Project Development Phase Model Performance Test

Date	10 November 2022
Team ID	Team-592327
Project Name	Deep Learning Model For Detecting Diseases In
	Tea Leaves
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	Denesh L
Maximum Marks	10 Marks

Model Performance Testing:

S.No.	Parameter	Values	Screenshot		
1.	Model Summary	CNN	CNN		
		Total params: 812888	Layer (type)	Output Shape	Paran #
		Trainable params: 812760	sequential (Sequential) rescaling (Rescaling)	(None, 224, 224, 3) (None, 224, 224, 3)	0
			conv2d (Conv2D)	(None, 224, 224, 3)	448
		Non-trainable params: 128	max_pooling2d (MaxPooling2 D)	(None, 112, 112, 16)	0
			conv2d_1 (Conv2D)	(None, 112, 112, 16)	2320
		VGG16	max_pooling2d_1 (MaxPoolin g2D)	(None, 56, 56, 16)	0
		Total params: 14915400	conv2d_2 (Conv2D)	(None, 56, 56, 32)	4640
		-	max_pooling2d_2 (MaxPoolin g2D)	(None, 28, 28, 32)	0
		Trainable params: 200712	flatten (Flatten)	(None, 25088)	0
		Non-trainable params: 14714688	dense (Dense)	(None, 32)	802848
		-	dense_1 (Dense)	(None, 32)	1056
		ResNet50	dropout (Dropout) batch_normalization (Batch Normalization)	(None, 32) (None, 32)	0 128
		Total params: 24390536	dense_2 (Dense)	(None, 32)	1056
		_	dropout_1 (Dropout)	(None, 32)	0
		Trainable params: 802824	<pre>batch_normalization_1 (Bat chNormalization)</pre>	(None, 32)	128
		Non-trainable params: 23587712	dense_3 (Dense)	(None, 8)	264
		-	Total params: 812888 (3.10 N Trainable params: 812760 (3. Non-trainable params: 128 (5	MB) .10 MB)	
			VGG16		

Layer (type)	Output Shape	Param #
input_1 (InputLayer)	[(None, 224, 224, 3)]	θ
block1_conv1 (Conv2D)	(None, 224, 224, 64)	1792
block1_conv2 (Conv2D)	(None, 224, 224, 64)	36928
block1_pool (MaxPooling2D)	(None, 112, 112, 64)	θ
block2_conv1 (Conv2D)	(None, 112, 112, 128)	73856
block2_conv2 (Conv2D)	(None, 112, 112, 128)	147584
block2_pool (MaxPooling2D)	(None, 56, 56, 128)	θ
block3_conv1 (Conv2D)	(None, 56, 56, 256)	295168
block3_conv2 (Conv2D)	(None, 56, 56, 256)	590080
block3_conv3 (Conv2D)	(None, 56, 56, 256)	590080
block3_pool (MaxPooling2D)	(None, 28, 28, 256)	θ
block4_conv1 (Conv2D)	(None, 28, 28, 512)	1180160
block4_conv2 (Conv2D)	(None, 28, 28, 512)	2359808
block4_conv3 (Conv2D)	(None, 28, 28, 512)	2359808
block4_pool (MaxPooling2D)	(None, 14, 14, 512)	θ
block5_conv1 (Conv2D)	(None, 14, 14, 512)	2359808
block5_conv2 (Conv2D)	(None, 14, 14, 512)	2359808
block5_conv3 (Conv2D)	(None, 14, 14, 512)	2359808
block5_pool (MaxPooling2D)	(None, 7, 7, 512)	θ
flatten_1 (Flatten)	(None, 25088)	θ
dense_4 (Dense)	(None, 8)	200712

Total params: 14915400 (56.90 MB) Trainable params: 200712 (784.03 KB) Non-trainable params: 14714688 (56.13 MB)

ResNet50

ResNet5	0		
Layer (type)	Output Shape	Param #	Connected to
input_2 (InputLayer)	[(None, 224, 224, 3)]	0	0
corw1_pad (ZeroPadding20)	(None, 230, 230, 3)	9 9877	['input_2[0][0]']
corwl_corw (Corw2D) corwl_bm (BatchNormalizati em)	(None, 112, 112, 64) (None, 112, 112, 64)	9872 256	['conv1_pad[0][0]'] ['conv1_conv[0][0]']
convl_relu (Activation) pooll pad (ZeroPadding20)	(None, 112, 112, 64) (None, 114, 114, 64)	0	['conv1_bo[0][0]']
pool1_pool (MaxPooling20)	(None, 56, 56, 64)	0	['pool1_pad(0)[0]']
comv2_block1_1_comv (Comv2 0)	(None, 56, 56, 64)	4160	['psoll_posl(0)[0]']
conv2_block1_1_bn (BatchNo rmalization)	(None, 56, 56, 64)	256	['conv2_block1_1_conv[0][0]']
corw2_block1_1_relu (Activ ation)	(None, 56, 56, 66)	0	['conv2_block1_1_bn(0)[0]']
conv2_block1_2_conv (Conv2 D)	(None, 56, 56, 66)	36928	['comu2_block1_1_relu[0][0]']
conv2_block1_2_bn (BatchNo rmalization)	(None, 56, 56, 64)	256	['conv2_block1_2_conv[0][0]']
comv2_block1_2_relu (Activ ation)	(None, 56, 56, 64)	0	['conv2_block1_2_bn[0][0]']
conv2_block1_0_conv (Conv2 0)	(None, 56, 56, 256)	16680	['peol1_pool(8)[8]']
corw2_block1_3_corw (Corw2 D)	(None, 56, 56, 256)	16649	['conv2_block1_2_relu[0][0]']
conv2_block1_0_bn (BatchNo rmalization)	(None, 56, 56, 256)	1024	['conv2_block1_0_conv[0][0]']
conv2_block1_3_bn (BatchNo rmalization)	(None, 56, 56, 256)	1024	['conv2_block1_3_conv[0][0]']
corw2_block1_add (Add)	(None. 56, 56, 256)	0	['comv2_block1_0_bn[0][0]', 'comv2_block1_3_bn[0][0]']
comv2_blockl_out (Activati	(None, 56, 56, 256)	0	['coew2_block1_add[0][0]']
comv2_block2_1_comv (Conv2 0)	(None, 56, 56, 64)	16448	['conv2_block1_out[0][0]']
comv2_block2_1_bm (BatchWo rmalization)		256	['comv2_black2_1_comv[0][0]']
comv2_block2_1_relu (Activ	(None, 56, 56, 64)	0	['conv2_block2_1_bn[0][0]']
comv2_block2_2_comv (Conv2 0)	(None, 56, 56, 64)	36928	['conv2_black2_1_relu[0][0]']
conv2_block2_2_bn (BatchWo rmalization)	(None, 56, 56, 64)	256	['conv2_black2_2_conv[0][0]']
comv2_block2_2_relu (Activ ation)	(None, 56, 56, 64)	0	['conv2_block2_2_bn[0][0]']
comv2_block2_3_comv (Conv2 0)	! (None, 56, 56, 256)	16640	['comv2_block2_2_relu[0][0]']
conv2_block2_3_bn (RatchWo rmalization)	(None, 56, 56, 256)	1924	['conv2_black2_3_conv[0][0]']
conv2_block2_add (Add)	(None, 56, 56, 256)	0	['comv2_black1_out[0][0]', 'comv2_black2_3_bn[0][0]']
conv2_block2_out (Activation)	(None, 56, 56, 256)	0	['conv2_block2_add[0][0]']
comv2_block3_1_comv (Convi 0)		16448	['comv2_block2_out[0][0]']
comv2_block3_1_bm (BatchNo rmalization)		256	['conv2_block3_1_conv[0][0]'
comv2_block3_1_relu (Activ ation)		0	['conv2_block3_1_bn[0][0]']
comv2_block3_2_comv (Conv3 0)	(None, 56, 56, 64)	36928	['conv2_block3_1_relu[0][0]']
comv2_block3_2_bn (RatchWo rmalization)	(None, 56, 56, 64)	256	['conv2_black3_2_conv[0][0]']
conv2_block3_2_relu (Activ ation)	(None, 56, 56, 64)	0	['conv2_block3_2_bn[0][0]']
corw2_block3_3_corw (Corw2 D)	(None, 56, 56, 256)	16649	['conv2_block3_2_relu[0][0]'
conv2_block3_3_bn (BatchNo rmalization)	(None, 56, 56, 256)	1024	['conv2_block3_3_conv(0)[0)'
corw2_block3_add (Add)	(None, 56, 56, 256)	0	['cenv2_block2_out[0][0]', 'cenv2_block3_3_bn[0][0]']
conv2_block3_out (Activati on)	(None, 56, 56, 256)	0	['conv2_block3_add[0][0]']
comv3_block1_1_comv (Comv2 0)	(None, 28, 28, 128)	32095	['conv2_block3_out[0][0]']
conv3_block1_1_bn (BatchNo rmalization)	(Nose, 28, 28, 128)	512	['conv3_block1_1_conv[0][0]'
conv3_block1_1_retu (Activ ation)	(None, 20, 28, 128)	0	['conv3_block1_1_bn[0][0]']
conv3_block1_2_conv (Conv2 0)	(None, 20, 28, 128)	147584	['conv3_block1_1_relu[0][0]']
corw3_block1_2_bn (BatchNo rmalization)	(None, 28, 28, 128)	512	['conw3_block1_2_conw[0][0]'
conv3_block1_2_relu (Activ ation)	(None, 20, 20, 120)	0	['conv3_block1_2_bn(0)[0]']
conv3_block1_0_conv (Conv2 0)	(None, 20, 28, 512)	131504	['conv2_block3_out[0][0]']
corw3_block1_3_comv (Conv2 D)	(None, 28, 28, 512)	66043	['conv3_block1_2_relu[0][0]']
conv3_block1_0_bm (BatchNo rmalization)	(None, 20, 20, 512)	2068	['conv3_block1_0_conv[0][0]']
conv3_block1_3_bn (BatchNo rmalization)	(None, 20, 28, 512)	2053	['conv3_block1_3_conv(0)[0)')
conv3_blockl_add (Add)	(None, 28, 28, 512)	0	['conv3_block1_8_bn[0][0]', 'conv3_block1_3_bn[0][0]']
conv3_block1_out (Activati on)	(None, 20, 28, 512)	0	['conv3_block1_add[0][0]']

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2.	Accuracy	CNN	med. Johans, J., even. (States). Blacks, 7, 7, 3221 med. Lineari, J., et al. (States). Blacks, 7, 7, 3221 med. Johans, J., et al. (States). Blacks, 7, 7, 3221 med. Johans, J., et al. (States). Blacks, 7, 7, 3222 med. Johans, J., et al. (States). Blacks, 7, 7, 3221 med. Johans, J., et al. (States). Blacks, 7, 7, 3281 med. Johans, J., et al. (States). Blacks, 7, 7, 3281 med. Johans, J., et al. (States). Blacks, 7, 7, 3281 med. Johans, J., et al. (States). Blacks, 7, 7, 3281 med. Johans, J., et al. (States). Blacks, 7, 7, 3281 med. Johans, J., et al. (States). Blacks, 7, 7, 3281 med. Johans, J., et al. (States). Blacks, 7, 7, 3281 med. Johans, J., et al. (States). Blacks, 7, 7, 3281 med. Johans, J., et al. (States). Blacks, 7, 7, 3281 med. Johans, J., et al. (States). Blacks, 7, 7, 3281 med. Johans, J., et al. (States). Blacks, 7, 7, 3221 med. Johans, J., et al. (States)	2484 8 1058424 1372 8 1737 8 174 175 175 175 175 175 175 175 175 175 175	From June 2, 2 and 1919 1 From June 2, 2 and 2 a
		VGG16 Training Accuracy - Validation Accuracy - Testing Accuracy - 50% ResNet50 Training Accuracy - 88.53% Validation Accuracy - 68.16% Testing Accuracy - 13%	0 0.86 1 0.76 2 0.69 3 0.81 4 0.90 5 1.00 6 1.00 7 1.00 7 1.00 7 1.00 8 1.00 9 0.73 8 weighted avg 0.83 VGG16 Total Street of Street	0.67 1.00 0.82 0.74 1.00 0.74 0.74 0.74 0.85 0.85 0.85 0.85 0.85 0.85 0.85 0.85	16 - 4 (Last 2 Mars - 4 (Last 2 Mars - 4 Mars -

			F	recision	recall	fl-score	support	
			0	0.20	0.50	0.29	18	
			1 2	0.00	0.00	0.00	13	
			3	0.00	0.00	0.00	23	
			4	0.10	0.20	0.13	18 13 11 23 20 7	
			6	0.00	0.00	0.00	15	
			7	0.00	0.00	0.00	21	
			accuracy			0.13	128	
			macro avg	0.05	0.13	0.07	128	
			weighted avg	0.05	0.13	0.07	128	
3.	Confidence Score	Class Detected - NA						
	(Only Volo							
	(Only fold							
	(Only Yolo Projects)	Confidence Score - NA						

Parameters & Accuracy

CNN

Layer (type)	Output Shape	Param #
sequential (Sequential)		θ
rescaling (Rescaling)	(None, 224, 224, 3)	θ
conv2d (Conv2D)	(None, 224, 224, 16)	448
<pre>max_pooling2d (MaxPooling2 D)</pre>	(None, 112, 112, 16)	θ
conv2d_1 (Conv2D)	(None, 112, 112, 16)	2320
<pre>max_pooling2d_1 (MaxPoolin g2D)</pre>	(None, 56, 56, 16)	θ
conv2d_2 (Conv2D)	(None, 56, 56, 32)	4640
<pre>max_pooling2d_2 (MaxPoolin g2D)</pre>	(None, 28, 28, 32)	θ
flatten (Flatten)	(None, 25088)	θ
dense (Dense)	(None, 32)	802848
dense_1 (Dense)	(None, 32)	1056
dropout (Dropout)	(None, 32)	Θ
batch_normalization (Batch Normalization)	(None, 32)	128
dense_2 (Dense)	(None, 32)	1056
dropout_1 (Dropout)	(None, 32)	θ
<pre>batch_normalization_1 (Bat chNormalization)</pre>	(None, 32)	128
dense_3 (Dense)	(None, 8)	264

Total params: 812888 (3.10 MB)
Trainable params: 812760 (3.10 MB)
Non-trainable params: 128 (512.00 Byte)

	precision	recall	fl-score	support
Θ	0.86	0.67	0.75	18
1	0.76	1.00	0.87	13
2	0.60	0.82	0.69	11
3	0.81	0.74	0.77	23
4	0.90	0.90	0.90	20
5	1.00	1.00	1.00	7
6	1.00	1.00	1.00	15
7	0.74	0.67	0.70	21
accuracy			0.82	128
macro avg	0.83	0.85	0.84	128
weighted avg	0.83	0.82	0.82	128

VGG16

Layer (type)	Output Shape	Param #
input_1 (InputLayer)		
block1_conv1 (Conv2D)	(None, 224, 224, 64)	1792
block1_conv2 (Conv2D)	(None, 224, 224, 64)	36928
block1_pool (MaxPooling2D)	(None, 112, 112, 64)	θ
block2_conv1 (Conv2D)	(None, 112, 112, 128)	73856
block2_conv2 (Conv2D)	(None, 112, 112, 128)	147584
block2_pool (MaxPooling2D)	(None, 56, 56, 128)	θ
block3_conv1 (Conv2D)	(None, 56, 56, 256)	295168
block3_conv2 (Conv2D)	(None, 56, 56, 256)	590080
block3_conv3 (Conv2D)	(None, 56, 56, 256)	590080
block3_pool (MaxPooling2D)	(None, 28, 28, 256)	θ
block4_conv1 (Conv2D)	(None, 28, 28, 512)	1180160
block4_conv2 (Conv2D)	(None, 28, 28, 512)	2359808
block4_conv3 (Conv2D)	(None, 28, 28, 512)	2359808
block4_pool (MaxPooling2D)	(None, 14, 14, 512)	θ
block5_conv1 (Conv2D)	(None, 14, 14, 512)	2359808
block5_conv2 (Conv2D)	(None, 14, 14, 512)	2359808
block5_conv3 (Conv2D)	(None, 14, 14, 512)	2359808
block5_pool (MaxPooling2D)	(None, 7, 7, 512)	θ
flatten_1 (Flatten)	(None, 25088)	θ
dense_4 (Dense)	(None, 8)	200712

Total params: 14915400 (56.90 MB)
Trainable params: 200712 (784.03 KB)
Non-trainable params: 14714688 (56.13 MB)

	precision	recall	fl-score	support
Θ	0.79	0.61	0.69	18
1	0.29	0.92	0.44	13
2	0.29	0.91	0.44	11
3	0.75	0.13	0.22	23
4	0.75	0.90	0.82	20
5	1.00	0.71	0.83	7
6	1.00	0.27	0.42	15
7	1.00	0.05	0.09	21
accuracy			0.50	128
macro avg	0.73	0.56	0.49	128
weighted avg	0.75	0.50	0.46	128

ResNet50

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conv5_block3_1_bn (BatchNo rmalization)	(None, 7, 7, 512)	2048	['conv5_block3_1_conv[0][0]']
<pre>conv5_block3_1_relu (Activ ation)</pre>	(None, 7, 7, 512)	θ	['conv5_block3_1_bn[θ][θ]']
conv5_block3_2_conv (Conv2 D)	(None, 7, 7, 512)	2359808	['conv5_block3_1_relu[0][0]']
conv5_block3_2_bn (BatchNo rmalization)	(None, 7, 7, 512)	2048	['conv5_block3_2_conv[0][0]']
<pre>conv5_block3_2_relu (Activ ation)</pre>	(None, 7, 7, 512)	Θ	['conv5_block3_2_bn[θ][θ]']
conv5_block3_3_conv (Conv2 D)	(None, 7, 7, 2048)	1050624	['conv5_block3_2_relu[0][0]']
conv5_block3_3_bn (BatchNo rmalization)	(None, 7, 7, 2048)	8192	['conv5_block3_3_conv[0][0]']
conv5_block3_add (Add)	(None, 7, 7, 2048)	Θ	['conv5_block2_out[0][0]', 'conv5_block3_3_bn[0][0]']
<pre>conv5_block3_out (Activati on)</pre>	(None, 7, 7, 2048)	Θ	['conv5_block3_add[0][0]']
flatten_2 (Flatten)	(None, 100352)	Θ	['conv5_block3_out[0][0]']
dense_5 (Dense)	(None, 8)	802824	['flatten_2[0][0]']

Total params: 24390536 (93.04 MB)
Trainable params: 802824 (3.06 MB)
Non-trainable params: 23587712 (89.98 MB)

	precision	recall	fl-score	support
Θ	0.20	0.50	0.29	18
1	0.00	0.00	0.00	13
2	0.09	0.36	0.15	11
3	0.00	0.00	0.00	23
4	0.10	0.20	0.13	20
5	0.00	0.00	0.00	7
6	0.00	0.00	0.00	15
7	0.00	0.00	0.00	21
accuracy			0.13	128
macro avg	0.05	0.13	0.07	128
weighted avg	0.05	0.13	0.07	128