

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

Mounted at /content/drive

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

kaggle.json

- **kaggle.json**(application/json) - 67 bytes, last modified: 11/13/2023 - 100% done








Saving kaggle.json to kaggle.json

```
{'kaggle.json':
  h'{"username": "aditvaadaki", "key": "ch98516ac51f67d4df2hd5hcr7dr8d06"}'}
```

```
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
maso0dahmed/netflix-movies-and-shows	Netflix Movies and Shows	172KB	2023-11-19 18:
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-
willianoliveiragabin/animal-condition	Animal Condition	12KB	2023-11-14 20:
ethankeyes/nba-all-star-players-and-stats-1980-2022	NBA All Star Players and Stats 1980-2022	46KB	2023-11-16 21:
everydaycodings/job-opportunity-dataset	Job Opportunities Dataset	95KB	2023-11-20 08:
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:

```
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 = prabhakaranoundar/sugarcane-disease-dataset 2gb
5 #cotton = seroshkarim/cotton-leaf-disease-dataset 190mb
6 dataset_name = 'maimunulkjisan/rice-leaf-dataset-from-mendeley-data'
7 zip_name = dataset_name.split('/')[1]
8
9 !kaggle datasets download -d {dataset_name}
10
```

Downloading rice-leaf-dataset-from-mendeley-data.zip to /content

99% 193M/196M [00:02<00:00, 92.3MB/s]

100% 196M/196M [00:02<00:00, 89.5MB/s]

```
1 !unzip -q ./rice-leaf-dataset-from-mendeley-data.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 Bacterialblight: 100%|██████████| 1108/1108 [00:10<00:00, 108.42it/s]
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Copying files for class Blast: 100%|██████████| 1008/1008 [00:09<00:00, 107.26it/s]
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Copying files for class Brownspot: 100%|██████████| 1120/1120 [00:10<00:00, 109.76it/s]
Copying files for class Brownspot: 100%|██████████| 480/480 [00:03<00:00, 121.97it/s]
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Copying files for class Tungro: 100%|██████████| 393/393 [00:03<00:00, 124.62it/s]

```

```

1 batch_size = 32
2 img_height = 224
3 img_width = 224
4 data_root = '/content/drive/MyDrive/GROUP-4/EDI/split_dataset/wheat_leaf/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 283 files belonging to 3 classes.
Using 227 files for training.

```

```

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

class names for predictions : ['Healthy' 'septoria' 'stripe_rust']

```

```

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

```

```

(32, 224, 224, 3)
(32,)

```

```

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_4"
```

Layer (type)	Output Shape	Param #
keras_layer_4 (KerasLayer)	(None, 1280)	2257984
dense_4 (Dense)	(None, 3)	3843

```

=====
Total params: 2261827 (8.63 MB)
Trainable params: 3843 (15.01 KB)
Non-trainable params: 2257984 (8.61 MB)
=====

```

```
1 image_batch.shape
```

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

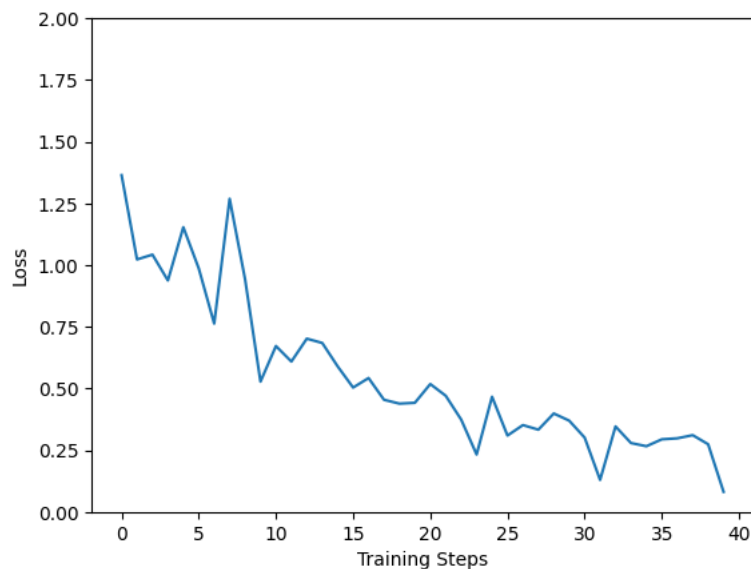
```
1 model.compile(
2     optimizer=tf.keras.optimizers.Adam(),
3     loss=tf.keras.losses.SparseCategoricalCrossentropy(from_logits=True),
4     metrics=['acc'])

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
8/8 [=====] - 33s 106ms/step - loss: 0.0000e+00 - acc: 0.0000e+00
Epoch 2/5
8/8 [=====] - 0s 49ms/step - loss: 0.0000e+00 - acc: 0.0000e+00
Epoch 3/5
8/8 [=====] - 0s 41ms/step - loss: 0.0000e+00 - acc: 0.0000e+00
Epoch 4/5
8/8 [=====] - 0s 39ms/step - loss: 0.0000e+00 - acc: 0.0000e+00
Epoch 5/5
8/8 [=====] - 0s 40ms/step - loss: 0.0000e+00 - acc: 0.0000e+00
```

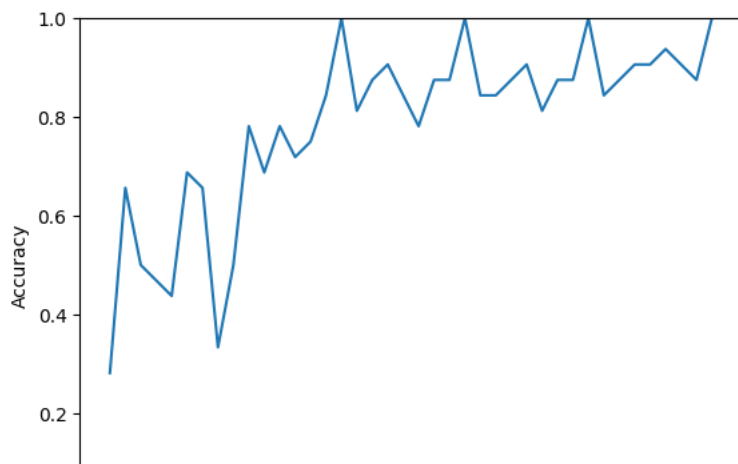
```
1 plt.figure()
2 plt.ylabel("Loss")
3 plt.xlabel("Training Steps")
4 plt.ylim([0,2])
5 plt.plot(batch_stats_callback.batch_losses)
```

```
[<matplotlib.lines.Line2D at 0x7c4b1dfe1bd0>]
```

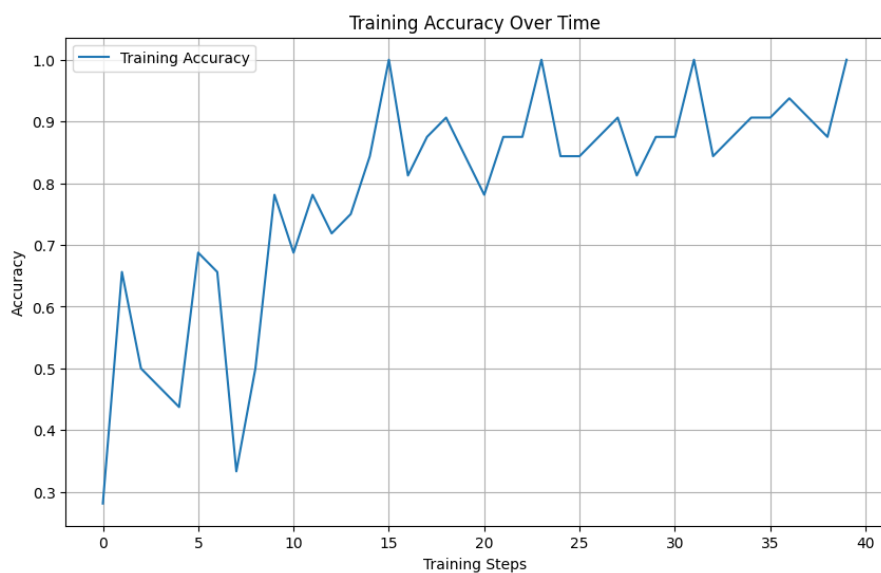


```
1 plt.figure()
2 plt.ylabel("Accuracy")
3 plt.xlabel("Training Steps")
4 plt.ylim([0,1])
5 plt.plot(batch_stats_callback.batch_acc)
```

[<matplotlib.lines.Line2D at 0x7c4b1c5607c0>]



```
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/wheat_leaf/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 283 files belonging to 3 classes.
Using 56 files for validation.
2/2 [=====] - 15s 517ms/step - loss: 0.4126 - acc: 0.8750
Validation Loss: 41.26%
Validation Accuracy: 87.50%

```

```

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

```

```

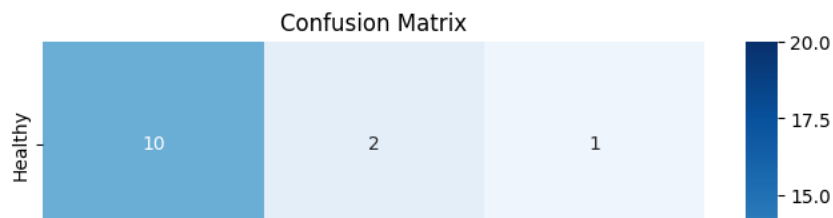
1/1 [=====] - 0s 465ms/step
1/1 [=====] - 1s 518ms/step

```

```

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/wheat_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/wheat_model.h5

```

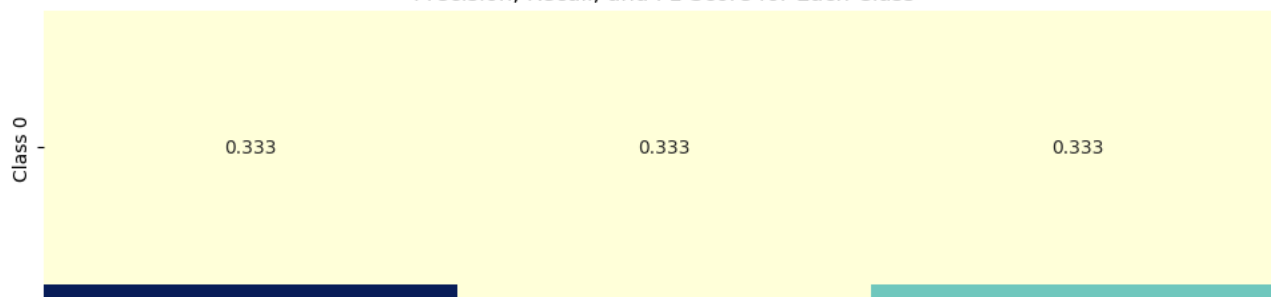
```

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

```



## Precision, Recall, and F1 Score for Each Class



```

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 = ["{:0.2f}".format(p * 100) for p in precision]
15 recall = ["{:0.2f}".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	15.38	20.00
Class 1	40.00	30.77
Class 2	16.67	20.83
class 3	29.17	23.33