OUTPUTS

Project Outputs for COVID-19 Radiography Classification(X-RAY)

Variation – 1:

```
Listing and processing 3 images in the 'COVID' directory:
1/1 ━━━━━━━━━━━━━━━━━━━━ 1s 584ms/step
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 19ms/step
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 18ms/step
```

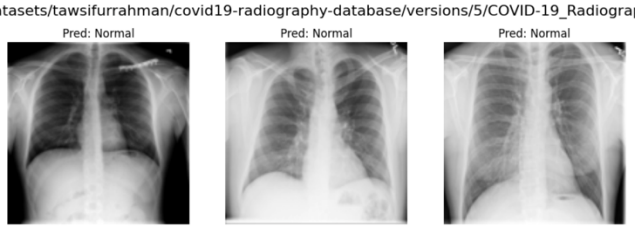
Predictions for /root/.cache/kagglehub/datasets/tawsifurrahman/covid19-radiography-database/versions/5/COVID-19_Radiography_Dataset/COVID/images Directory


```
Listing and processing 3 images in the 'Lung_Opacity' directory:
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 18ms/step
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 17ms/step
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 17ms/step
```

Predictions for /root/.cache/kagglehub/datasets/tawsifurrahman/covid19-radiography-database/versions/5/COVID-19_Radiography_Dataset/Lung_Opacity/images Directory


```
Listing and processing 3 images in the 'Normal' directory:
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 17ms/step
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 18ms/step
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 17ms/step
```

Predictions for /root/.cache/kagglehub/datasets/tawsifurrahman/covid19-radiography-database/versions/5/COVID-19_Radiography_Dataset/Normal/images Directory




```
Listing and processing 3 images in the 'Viral Pneumonia' directory:
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 25ms/step
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 18ms/step
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 17ms/step
```

Predictions for /root/.cache/kagglehub/datasets/tawsifurrahman/covid19-radiography-database/versions/5/COVID-19_Radiography_Dataset/Viral Pneumonia/images Directory

```
Test Loss: 0.3961440324783325
Test Accuracy: 0.877864420413971
Test Precision: 0.8806290030479431
```

	precision	recall	f1-score	support
COVID	0.87	0.88	0.88	701
Lung_Opacity	0.81	0.82	0.82	1246
Normal	0.89	0.89	0.89	2024
Viral Pneumonia	0.97	0.88	0.92	262
accuracy			0.87	4233
macro avg	0.88	0.87	0.87	4233
weighted avg	0.87	0.87	0.87	4233

In Variation 1, the CNN model uses a relatively simple architecture with two convolutional layers (32 and 64 filters), followed by max-pooling layers and a dense layer with 128 neurons. The model achieves a test accuracy of **87.78%** and a test precision of **88.06%**. Although it performs well, some misclassifications are observed, especially in Lung _opacity (2 misclassifications).

Variation – 2:

```
Listing and processing 3 images in the 'COVID' directory:
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 314ms/step
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 18ms/step
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 18ms/step
```

Predictions for /root/.cache/kagglehub/datasets/tawsifurrahman/covid19-radiography-database/versions/5/COVID-19_Radiography_Dataset/COVID/images Directory


```
Listing and processing 3 images in the 'Lung_Opacity' directory:
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 27ms/step
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 40ms/step
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 26ms/step
```

Predictions for /root/.cache/kagglehub/datasets/tawsifurrahman/covid19-radiography-database/versions/5/COVID-19_Radiography_Dataset/Lung_Opacity/images Directory


```
Listing and processing 3 images in the 'Normal' directory:
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 27ms/step
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 26ms/step
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 26ms/step
```

Predictions for /root/.cache/kagglehub/datasets/tawsifurrahman/covid19-radiography-database/versions/5/COVID-19_Radiography_Dataset/Normal/images Directory


```
Listing and processing 3 images in the 'Viral Pneumonia' directory:
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 26ms/step
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 24ms/step
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 25ms/step
```

Predictions for /root/.cache/kagglehub/datasets/tawsifurrahman/covid19-radiography-database/versions/5/COVID-19_Radiography_Dataset/Viral Pneumonia/images Directory

```
Test Loss: 0.262928456068038 94
Test Accuracy: 0.904323160648346
Test Precision: 0.907192051410675
```

	precision	recall	f1-score	support
COVID	0.93	0.94	0.94	701
Lung_Opacity	0.90	0.82	0.85	1246
Normal	0.89	0.94	0.91	2024
Viral Pneumonia	0.96	0.97	0.96	262
accuracy			0.90	4233
macro avg	0.92	0.92	0.92	4233
weighted avg	0.90	0.90	0.90	4233

In Variation 2, the CNN model is deeper and more complex, utilizing four convolutional layers with progressively larger filter sizes (16, 64, 128, 128) and higher dropout rates for regularization. This variation improves performance, achieving a test accuracy of **90.43%** and a precision of **90.73%**, with better overall classification, especially for the Lung _opacity and Normal categories.