PS C:\Users\tgillard\Desktop\internship\0\_Final\_Code> c:; cd 'c:\Users\tgillard\Desktop\internship\0\_Final\_Code'; & 'C:\Users\tgillard\Anaconda3\envs\cnn\python.exe' 'c:\Users\tgillard\.vscode\extensions\ms-python.python-2022.18.2\pythonFiles\lib\python\debugpy\adapter/../..\debugpy\launcher' '35026' '--' 'c:\Users\tgillard\Desktop\internship\0\_Final\_Code\data\_augmentation.py'

train -0 nothing : 100%|████████████████████████████████████████████████| 2830/2830 [00:00<00:00, 190161.49files/s]

train -1stem : 100%|██████████████████████████████████████████████████| 610/610 [00:00<00:00, 175698.77files/s]

train -2calyx : 100%|██████████████████████████████████████████████████| 554/554 [00:00<00:00, 159580.00files/s]

train -3defect : 100%|██████████████████████████████████████████████████| 490/490 [00:00<00:00, 164601.07files/s]

test -0 nothing : 100%|██████████████████████████████████████████████████| 525/525 [00:00<00:00, 132332.31files/s]

test -1stem : 100%|██████████████████████████████████████████████████| 116/116 [00:00<00:00, 234025.62files/s]

test -2calyx : 100%|████████████████████████████████████████████████████| 98/98 [00:00<00:00, 197616.25files/s]

test -3defect : 100%|████████████████████████████████████████████████████| 85/85 [00:00<00:00, 171401.85files/s]

number of classes in processed dataset= 4

the maximum files in any class in train\_df is 2688 the minimum files in any class in train\_df is 466

train\_df length: 4259 test\_df length: 824 valid\_df length: 225

average image height= 92 average image width= 92 aspect ratio h/w= 1.0

Initial length of dataframe is 4259

Found 579 validated image filenames. for class 1stem creating 221 augmented images

Found 526 validated image filenames. for class 2calyx creating 274 augmented images

Found 466 validated image filenames. for class 3defect creating 334 augmented images

Total Augmented images created= 829

Length of augmented dataframe is now 5088

Found 5088 validated image filenames belonging to 4 classes. for train generator

Found 225 validated image filenames belonging to 4 classes. for valid generator

Found 824 validated image filenames belonging to 4 classes. for test generator

test batch size: 8 test steps: 103 number of classes : 4

Created EfficientNet B7 model with initial learning rate set to 0.001

Epoch 1/40

255/255 [==============================] - 961s 4s/step - loss: 6.6984 - accuracy: 0.8430 - val\_loss: 5.0000 - val\_accuracy: 0.9200

Epoch 2/40

255/255 [==============================] - 963s 4s/step - loss: 4.1397 - accuracy: 0.9228 - val\_loss: 3.3557 - val\_accuracy: 0.9600

Epoch 3/40

255/255 [==============================] - 792s 3s/step - loss: 2.8209 - accuracy: 0.9446 - val\_loss: 2.2703 - val\_accuracy: 0.9600

Epoch 4/40

255/255 [==============================] - 659s 3s/step - loss: 1.9090 - accuracy: 0.9589 - val\_loss: 1.5071 - val\_accuracy: 0.9778

Epoch 5/40

255/255 [==============================] - 724s 3s/step - loss: 1.3026 - accuracy: 0.9688 - val\_loss: 1.0586 - val\_accuracy: 0.9733

Epoch 6/40

255/255 [==============================] - 663s 3s/step - loss: 0.9348 - accuracy: 0.9717 - val\_loss: 0.7588 - val\_accuracy: 0.9778

Epoch 7/40

255/255 [==============================] - 635s 2s/step - loss: 0.6623 - accuracy: 0.9778 - val\_loss: 0.6119 - val\_accuracy: 0.9644

Epoch 8/40

255/255 [==============================] - 668s 3s/step - loss: 0.5018 - accuracy: 0.9809 - val\_loss: 0.4377 - val\_accuracy: 0.9822

Epoch 9/40

255/255 [==============================] - 666s 3s/step - loss: 0.3798 - accuracy: 0.9855 - val\_loss: 0.3512 - val\_accuracy: 0.9778

Epoch 10/40

255/255 [==============================] - 660s 3s/step - loss: 0.3244 - accuracy: 0.9821 - val\_loss: 0.2964 - val\_accuracy: 0.9689

Epoch 11/40

255/255 [==============================] - 665s 3s/step - loss: 0.2824 - accuracy: 0.9823 - val\_loss: 0.2425 - val\_accuracy: 0.9778

Epoch 12/40

255/255 [==============================] - 749s 3s/step - loss: 0.2415 - accuracy: 0.9841 - val\_loss: 0.2050 - val\_accuracy: 0.9822

Epoch 13/40

255/255 [==============================] - 745s 3s/step - loss: 0.2015 - accuracy: 0.9904 - val\_loss: 0.2247 - val\_accuracy: 0.9778

Epoch 14/40

255/255 [==============================] - 686s 3s/step - loss: 0.1785 - accuracy: 0.9929 - val\_loss: 0.1652 - val\_accuracy: 0.9822

Epoch 15/40

255/255 [==============================] - 906s 4s/step - loss: 0.1581 - accuracy: 0.9943 - val\_loss: 0.1927 - val\_accuracy: 0.9778

Epoch 16/40

255/255 [==============================] - 760s 3s/step - loss: 0.1465 - accuracy: 0.9949 - val\_loss: 0.2069 - val\_accuracy: 0.9778

Epoch 17/40

255/255 [==============================] - 897s 4s/step - loss: 0.1509 - accuracy: 0.9896 - val\_loss: 0.1932 - val\_accuracy: 0.9778

Epoch 18/40

255/255 [==============================] - 852s 3s/step - loss: 0.1389 - accuracy: 0.9949 - val\_loss: 0.1738 - val\_accuracy: 0.9733

Epoch 19/40

255/255 [==============================] - 851s 3s/step - loss: 0.1379 - accuracy: 0.9921 - val\_loss: 0.1818 - val\_accuracy: 0.9733

Epoch 20/40

255/255 [==============================] - 923s 4s/step - loss: 0.1491 - accuracy: 0.9888 - val\_loss: 0.1661 - val\_accuracy: 0.9778

Epoch 21/40

255/255 [==============================] - 1058s 4s/step - loss: 0.1340 - accuracy: 0.9929 - val\_loss: 0.1477 - val\_accuracy: 0.9867

Epoch 22/40

255/255 [==============================] - 1085s 4s/step - loss: 0.1181 - accuracy: 0.9959 - val\_loss: 0.1610 - val\_accuracy: 0.9778

Epoch 23/40

255/255 [==============================] - 890s 3s/step - loss: 0.1253 - accuracy: 0.9943 - val\_loss: 0.1927 - val\_accuracy: 0.9822

Epoch 24/40

255/255 [==============================] - 1103s 4s/step - loss: 0.1099 - accuracy: 0.9961 - val\_loss: 0.1713 - val\_accuracy: 0.9822

Epoch 25/40

255/255 [==============================] - 977s 4s/step - loss: 0.1181 - accuracy: 0.9939 - val\_loss: 0.1845 - val\_accuracy: 0.9822

Epoch 26/40

255/255 [==============================] - 1177s 5s/step - loss: 0.1060 - accuracy: 0.9971 - val\_loss: 0.1672 - val\_accuracy: 0.9778

Epoch 27/40

255/255 [==============================] - 975s 4s/step - loss: 0.1015 - accuracy: 0.9965 - val\_loss: 0.2151 - val\_accuracy: 0.9689

Epoch 28/40

255/255 [==============================] - 876s 3s/step - loss: 0.1003 - accuracy: 0.9972 - val\_loss: 0.1953 - val\_accuracy: 0.9644

Epoch 29/40

255/255 [==============================] - 873s 3s/step - loss: 0.1191 - accuracy: 0.9931 - val\_loss: 0.1933 - val\_accuracy: 0.9733

Epoch 30/40

255/255 [==============================] - 926s 4s/step - loss: 0.0958 - accuracy: 0.9959 - val\_loss: 0.1713 - val\_accuracy: 0.9733

Epoch 31/40

255/255 [==============================] - 944s 4s/step - loss: 0.0945 - accuracy: 0.9969 - val\_loss: 0.1392 - val\_accuracy: 0.9822

Epoch 32/40

255/255 [==============================] - 901s 4s/step - loss: 0.0979 - accuracy: 0.9957 - val\_loss: 0.1833 - val\_accuracy: 0.9778

Epoch 33/40

255/255 [==============================] - 934s 4s/step - loss: 0.0919 - accuracy: 0.9969 - val\_loss: 0.1445 - val\_accuracy: 0.9733

Epoch 34/40

255/255 [==============================] - 883s 3s/step - loss: 0.0909 - accuracy: 0.9971 - val\_loss: 0.1440 - val\_accuracy: 0.9733

Epoch 35/40

255/255 [==============================] - 966s 4s/step - loss: 0.0937 - accuracy: 0.9951 - val\_loss: 0.1634 - val\_accuracy: 0.9689

Epoch 36/40

255/255 [==============================] - 838s 3s/step - loss: 0.0864 - accuracy: 0.9963 - val\_loss: 0.2052 - val\_accuracy: 0.9778

Epoch 37/40

255/255 [==============================] - 880s 3s/step - loss: 0.0918 - accuracy: 0.9953 - val\_loss: 0.1672 - val\_accuracy: 0.9778

Epoch 38/40

255/255 [==============================] - 923s 4s/step - loss: 0.0833 - accuracy: 0.9972 - val\_loss: 0.1936 - val\_accuracy: 0.9733

Epoch 39/40

255/255 [==============================] - 901s 4s/step - loss: 0.0764 - accuracy: 0.9978 - val\_loss: 0.1904 - val\_accuracy: 0.9733

Epoch 40/40

255/255 [==============================] - 903s 4s/step - loss: 0.0939 - accuracy: 0.9945 - val\_loss: 0.1524 - val\_accuracy: 0.9778

103/103 [==============================] - 41s 343ms/step

there were 20 errors in 824 tests for an accuracy of 97.57

Classification Report:

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precision recall f1-score support

0 nothing 0.9847 0.9790 0.9819 525

1stem 1.0000 0.9828 0.9913 116

2calyx 0.9700 0.9898 0.9798 98

3defect 0.8977 0.9294 0.9133 85

accuracy 0.9757 824

macro avg 0.9631 0.9703 0.9666 824

weighted avg 0.9761 0.9757 0.9759 824

Below is a list of test files that were miss classified

Test File Predicted as

C:\Users\tgillard\Desktop\internship\DATA\_SET\T1 Braeburn\_trie\Team\test\0 nothing\10428000.BMP

C:\Users\tgillard\Desktop\internship\DATA\_SET\T1 Braeburn\_trie\Team\test\0 nothing\12223000.BMP

C:\Users\tgillard\Desktop\internship\DATA\_SET\T1 Braeburn\_trie\Team\test\0 nothing\12528000.BMP

C:\Users\tgillard\Desktop\internship\DATA\_SET\T1 Braeburn\_trie\Team\test\0 nothing\13325000.BMP

C:\Users\tgillard\Desktop\internship\DATA\_SET\T1 Braeburn\_trie\Team\test\0 nothing\14923000.BMP

C:\Users\tgillard\Desktop\internship\DATA\_SET\T1 Braeburn\_trie\Team\test\0 nothing\15524000.BMP

C:\Users\tgillard\Desktop\internship\DATA\_SET\T1 Braeburn\_trie\Team\test\0 nothing\15703000.BMP

C:\Users\tgillard\Desktop\internship\DATA\_SET\T1 Braeburn\_trie\Team\test\0 nothing\19427000.BMP

C:\Users\tgillard\Desktop\internship\DATA\_SET\T1 Braeburn\_trie\Team\test\0 nothing\19628000.BMP

C:\Users\tgillard\Desktop\internship\DATA\_SET\T1 Braeburn\_trie\Team\test\0 nothing\7227000.BMP

C:\Users\tgillard\Desktop\internship\DATA\_SET\T1 Braeburn\_trie\Team\test\0 nothing\9813000.BMP

C:\Users\tgillard\Desktop\internship\DATA\_SET\T1 Braeburn\_trie\Team\test\1stem\12106120.BMP

C:\Users\tgillard\Desktop\internship\DATA\_SET\T1 Braeburn\_trie\Team\test\1stem\1728120.BMP

C:\Users\tgillard\Desktop\internship\DATA\_SET\T1 Braeburn\_trie\Team\test\2calyx\4322200.BMP

C:\Users\tgillard\Desktop\internship\DATA\_SET\T1 Braeburn\_trie\Team\test\3defect\12301310.BMP

C:\Users\tgillard\Desktop\internship\DATA\_SET\T1 Braeburn\_trie\Team\test\3defect\15611300.BMP

C:\Users\tgillard\Desktop\internship\DATA\_SET\T1 Braeburn\_trie\Team\test\3defect\18811320.BMP

C:\Users\tgillard\Desktop\internship\DATA\_SET\T1 Braeburn\_trie\Team\test\3defect\5418320.BMP

C:\Users\tgillard\Desktop\internship\DATA\_SET\T1 Braeburn\_trie\Team\test\3defect\8801300.BMP

C:\Users\tgillard\Desktop\internship\DATA\_SET\T1 Braeburn\_trie\Team\test\3defect\8827300.BMP

model was saved as ./Braeburn\_final-97.59.h5

