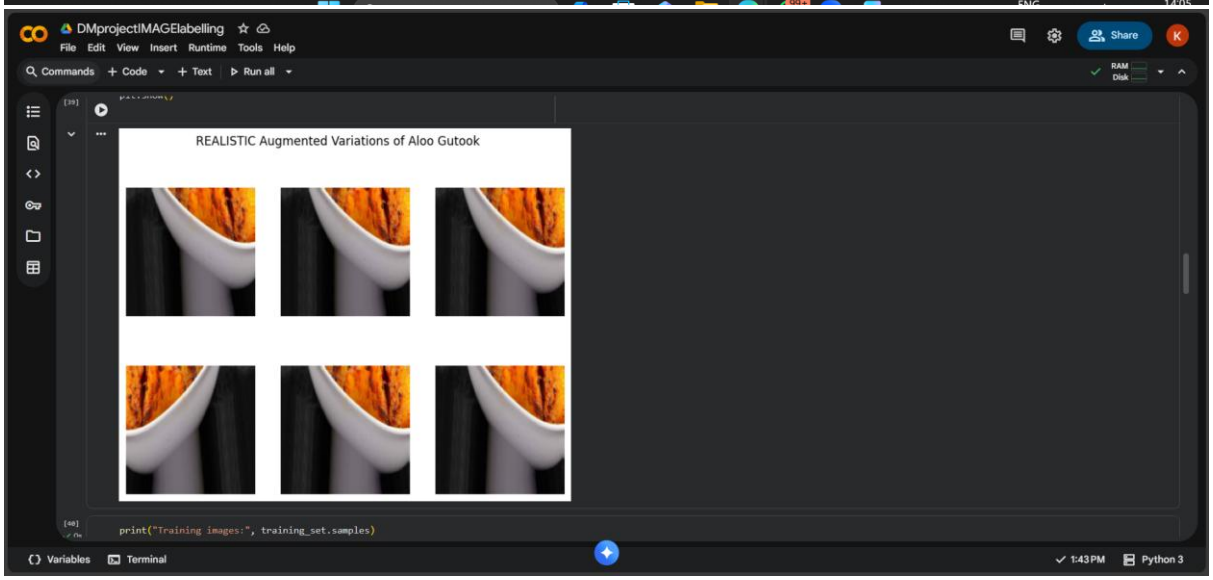
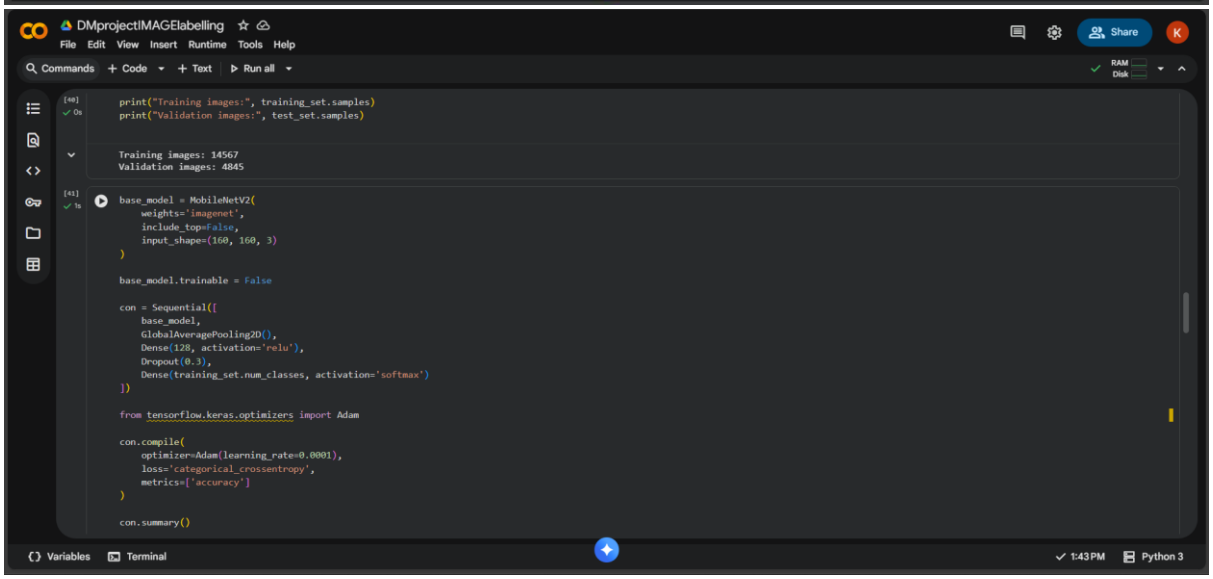

DMprojectIMAGElabelling
File Edit View Insert Runtime Tools Help
Commands + Code + Text Run all
Share
import numpy as np
import matplotlib.pyplot as plt
import os
import tensorflow as tf
from tensorflow.keras.preprocessing.image import ImageDataGenerator
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense, Dropout, GlobalAveragePooling2D
from tensorflow.keras.applications import MobileNetV2
from google.colab import drive
drive.mount('/content/drive')
root_path = '/content/drive/MyDrive/'
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).
data_path = root_path + 'DM-PROJECT/Uttrakhand_dishes'
data_path
'/content/drive/MyDrive/DM-PROJECT/Uttrakhand_dishes'
os.listdir(data_path)
['Thechwani',
Variables Terminal
1:43 PM Python 3


DMprojectIMAGElabelling
File Edit View Insert Runtime Tools Help
Commands + Code + Text Run all
Share
'Roat',
'Singori',
'Phaanu',
'Thhatwani',
'Kandaali Ka Saag',
'Jhangora Ki Kheer',
'Kafuli',
'Gulgula',
'Kumaoni Raita',
'Chainsoo',
'Garhwal Ka Fannah',
'Bhang Ki Chutney',
'Gahat Soup',
'Baadi',
'Dubuk',
'Bal Mithai',
'Aloo Gutook',
'Arsa',
'Aaloo Tamatar Ka Jhol']
train_datagen = ImageDataGenerator(
rescale=1./255,
validation_split=0.25,
rotation_range=10,
zoom_range=0.1,
width_shift_range=0.05,
height_shift_range=0.05,
horizontal_flip=True
)
training_set = train_datagen.flow_from_directory(
data_path,
Variables Terminal
1:43 PM Python 3


DMprojectIMAGElabelling
File Edit View Insert Runtime Tools Help
Commands + Code + Text Run all
Share
training_set = train_datagen.flow_from_directory(
data_path,
target_size=(160, 160),
batch_size=16,
class_mode='categorical',
subset='training'
)
test_set = train_datagen.flow_from_directory(
data_path,
target_size=(160, 160),
batch_size=16,
class_mode='categorical',
subset='validation'
)
Found 14567 images belonging to 20 classes.
Found 4845 images belonging to 20 classes.
import matplotlib.pyplot as plt
import random
from tensorflow.keras.preprocessing.image import ImageDataGenerator, load_img, img_to_array
sample_class = random.choice(os.listdir(data_path))
sample_path = os.path.join(data_path, sample_class)
sample_image = random.choice(os.listdir(sample_path))
img = load_img(os.path.join(sample_path, sample_image), target_size=(160, 160))
x = img_to_array(img)
x = x.reshape((1,) + x.shape)
Variables Terminal
1:43 PM Python 3


DMprojectIMAGElabelling
File Edit View Insert Runtime Tools Help
Share
Commands + Code + Text Run all
img = load_img(os.path.join(sample_path, sample_image), target_size=(160, 160))
x = img_to_array(img)
x = x.reshape((1,) + x.shape)
preview_gen = ImageDataGenerator(
rotation_range=5,
zoom_range=0.02,
width_shift_range=0.02,
height_shift_range=0.02,
horizontal_flip=True
)
plt.figure(figsize=(8, 6))
i = 0
for batch in preview_gen.flow(x, batch_size=1):
plt.subplot(2, 3, i + 1)
plt.imshow(batch[0].astype('uint8'))
plt.axis('off')
i += 1
if i == 6:
break
plt.suptitle(f"REALISTIC Augmented Variations of {sample_class}")
plt.show()
REALISTIC Augmented Variations of Aloo Gutook
Variables Terminal
1:43 PM Python 3


DMprojectIMAGElabelling
File Edit View Insert Runtime Tools Help
Share
Commands + Code + Text Run all
REALISTIC Augmented Variations of Aloo Gutook
print("Training images:", training_set.samples)
Variables Terminal
1:43 PM Python 3


DMprojectIMAGElabelling
File Edit View Insert Runtime Tools Help
Share
Commands + Code + Text Run all
print("Training images:", training_set.samples)
print("Validation images:", test_set.samples)
Training images: 14567
Validation images: 4845
base_model = MobileNetV2(
weights='imagenet',
include_top=False,
input_shape=(160, 160, 3)
)
base_model.trainable = False
con = Sequential([
base_model,
GlobalAveragePooling2D(),
Dense(128, activation='relu'),
Dropout(0.3),
Dense(training_set.num_classes, activation='softmax')
])
from tensorflow.keras.optimizers import Adam
con.compile(
optimizer=Adam(learning_rate=0.0001),
loss='categorical_crossentropy',
metrics=['accuracy']
)
con.summary()
Variables Terminal
1:43 PM Python 3

DMprojectIMAGElabelling

File Edit View Insert Runtime Tools Help

Share

Commands + Code + Text Run all

```
con.summary()
```

Model: "sequential_3"

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_160 (Functional)	(None, 5, 5, 1280)	2,257,984
global_average_pooling2d_3 (GlobalAveragePooling2D)	(None, 1280)	0
dense_6 (Dense)	(None, 128)	163,968
dropout_3 (Dropout)	(None, 128)	0
dense_7 (Dense)	(None, 20)	2,580

Total params: 2,424,532 (9.25 MB)
Trainable params: 166,548 (650.58 KB)
Non-trainable params: 2,257,984 (8.61 MB)

```
history = con.fit(
    training_set,
    validation_data=test_set,
    epochs=12,
    steps_per_epoch=80,        # MUCH faster
    validation_steps=20,
    verbose=1
)
```

```
Epoch 1/12
80/80 ━━━━━━━━━━━━━━━━━━━━ 281s 4s/step - accuracy: 0.7278 - loss: 0.9506 - val_accuracy: 0.8438 - val_loss: 0.7791
```

Variables Terminal 1:43 PM Python 3

DMprojectIMAGElabelling

File Edit View Insert Runtime Tools Help

Share

Commands + Code + Text Run all

```
)
```

```
Epoch 1/12
80/80 ━━━━━━━━━━━━━━━━━━━━ 281s 4s/step - accuracy: 0.7278 - loss: 0.9506 - val_accuracy: 0.8438 - val_loss: 0.7791
Epoch 2/12
80/80 ━━━━━━━━━━━━━━━━━━━━ 233s 3s/step - accuracy: 0.7651 - loss: 0.8174 - val_accuracy: 0.8531 - val_loss: 0.6354
Epoch 3/12
80/80 ━━━━━━━━━━━━━━━━━━━━ 216s 3s/step - accuracy: 0.7947 - loss: 0.7386 - val_accuracy: 0.8969 - val_loss: 0.4907
Epoch 4/12
80/80 ━━━━━━━━━━━━━━━━━━━━ 184s 2s/step - accuracy: 0.8475 - loss: 0.5779 - val_accuracy: 0.9187 - val_loss: 0.4126
Epoch 5/12
80/80 ━━━━━━━━━━━━━━━━━━━━ 158s 2s/step - accuracy: 0.8385 - loss: 0.5361 - val_accuracy: 0.9344 - val_loss: 0.4027
Epoch 6/12
80/80 ━━━━━━━━━━━━━━━━━━━━ 126s 2s/step - accuracy: 0.8934 - loss: 0.4376 - val_accuracy: 0.9344 - val_loss: 0.3529
Epoch 7/12
80/80 ━━━━━━━━━━━━━━━━━━━━ 140s 2s/step - accuracy: 0.8907 - loss: 0.4281 - val_accuracy: 0.9594 - val_loss: 0.2339
Epoch 8/12
80/80 ━━━━━━━━━━━━━━━━━━━━ 98s 1s/step - accuracy: 0.9042 - loss: 0.3566 - val_accuracy: 0.9844 - val_loss: 0.1960
Epoch 9/12
80/80 ━━━━━━━━━━━━━━━━━━━━ 110s 1s/step - accuracy: 0.9361 - loss: 0.2872 - val_accuracy: 0.9656 - val_loss: 0.1765
Epoch 10/12
80/80 ━━━━━━━━━━━━━━━━━━━━ 95s 1s/step - accuracy: 0.9337 - loss: 0.2825 - val_accuracy: 0.9781 - val_loss: 0.1832
Epoch 11/12
80/80 ━━━━━━━━━━━━━━━━━━━━ 86s 1s/step - accuracy: 0.9375 - loss: 0.2724 - val_accuracy: 0.9812 - val_loss: 0.1647
Epoch 12/12
31/80 ━━━━━━━━━━━━━━━━━━━━ 9s 196ms/step - accuracy: 0.9257 - loss: 0.2739/usr/local/lib/python3.12/dist-packages/keras/src/trainers/epoch_iterator.py:116: UserWarning: Your input ran out of data
  self._interrupted_warning()
80/80 ━━━━━━━━━━━━━━━━━━━━ 37s 459ms/step - accuracy: 0.9280 - loss: 0.2645 - val_accuracy: 0.9875 - val_loss: 0.1166
```

```
test_loss, test_accuracy = con.evaluate(test_set)

print("Test Accuracy:", test_accuracy)
```

Variables Terminal 1:43 PM Python 3

DMprojectIMAGElabelling

File Edit View Insert Runtime Tools Help

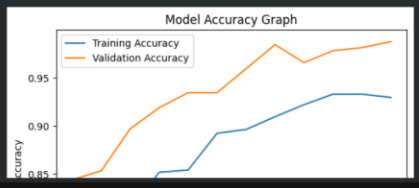
Share

Commands + Code + Text Run all

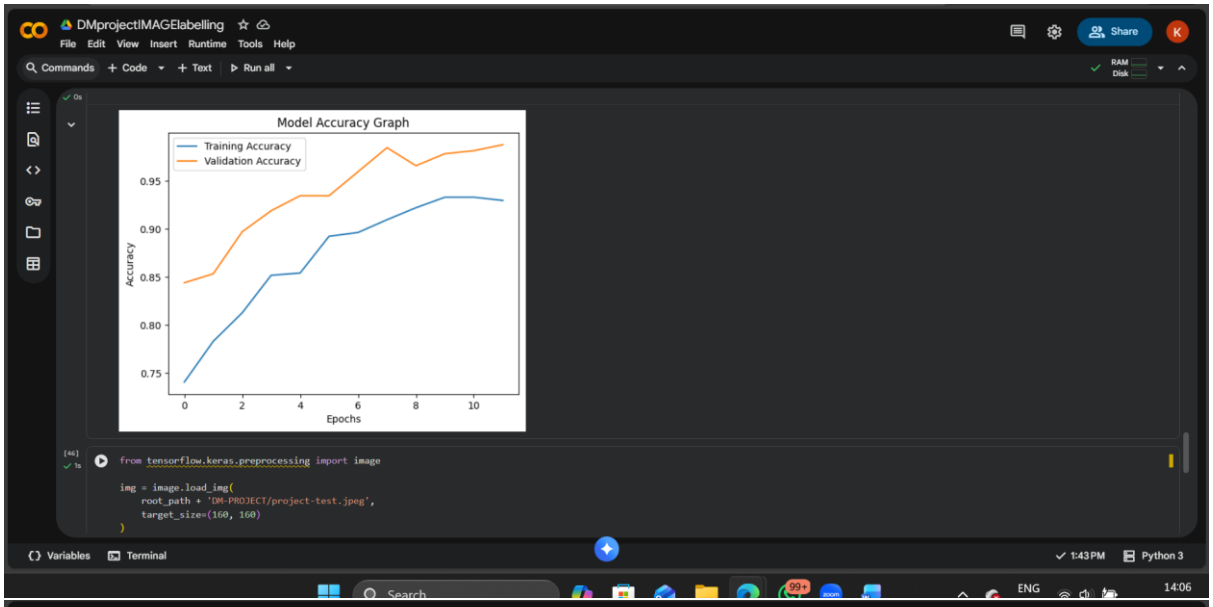
```
test_loss, test_accuracy = con.evaluate(test_set)

print("Test Accuracy:", test_accuracy)
```

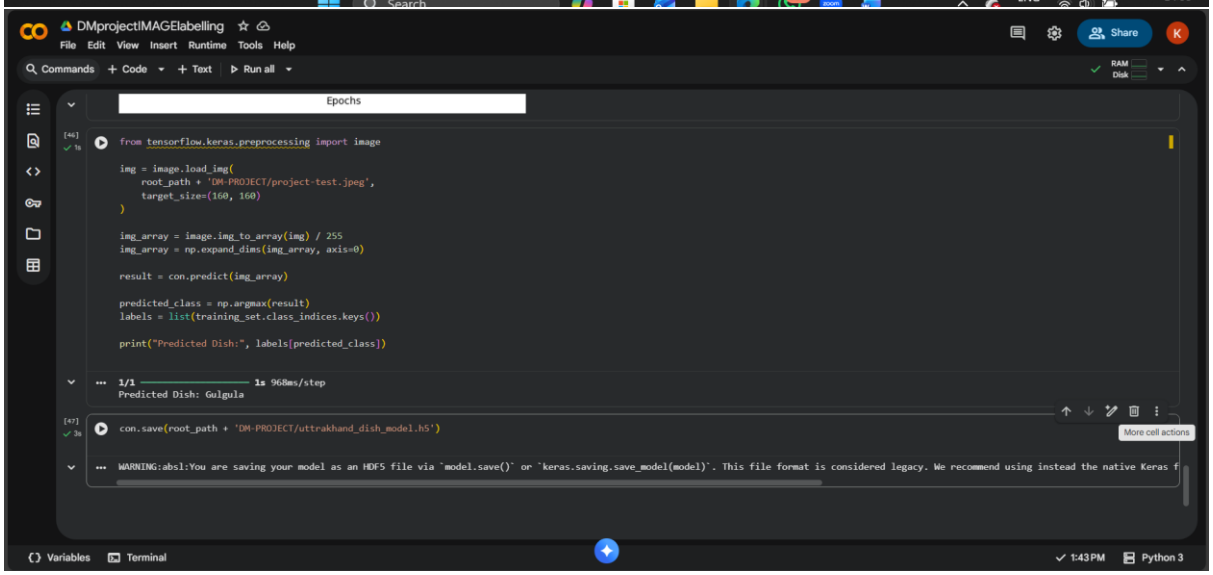
```
303/303 ━━━━━━━━━━━━━━━━━━━━ 392s 1s/step - accuracy: 0.9778 - loss: 0.1544
Test Accuracy: 0.9785345792770386
```

```
plt.plot(history.history['accuracy'])
plt.plot(history.history['val_accuracy'])

plt.xlabel('Epochs')
plt.ylabel('Accuracy')
plt.title('Model Accuracy Graph')
plt.legend(['Training Accuracy', 'Validation Accuracy'])

plt.show()
```



Variables Terminal 1:43 PM Python 3


DMprojectIMAGElabelling
File Edit View Insert Runtime Tools Help
Share
Commands + Code + Text Run all
Model Accuracy Graph
Training Accuracy
Validation Accuracy
Accuracy
Epochs
0.95
0.90
0.85
0.80
0.75
0 2 4 6 8 10
[46] 1s
from tensorflow.keras.preprocessing import image
img = image.load_img(
root_path + 'DM-PROJECT/project-test.jpeg',
target_size=(160, 160)
)
Variables Terminal
1:43 PM Python 3
Search
ENG
14:06


DMprojectIMAGElabelling
File Edit View Insert Runtime Tools Help
Share
Commands + Code + Text Run all
Epochs
[46] 1s
from tensorflow.keras.preprocessing import image
img = image.load_img(
root_path + 'DM-PROJECT/project-test.jpeg',
target_size=(160, 160)
)
img_array = image.img_to_array(img) / 255
img_array = np.expand_dims(img_array, axis=0)
result = con.predict(img_array)
predicted_class = np.argmax(result)
labels = list(training_set.class_indices.keys())
print("Predicted Dish:", labels[predicted_class])
1/1 1s 968ms/step
Predicted Dish: Gulgula
[47] 3s
con.save(root_path + 'DM-PROJECT/uttrakhand_dish_model.h5')
More cell actions
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 f
Variables Terminal
1:43 PM Python 3