

```
1 from google.colab import drive
2 drive.mount('/content/drive')
3
```

Mounted at /content/drive

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1 from google.colab import files
2 files.upload()
3
```

Choose Files No file chosen Upload widget is only available when the cell has been executed in the current browser session. Please rerun this cell to enable.
Saving kaggle.json to kaggle.json
{'kaggle.json':

```
1 !rm -r ~/.kaggle
2 !mkdir ~/.kaggle
3 !mv ./kaggle.json ~/.kaggle/
4 !chmod 600 ~/.kaggle/kaggle.json
5
```

rm: cannot remove '/root/.kaggle': No such file or directory

```
1 ! kaggle datasets list
```

ref	title	size	lastUpdated
carlmcbrideellis/llm-7-prompt-training-dataset	LLM: 7 prompt training dataset	41MB	2023-11-15 07:
thedrcat/daigt-proper-train-dataset	DAIGT Proper Train Dataset	119MB	2023-11-05 14:
thedrcat/daigt-v2-train-dataset	DAIGT V2 Train Dataset	29MB	2023-11-16 01:
joebeachcapital/30000-spotify-songs	30000 Spotify Songs	3MB	2023-11-01 06:
iamsouravbanerjee/customer-shopping-trends-dataset	Customer Shopping Trends Dataset	146KB	2023-10-05 06:
nelgiriwithana/world-educational-data	World Educational Data	9KB	2023-11-04 06:
prasad22/healthcare-dataset	Healthcare Dataset	483KB	2023-10-31
ddosad/auto-sales-data	Automobile Sales data	79KB	2023-11-18 12:
dillonmyrick/high-school-student-performance-and-demographics	High School Student Performance & Demographics	24KB	2023-11-10 01:
jacksondivakarr/online-shopping-dataset	Online Shopping Dataset	5MB	2023-11-
everydaycodings/job-opportunity-dataset	Job Opportunities Dataset	95KB	2023-11-20 08:
bwandowando/1-5-million-netflix-google-store-reviews	1.5 Million Netflix Google Store Reviews	114MB	2023-11-17
jdaustralia/icc-cwc23-all-innings-cleaned	ICC Cricket World Cup CWC23 All innings	28KB	2023-11-21 04:
anshtanwar/top-200-trending-books-with-reviews	Top 100 Bestselling Book Reviews on Amazon	422KB	2023-11-09 06:
joebeachcapital/coronavirus-covid-19-cases-daily-updates	Coronavirus (COVID-19) Cases (Daily Updates)	14MB	2023-11-23 23:
mauryansshivam/list-of-internet-products-of-top-tech-companies	List of Internet Products of Top Tech Companies	9KB	2023-11-15 19:
vikramrn/icc-mens-odi-world-cup-wc-2023	ICC mens cricket odi world cup wc 2023 - batting	16KB	2023-11-20 12:
samybaladram/databank-world-development-indicators	Global Socio-Economic & Demographic Insights	2MB	2023-11-06 05
shudhanshusingh/real-estate-properties-dataset	Real Estate Properties Dataset	882KB	2023-11-18 20:
samyakb/student-stress-factors	Student stress factors	887B	2023-11-02 12:

```
1 # wheat = olyadgetch/wheat-leaf-dataset 2gb
2 #Maize = smaranjitghose/corn-or-maize-leaf-disease-dataset 169mb
3 #rice2 = maimunulkjisan/rice-leaf-dataset-from-mendeley-data 205mb
4 #sugarcane = prabhakaransoundar/sugarcane-disease-dataset 2gb
5 #cotton = seroshkarim/cotton-leaf-disease-dataset 190mb
6 dataset_name = 'prabhakaransoundar/sugarcane-disease-dataset'
7 zip_name = dataset_name.split('/')[1]
8
9 !kaggle datasets download -d {dataset_name}
10
```

Downloading sugarcane-disease-dataset.zip to /content
100% 1.99G/2.00G [00:25<00:00, 146MB/s]
100% 2.00G/2.00G [00:25<00:00, 83.1MB/s]

```
1 !unzip -q ./sugarcane-disease-dataset.zip -d /content/drive/MyDrive/GROUP-4/EDI/Dataset
```

```

1 import numpy as np
2 import time
3
4 import PIL.Image as Image
5 import matplotlib.pyplot as plt
6
7 import tensorflow as tf
8 import tensorflow_hub as hub
9
10 import os
11 import shutil
12 from sklearn.model_selection import train_test_split
13 from tqdm import tqdm
14
15 import matplotlib.pyplot as plt
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17 from sklearn.metrics import confusion_matrix
18 import seaborn as sns
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Copying files for class Bacterial Blight: 100% ██████████ 70/70 [00:03<00:00, 17.88it/s]
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Copying files for class Healthy: 100% ██████████ 70/70 [00:07<00:00, 9.44it/s]
Copying files for class Healthy: 100% ██████████ 30/30 [00:02<00:00, 13.68it/s]
Copying files for class Red Rot: 100% ██████████ 70/70 [00:06<00:00, 11.50it/s]
Copying files for class Red Rot: 100% ██████████ 30/30 [00:03<00:00, 9.03it/s]

```

```
1 batch_size = 32
2 img_height = 224
3 img_width = 224
4 data_root = '/content/drive/MyDrive/GROUP-4/EDI/split_dataset/cotton/train'
5
6 train_ds = tf.keras.preprocessing.image_dataset_from_directory(
7     str(data_root),
8     validation_split=0.2,
9     subset="training",
10    seed=123,
11    image_size=(img_height, img_width),
12    batch_size=batch_size)
```

```
Found 1196 files belonging to 4 classes.
Using 957 files for training.
```

```
1 class_names = np.array(train_ds.class_names)
2 print('class names for predictions :',class_names)
```

```
class names for predictions : ['bacterial_blight' 'curl_virus' 'fussarium_wilt' 'healthy']
```

```
1 normalization_layer = tf.keras.layers.experimental.preprocessing.Rescaling(1./255)
2 train_ds = train_ds.map(lambda x, y: (normalization_layer(x), y))
```

```
1 AUTOTUNE = tf.data.AUTOTUNE
2 train_ds = train_ds.cache().prefetch(buffer_size=AUTOTUNE)
```

```
1 for image_batch, labels_batch in train_ds:
2     print(image_batch.shape)
3     print(labels_batch.shape)
4     break
```

$$\begin{array}{l} (32, 224, 224, 3) \\ (32,) \end{array}$$

```
1 feature_extractor_model = "https://tfhub.dev/google/tf2-preview/mobilenet_v2/feature_vector/4"
2 feature_extractor_layer = hub.KerasLayer(
3     feature_extractor_model, input_shape=(224, 224, 3), trainable=False)
```

```
1 num_classes = len(class_names)
2
3 model = tf.keras.Sequential([
4     feature_extractor_layer,
5     tf.keras.layers.Dense(num_classes)
6 ])
7
8 model.summary()
```

```
Model: "sequential_1"
```

Layer (type)	Output Shape	Param #
keras_layer_1 (KerasLayer)	(None, 1280)	2257984
dense_1 (Dense)	(None, 4)	5124
Total params: 2263108 (8.63 MB)		
Trainable params: 5124 (20.02 KB)		
Non-trainable params: 2257984 (8.61 MB)		

```
1 image_batch.shape
```

```
TensorShape([32, 224, 224, 3])
```

```

1 model.compile(
2     optimizer=tf.keras.optimizers.Adam(),
3     loss=tf.keras.losses.SparseCategoricalCrossentropy(from_logits=True),
4     metrics=['acc'])

1 class CollectBatchStats(tf.keras.callbacks.Callback):
2     def __init__(self):
3         self.batch_losses = []
4         self.batch_acc = []
5
6     def on_train_batch_end(self, batch, logs=None):
7         self.batch_losses.append(logs['loss'])
8         self.batch_acc.append(logs['acc'])
9         self.model.reset_metrics()
10
11 batch_stats_callback = CollectBatchStats()
12
13 history = model.fit(train_ds, epochs=5,
14                     callbacks=[batch_stats_callback])

Epoch 1/5
30/30 [=====] - 73s 2s/step - loss: 0.0000e+00 - acc: 0.0000e+00
Epoch 2/5
30/30 [=====] - 1s 43ms/step - loss: 0.0000e+00 - acc: 0.0000e+00
Epoch 3/5
30/30 [=====] - 1s 41ms/step - loss: 0.0000e+00 - acc: 0.0000e+00
Epoch 4/5
30/30 [=====] - 1s 41ms/step - loss: 0.0000e+00 - acc: 0.0000e+00
Epoch 5/5
30/30 [=====] - 1s 43ms/step - loss: 0.0000e+00 - acc: 0.0000e+00

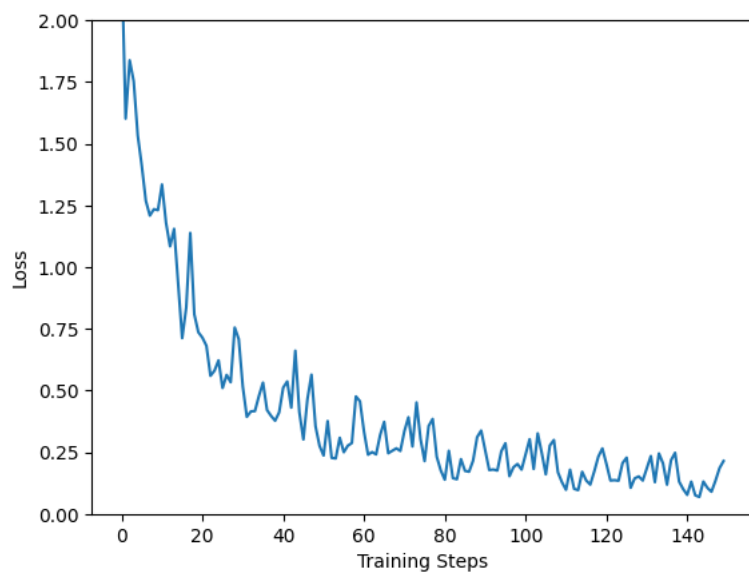
```

```

1 plt.figure()
2 plt.ylabel("Loss")
3 plt.xlabel("Training Steps")
4 plt.ylim([0,2])
5 plt.plot(batch_stats_callback.batch_losses)

[<matplotlib.lines.Line2D at 0x7c4b1bb33130>]

```

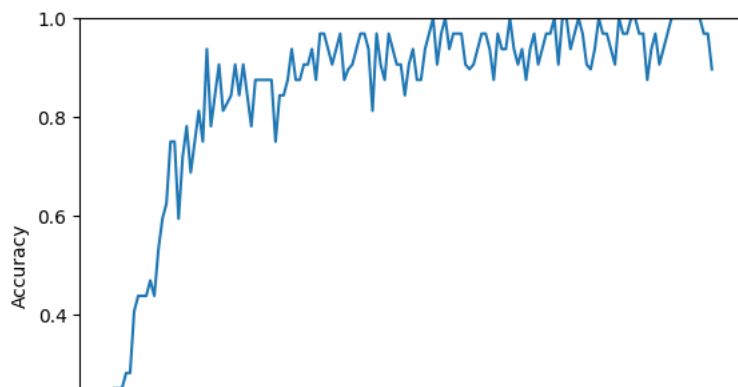


```

1 plt.figure()
2 plt.ylabel("Accuracy")
3 plt.xlabel("Training Steps")
4 plt.ylim([0,1])
5 plt.plot(batch_stats_callback.batch_acc)

```

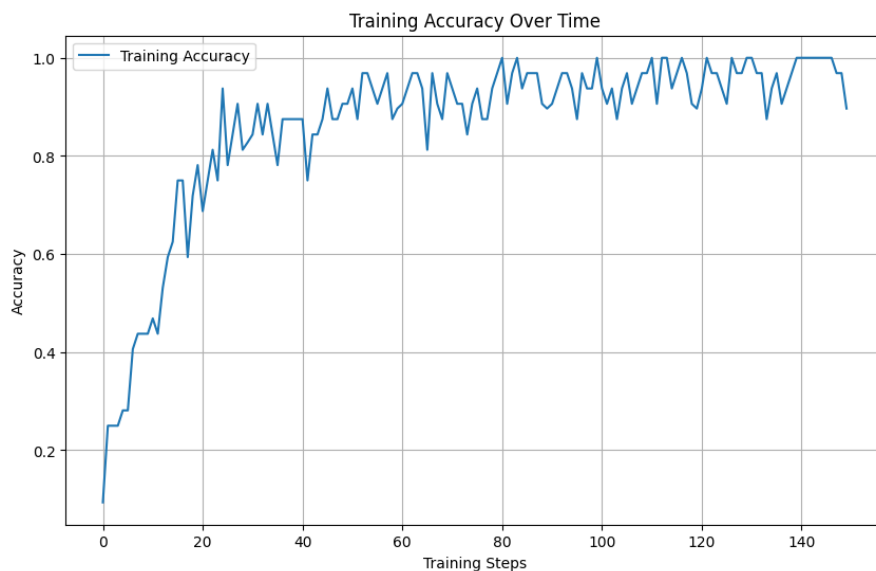
[<matplotlib.lines.Line2D at 0x7c4b1bba3910>]



```

1 import matplotlib.pyplot as plt
2
3 # Access accuracy values collected during training
4 batch_acc = batch_stats_callback.batch_acc
5
6 # Plot the accuracy matrix
7 plt.figure(figsize=(10, 6))
8 plt.plot(batch_acc, label='Training Accuracy')
9 plt.xlabel('Training Steps')
10 plt.ylabel('Accuracy')
11 plt.title('Training Accuracy Over Time')
12 plt.legend()
13 plt.grid(True)
14 plt.show()
15

```



```

1 # Load and preprocess validation dataset
2 data_root_val = '/content/drive/MyDrive/GROUP-4/EDI/split_dataset/cotton/val'
3
4 val_ds = tf.keras.preprocessing.image_dataset_from_directory(
5     str(data_root),
6     validation_split=0.2,
7     subset="validation", # Use validation subset
8     seed=123,
9     image_size=(img_height, img_width),
10    batch_size=batch_size)
11
12 val_ds = val_ds.map(lambda x, y: (normalization_layer(x), y))
13 val_ds = val_ds.cache().prefetch(buffer_size=AUTOTUNE)
14
15 # Evaluate the model on the validation dataset
16 val_loss, val_accuracy = model.evaluate(val_ds)
17
18 print(f"Validation Loss: {val_loss * 100:.2f}%")
19 print(f"Validation Accuracy: {val_accuracy * 100:.2f}%")
20

```

```

Found 1196 files belonging to 4 classes.
Using 239 files for validation.
8/8 [=====] - 19s 110ms/step - loss: 0.1482 - acc: 0.9623
Validation Loss: 14.82%
Validation Accuracy: 96.23%

```

```

1 true_labels = []
2 predicted_labels = []
3
4 for images, labels in val_ds:
5     true_labels.extend(labels.numpy()) # Collect true labels
6     predictions = model.predict(images)
7     predicted_labels.extend(tf.argmax(predictions, axis=1).numpy()) # Collect predicted labels
8

```

```

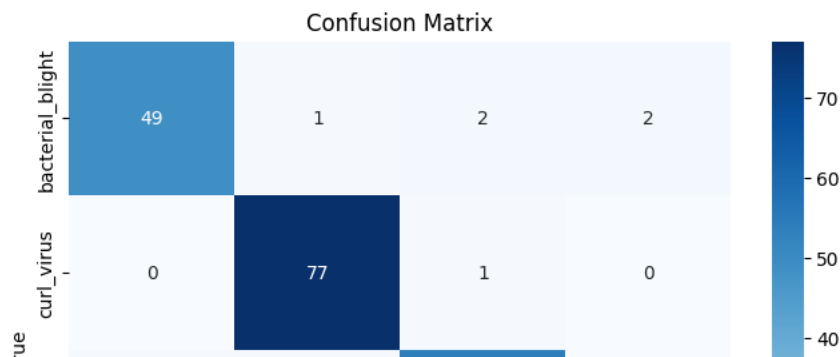
1/1 [=====] - 1s 798ms/step
1/1 [=====] - 0s 66ms/step
1/1 [=====] - 0s 49ms/step
1/1 [=====] - 0s 43ms/step
1/1 [=====] - 0s 73ms/step
1/1 [=====] - 0s 46ms/step
1/1 [=====] - 0s 55ms/step
1/1 [=====] - 1s 767ms/step

```

```

1 import numpy as np
2 import matplotlib.pyplot as plt
3 from sklearn.metrics import confusion_matrix
4 import seaborn as sns
5
6 # Calculate confusion matrix
7 cm = confusion_matrix(true_labels, predicted_labels)
8
9 # Plot confusion matrix as a heatmap
10 plt.figure(figsize=(8, 6))
11 sns.heatmap(cm, annot=True, fmt="d", cmap="Blues", xticklabels=class_names, yticklabels=class_names)
12 plt.xlabel('Predicted')
13 plt.ylabel('True')
14 plt.title('Confusion Matrix')
15 plt.show()
16

```



```

1 # Specify the path for saving the model in Google Drive
2 h5_export_path = "/content/drive/MyDrive/cotton_model.h5"
3
4 # Save the model as an HDF5 file
5 model.save(h5_export_path)
6
7 print(f"Model saved as {h5_export_path}")
8

```

```

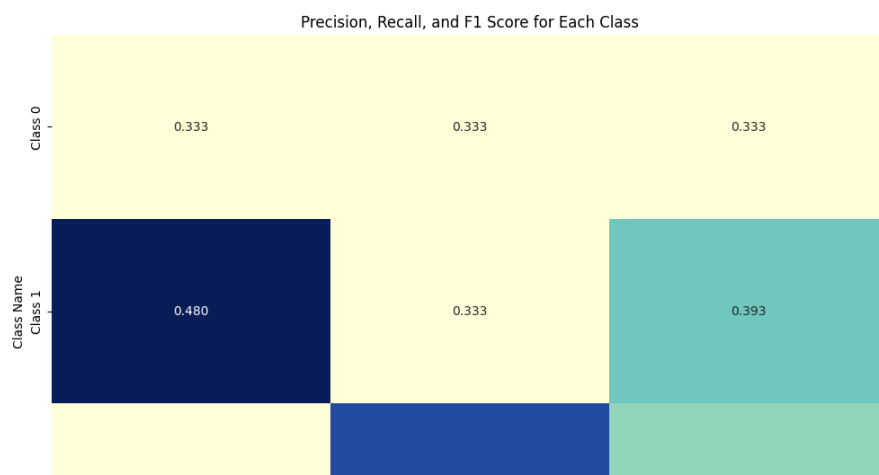
/usr/local/lib/python3.10/dist-packages/keras/src/engine/training.py:3079: UserWarning: You are saving your model as an HDF5 file via `
  saving_api.save_model(
Model saved as /content/drive/MyDrive/cotton_model.h5

```

```

1 import numpy as np
2 import matplotlib.pyplot as plt
3 from sklearn.metrics import confusion_matrix, precision_score, recall_score, f1_score
4 import seaborn as sns
5 import pandas as pd # Import pandas library
6
7 # Generate example data (replace this with your actual data)
8 np.random.seed(42)
9 true_labels = np.random.randint(0, 3, 100)
10 predicted_labels = np.random.randint(0, 3, 100)
11 class_names = ['Class 0', 'Class 1', 'Class 2']
12
13 # Calculate confusion matrix
14 cm = confusion_matrix(true_labels, predicted_labels)
15
16 # Calculate precision, recall, and f1 score for each class
17 precision = precision_score(true_labels, predicted_labels, average=None)
18 recall = recall_score(true_labels, predicted_labels, average=None)
19 f1 = f1_score(true_labels, predicted_labels, average=None)
20
21 # Plot precision, recall, and f1 score in a table
22 plt.figure(figsize=(12, 8))
23 table_data = {'Class Name': class_names, 'Precision': precision, 'Recall': recall, 'F1 Score': f1}
24 sns.heatmap(pd.DataFrame(table_data).set_index('Class Name'), annot=True, cmap="YlGnBu", fmt=".3f", cbar=False)
25 plt.xlabel('Metrics')
26 plt.title('Precision, Recall, and F1 Score for Each Class')
27 plt.show()
28

```



```

1 import numpy as np
2 import matplotlib.pyplot as plt
3 from sklearn.metrics import confusion_matrix, precision_score, recall_score
4 import pandas as pd
5
6 # Calculate confusion matrix
7 cm = confusion_matrix(true_labels, predicted_labels)
8
9 # Calculate precision and recall for each class as float values
10 precision = precision_score(true_labels, predicted_labels, average=None)
11 recall = recall_score(true_labels, predicted_labels, average=None)
12
13 # Multiply precision and recall by 100 and format to two decimal places
14 precision = ["{:.2f}".format(p * 100) for p in precision]
15 recall = ["{:.2f}".format(r * 100) for r in recall]
16
17 # Create a table with reduced width
18 plt.figure(figsize=(4, 4)) # Smaller table width
19 table_data = {'Class Name': class_names, 'Precision': precision, 'Recall': recall}
20 ax = plt.subplot(111, frame_on=False) # Remove frame around table
21 ax.xaxis.set_visible(False)
22 ax.yaxis.set_visible(False)
23
24 # Convert the column labels to a list
25 col_labels = list(table_data.keys())
26
27 # Use col_labels when creating the table
28 ax.table(cellText=pd.DataFrame(table_data).values, colLabels=col_labels, cellLoc='center', loc='center')
29
30 plt.title('Precision and Recall for Each Class')
31 plt.show()
32

```



Precision and Recall for Each Class

Class Name	Precision	Recall
Class 0	33.33	33.33
Class 1	48.00	33.33
Class 2	33.33	45.16