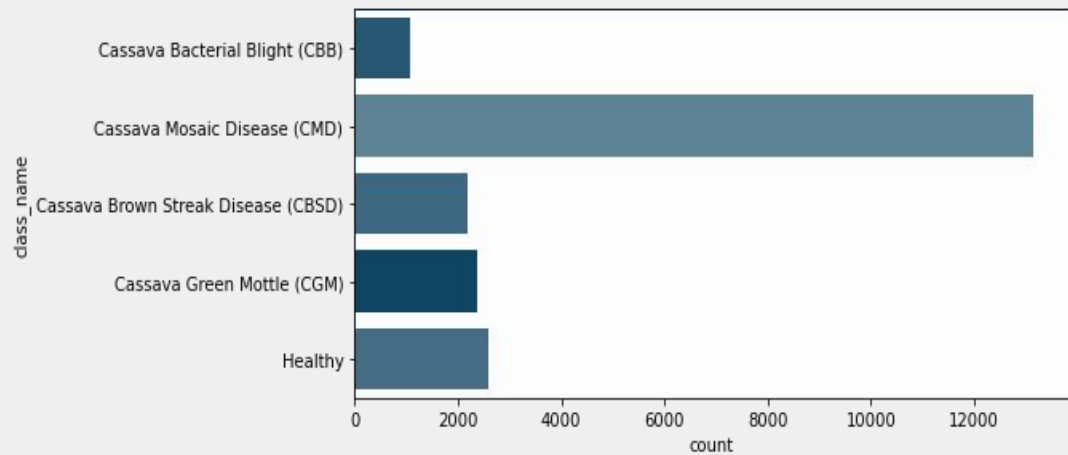


Problem: Cassava Leaf Disease Classification

From image, classify cassava leaves into 5 categories:

- Cassava Bacterial Blight (CBB)
- Cassava Brown Streak Disease (CBSD)
- Cassava Green Mottle (CGM)
- Cassava Mosaic Disease (CMD)
- Healthy



Labels	# Images
Cassava Mosaic Disease (CMD)	13158
Healthy	2577
Cassava Green Mottle (CGM)	2386
Cassava Brown Streak Disease (CBSD)	2189
Cassava Bacterial Blight (CBB)	1087

Results on Final Epoch:

Baseline model:

Epoch 30/30
135/135 [=====] - 65s 479ms/step -
sparse_categorical_accuracy: 0.7038 - loss: 0.8052 -
val_sparse_categorical_accuracy: 0.7059 - val_loss: 0.8064

Modified Model:

Epoch 30/30
135/135 [=====] - 66s 486ms/step -
sparse_categorical_accuracy: 0.7490 - loss: 0.6966 -
val_sparse_categorical_accuracy: 0.7674 - val_loss: 0.6355

Baseline Model Stats:

Model: "sequential"		
Layer (type)	Output Shape	Param #
=====		
vgg19 (Model)	(None, 16, 16, 512)	20024384

flatten (Flatten)	(None, 131072)	0

dense (Dense)	(None, 512)	67109376

dense_1 (Dense)	(None, 5)	2565
=====		
Total params: 87,136,325		
Trainable params: 67,111,941		
Non-trainable params: 20,024,384		

Final Model Stats:

Model: "sequential_14"		
Layer (type)	Output Shape	Param #
=====		
vgg19 (Model)	(None, 16, 16, 512)	20024384

conv2d_4 (Conv2D)	(None, 14, 14, 128)	589952

conv2d_5 (Conv2D)	(None, 12, 12, 64)	73792

max_pooling2d_2 (MaxPooling2)	(None, 6, 6, 64)	0

dropout_19 (Dropout)	(None, 6, 6, 64)	0

flatten_14 (Flatten)	(None, 2304)	0

dense_39 (Dense)	(None, 128)	295040

dropout_20 (Dropout)	(None, 128)	0

dense_40 (Dense)	(None, 10)	1290
=====		
Total params: 20,984,458		
Trainable params: 960,074		
Non-trainable params: 20,024,384		

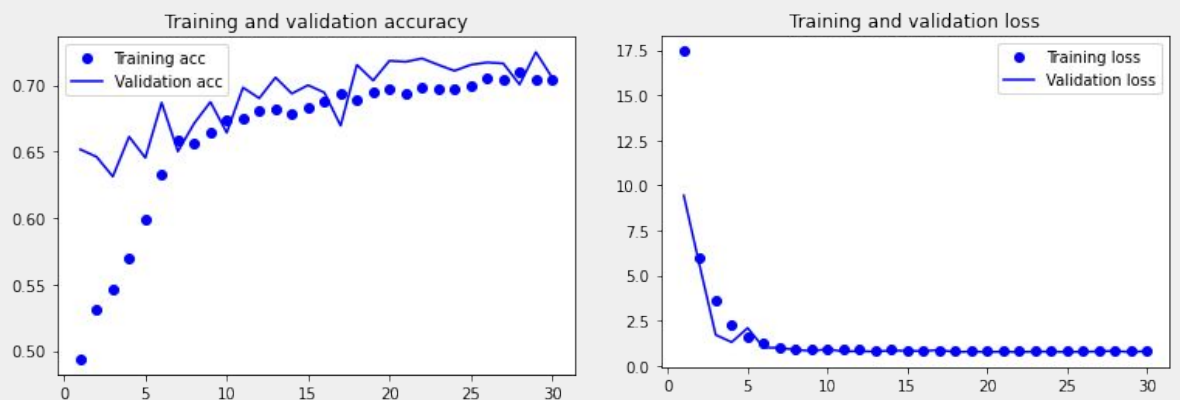
Hyper Parameters

Baseline Model:

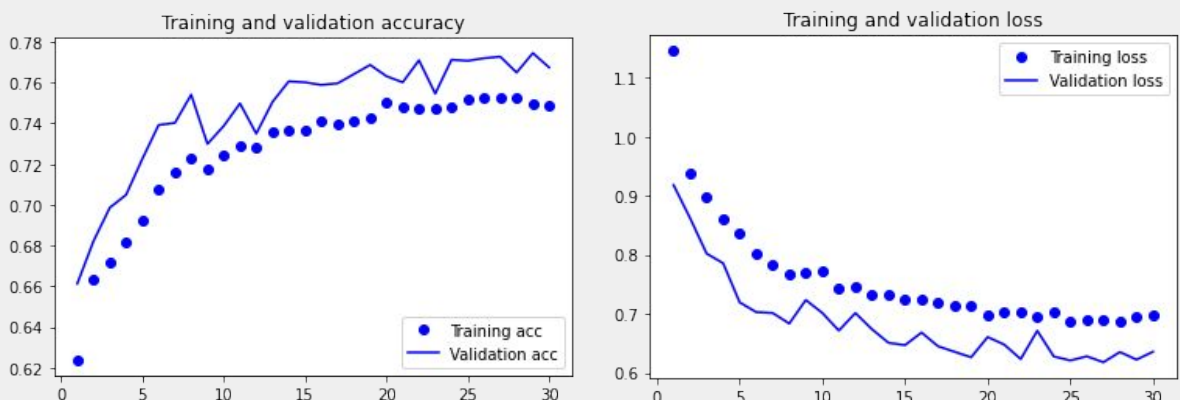
Conv Base: VGG19(weights='imagenet')
Batch_size = 128
Optimizer = RMSProp()
Loss = 'sparse_categorical_crossentropy'
Epochs = 30

Final Model:

Conv Base: VGG19(weights='imagenet')
Batch_size = 128
Optimizer = Adam()
Loss = 'sparse_categorical_crossentropy'
Epochs = 30



Comments: With an overall accuracy of 70%, this model is most likely underfitting the data.



Comments: With an overall accuracy of 75%, this model is most likely overfitting data. While the modified model structure and the use of dropouts has slightly increased the accuracy, it could still be improved by changing what features are extracted.

Conclusions:

Better accuracy could be achieved through extracting features that are more characteristic of the images being analyzed, such as transforming the image to a different color space. Dimensionality reduction could also be use to speed up the processing time. Some further tweaking of hyperparameters such as learning rate and loss functions could also improve classification.