

# **SEASONS OF CODE PROJECT** **REPORT**

**PREPARED BY:** TIYASH DUTTA

**ROLL NUMBER:** 23B1544

**DEPARTMENT:** ENERGY SCIENCE AND  
ENGINEERING

**COURSE NAME:** DEEP LEARNING

**MENTOR NAME:** SHUBHAM RAJ

**PROJECT TOPIC:** CONVOLUTIONAL NEURAL  
NETWORK

# CNN MODEL FOR IMAGE CLASSIFICATION OF BIRDS

- The dataset is available here: [Data](#)
- It is a very large dataset, so it will get downloaded as a zipped file. Unzip this zipped file
- Import the necessary libraries (TensorFlow)
- The image folder contains 200 subdirectories (each of which contains some image files), and these are the number of classes. The image size should be (224, 224) and the dataset should be shuffled.
- Map the data by dividing all the pixel values by 255, so that the pixel values range from 0 to 1.
- Split the image dataset with the help of train\_test\_split.txt file present in the CUB\_200\_2011 folder (the one downloaded from [Data](#))
- Model Architecture:

Layer (type)	Output Shape	Param #	Connected to
input_layer_18 (InputLayer)	(None, 224, 224, 3)	0	-
rescaling_36 (Rescaling)	(None, 224, 224, 3)	0	input_layer_18[0]...
normalization_18 (Normalization)	(None, 224, 224, 3)	7	rescaling_36[0][...]...
rescaling_37 (Rescaling)	(None, 224, 224, 3)	0	normalization_18...
stem_conv_pad (ZeroPadding2D)	(None, 225, 225, 3)	0	rescaling_37[0][...]...
stem_conv (Conv2D)	(None, 112, 112, 32)	864	stem_conv_pad[0]...
stem_bn (BatchNormalizatio...	(None, 112, 112, 32)	128	stem_conv[0][0]
stem_activation (Activation)	(None, 112, 112, 32)	0	stem_bn[0][0]
block1a_dwconv (DepthwiseConv2D)	(None, 112, 112, 32)	288	stem_activation[...
block1a_bn (BatchNormalizatio...	(None, 112, 112, 32)	128	block1a_dwconv[0]...
block1a_activation (Activation)	(None, 112, 112, 32)	0	block1a_bn[0][0]
block1a_se_squeeze (GlobalAveragePool...	(None, 32)	0	block1a_activati...
block1a_se_reshape (Reshape)	(None, 1, 1, 32)	0	block1a_se_squee...
block1a_se_reduce (Conv2D)	(None, 1, 1, 8)	264	block1a_se_resha...

block1a_se_expand (Conv2D)	(None, 1, 1, 32)	288	block1a_se_reduc...
block1a_se_excite (Multiply)	(None, 112, 112, 32)	0	block1a_activati... block1a_se_expan...
block1a_project_co... (Conv2D)	(None, 112, 112, 16)	512	block1a_se_excit...
block1a_project_bn (BatchNormalizatio...	(None, 112, 112, 16)	64	block1a_project_...
block2a_expand_conv (Conv2D)	(None, 112, 112, 96)	1,536	block1a_project_...
block2a_expand_bn (BatchNormalizatio...	(None, 112, 112, 96)	384	block2a_expand_c...
block2a_expand_act... (Activation)	(None, 112, 112, 96)	0	block2a_expand_b...
block2a_dwconv_pad (ZeroPadding2D)	(None, 113, 113, 96)	0	block2a_expand_a...
block2a_dwconv (DepthwiseConv2D)	(None, 56, 56, 96)	864	block2a_dwconv_p...
block2a_bn (BatchNormalizatio...	(None, 56, 56, 96)	384	block2a_dwconv[0...
block2a_activation (Activation)	(None, 56, 56, 96)	0	block2a_bn[0][0]
block2a_se_squeeze (GlobalAveragePool...	(None, 96)	0	block2a_activati...
block2a_se_reshape (Reshape)	(None, 1, 1, 96)	0	block2a_se_squee...
block2a_se_reduce (Conv2D)	(None, 1, 1, 4)	388	block2a_se_resha...
block2a_se_expand (Conv2D)	(None, 1, 1, 96)	480	block2a_se_reduc...
block2a_se_excite (Multiply)	(None, 56, 56, 96)	0	block2a_activati... block2a_se_expan...
block2a_project_co... (Conv2D)	(None, 56, 56, 24)	2,304	block2a_se_excit...
block2a_project_bn (BatchNormalizatio...	(None, 56, 56, 24)	96	block2a_project_...
block2b_expand_conv (Conv2D)	(None, 56, 56, 144)	3,456	block2a_project_...
block2b_expand_bn (BatchNormalizatio...	(None, 56, 56, 144)	576	block2b_expand_c...
block2b_expand_act... (Activation)	(None, 56, 56, 144)	0	block2b_expand_b...
block2b_dwconv (DepthwiseConv2D)	(None, 56, 56, 144)	1,296	block2b_expand_a...
block2b_bn (BatchNormalizatio...	(None, 56, 56, 144)	576	block2b_dwconv[0...
block2b_activation (Activation)	(None, 56, 56, 144)	0	block2b_bn[0][0]
block2b_se_squeeze (GlobalAveragePool...	(None, 144)	0	block2b_activati...
block2b_se_reshape (Reshape)	(None, 1, 1, 144)	0	block2b_se_squee...
block2b_se_reduce (Conv2D)	(None, 1, 1, 6)	870	block2b_se_resha...
block2b_se_expand (Conv2D)	(None, 1, 1, 144)	1,008	block2b_se_reduc...

block2b_se_excite (Multiply)	(None, 56, 56, 144)	0	block2b_activati... block2b_se_expan...
block2b_project_co... (Conv2D)	(None, 56, 56, 24)	3,456	block2b_se_excit...
block2b_project_bn (BatchNormalizatio...	(None, 56, 56, 24)	96	block2b_project_...
block2b_drop (Dropout)	(None, 56, 56, 24)	0	block2b_project_...
block2b_add (Add)	(None, 56, 56, 24)	0	block2b_drop[0][...] block2a_project_...
block3a_expand_conv (Conv2D)	(None, 56, 56, 144)	3,456	block2b_add[0][0]
block3a_expand_bn (BatchNormalizatio...	(None, 56, 56, 144)	576	block3a_expand_c...
block3a_expand_act... (Activation)	(None, 56, 56, 144)	0	block3a_expand_b...
block3a_dwconv_pad (ZeroPadding2D)	(None, 59, 59, 144)	0	block3a_expand_a...
block3a_dwconv (DepthwiseConv2D)	(None, 28, 28, 144)	3,600	block3a_dwconv_p...
block3a_bn (BatchNormalizatio...	(None, 28, 28, 144)	576	block3a_dwconv[0...
block3a_activation (Activation)	(None, 28, 28, 144)	0	block3a_bn[0][0]
block3a_se_squeeze (GlobalAveragePool...	(None, 144)	0	block3a_activati...
block3a_se_reshape (Reshape)	(None, 1, 1, 144)	0	block3a_se_squee...
block3a_se_reduce (Conv2D)	(None, 1, 1, 6)	870	block3a_se_resha...
block3a_se_expand (Conv2D)	(None, 1, 1, 144)	1,008	block3a_se_reduc...
block3a_se_excite (Multiply)	(None, 28, 28, 144)	0	block3a_activati... block3a_se_expan...
block3a_project_co... (Conv2D)	(None, 28, 28, 40)	5,760	block3a_se_excit...
block3a_project_bn (BatchNormalizatio...	(None, 28, 28, 40)	160	block3a_project_...
block3b_expand_conv (Conv2D)	(None, 28, 28, 240)	9,600	block3a_project_...
block3b_expand_bn (BatchNormalizatio...	(None, 28, 28, 240)	960	block3b_expand_c...
block3b_expand_act... (Activation)	(None, 28, 28, 240)	0	block3b_expand_b...
block3b_dwconv (DepthwiseConv2D)	(None, 28, 28, 240)	6,000	block3b_expand_a...
block3b_bn (BatchNormalizatio...	(None, 28, 28, 240)	960	block3b_dwconv[0...
block3b_activation (Activation)	(None, 28, 28, 240)	0	block3b_bn[0][0]
block3b_se_squeeze (GlobalAveragePool...	(None, 240)	0	block3b_activati...
block3b_se_reshape (Reshape)	(None, 1, 1, 240)	0	block3b_se_squee...
block3b_se_reduce (Conv2D)	(None, 1, 1, 10)	2,410	block3b_se_resha...

block4a_se_expand (Conv2D)	(None, 1, 1, 240)	2,640	block4a_se_reduc_
block4a_se_excite (Multiply)	(None, 14, 14, 240)	0	block4a_activati_ block4a_se_expan_
block4a_project_co_ (Conv2D)	(None, 14, 14, 80)	19,200	block4a_se_excit_
block4a_project_bn (BatchNormalizatio_	(None, 14, 14, 80)	320	block4a_project_
block4b_expand_conv (Conv2D)	(None, 14, 14, 480)	38,400	block4a_project_
block4b_expand_bn (BatchNormalizatio_	(None, 14, 14, 480)	1,920	block4b_expand_c_
block4b_expand_act_ (Activation)	(None, 14, 14, 480)	0	block4b_expand_b_
block4b_dwconv (DepthwiseConv2D)	(None, 14, 14, 480)	4,320	block4b_expand_a_
block4b_bn (BatchNormalizatio_	(None, 14, 14, 480)	1,920	block4b_dwconv[0_
block4b_activation (Activation)	(None, 14, 14, 480)	0	block4b_bn[0][0]
block4b_se_squeeze (GlobalAveragePool_	(None, 480)	0	block4b_activati_
block4b_se_reshape (Reshape)	(None, 1, 1, 480)	0	block4b_se_squee_
block4b_se_reduce (Conv2D)	(None, 1, 1, 20)	9,620	block4b_se_resha_
block4b_se_expand (Conv2D)	(None, 1, 1, 480)	10,080	block4b_se_reduc_
block4b_se_excite (Multiply)	(None, 14, 14, 480)	0	block4b_activati_ block4b_se_expan_
block4b_project_co_ (Conv2D)	(None, 14, 14, 80)	38,400	block4b_se_excit_
block4b_project_bn (BatchNormalizatio_	(None, 14, 14, 80)	320	block4b_project_
block4b_drop (Dropout)	(None, 14, 14, 80)	0	block4b_project_
block4b_add (Add)	(None, 14, 14, 80)	0	block4b_drop[0][_ block4a_project_
block4c_expand_conv (Conv2D)	(None, 14, 14, 480)	38,400	block4b_add[0][0]

block4c_expand_bn (BatchNormalizatio...	(None, 14, 14, 480)	1,920	block4c_expand_c...
block4c_expand_act_ (Activation)	(None, 14, 14, 480)	0	block4c_expand_b...
block4c_dwconv (DepthwiseConv2D)	(None, 14, 14, 480)	4,320	block4c_expand_a...
block4c_bn (BatchNormalizatio...	(None, 14, 14, 480)	1,920	block4c_dwconv[0...
block4c_activation (Activation)	(None, 14, 14, 480)	0	block4c_bn[0][0]
block4c_se_squeeze (GlobalAveragePool...	(None, 480)	0	block4c_activati...
block4c_se_reshape (Reshape)	(None, 1, 1, 480)	0	block4c_se_squee...
block4c_se_reduce (Conv2D)	(None, 1, 1, 20)	9,620	block4c_se_resha...
block4c_se_expand (Conv2D)	(None, 1, 1, 480)	10,080	block4c_se_reduc...
block4c_se_excite (Multiply)	(None, 14, 14, 480)	0	block4c_activati_ block4c_se_expan...
block4c_project_co_ (Conv2D)	(None, 14, 14, 80)	38,400	block4c_se_excit...
block4c_project_bn (BatchNormalizatio...	(None, 14, 14, 80)	320	block4c_project_...
block4c_drop (Dropout)	(None, 14, 14, 80)	0	block4c_project_...
block4c_add (Add)	(None, 14, 14, 80)	0	block4c_drop[0][... block4b_add[0][0]
block5a_expand_conv (Conv2D)	(None, 14, 14, 480)	38,400	block4c_add[0][0]
block5a_expand_bn (BatchNormalizatio...	(None, 14, 14, 480)	1,920	block5a_expand_c...
block5a_expand_act_ (Activation)	(None, 14, 14, 480)	0	block5a_expand_b...
block5a_dwconv (DepthwiseConv2D)	(None, 14, 14, 480)	12,000	block5a_expand_a...
block5a_bn (BatchNormalizatio...	(None, 14, 14, 480)	1,920	block5a_dwconv[0...
block5a_activation (Activation)	(None, 14, 14, 480)	0	block5a_bn[0][0]

block5a_se_squeeze (GlobalAveragePool...)	(None, 480)	0	block5a_activati...
block5a_se_reshape (Reshape)	(None, 1, 1, 480)	0	block5a_se_squee...
block5a_se_reduce (Conv2D)	(None, 1, 1, 20)	9,620	block5a_se_resha...
block5a_se_expand (Conv2D)	(None, 1, 1, 480)	10,080	block5a_se_reduc...
block5a_se_excite (Multiply)	(None, 14, 14, 480)	0	block5a_activati_ block5a_se_expan...
block5a_project_co_ (Conv2D)	(None, 14, 14, 112)	53,760	block5a_se_excit...
block5a_project_bn (BatchNormalizatio...)	(None, 14, 14, 112)	448	block5a_project_...
block5b_expand_conv (Conv2D)	(None, 14, 14, 672)	75,264	block5a_project_...
block5b_expand_bn (BatchNormalizatio...)	(None, 14, 14, 672)	2,688	block5b_expand_c...
block5b_expand_act_ (Activation)	(None, 14, 14, 672)	0	block5b_expand_b...
block5b_dwconv (DepthwiseConv2D)	(None, 14, 14, 672)	16,800	block5b_expand_a...
block5b_bn (BatchNormalizatio...)	(None, 14, 14, 672)	2,688	block5b_dwconv[0...
block5b_activation (Activation)	(None, 14, 14, 672)	0	block5b_bn[0][0]
block5b_se_squeeze (GlobalAveragePool...)	(None, 672)	0	block5b_activati...
block5b_se_reshape (Reshape)	(None, 1, 1, 672)	0	block5b_se_squee...
block5b_se_reduce (Conv2D)	(None, 1, 1, 28)	18,844	block5b_se_resha...
block5b_se_expand (Conv2D)	(None, 1, 1, 672)	19,488	block5b_se_reduc...
block5b_se_excite (Multiply)	(None, 14, 14, 672)	0	block5b_activati_ block5b_se_expan...
block5b_project_co_ (Conv2D)	(None, 14, 14, 112)	75,264	block5b_se_excit...
block5b_project_bn (BatchNormalizatio...)	(None, 14, 14, 112)	448	block5b_project_...

block5b_drop (Dropout)	(None, 14, 14, 112)	0	block5b_project_
block5b_add (Add)	(None, 14, 14, 112)	0	block5b_drop[0][_] block5a_project_
block5c_expand_conv (Conv2D)	(None, 14, 14, 672)	75,264	block5b_add[0][0]
block5c_expand_bn (BatchNormalizatio...	(None, 14, 14, 672)	2,688	block5c_expand_c_
block5c_expand_act_ (Activation)	(None, 14, 14, 672)	0	block5c_expand_b_
block5c_dwconv (DepthwiseConv2D)	(None, 14, 14, 672)	16,800	block5c_expand_a_
block5c_bn (BatchNormalizatio...	(None, 14, 14, 672)	2,688	block5c_dwconv[0_
block5c_activation (Activation)	(None, 14, 14, 672)	0	block5c_bn[0][0]
block5c_se_squeeze (GlobalAveragePool...	(None, 672)	0	block5c_activati_
block5c_se_reshape (Reshape)	(None, 1, 1, 672)	0	block5c_se_squee_
block5c_se_reduce (Conv2D)	(None, 1, 1, 28)	18,844	block5c_se_resha_
block5c_se_expand (Conv2D)	(None, 1, 1, 672)	19,488	block5c_se_reduc_
block5c_se_excite (Multiply)	(None, 14, 14, 672)	0	block5c_activati_ block5c_se_expan_
block5c_project_co_ (Conv2D)	(None, 14, 14, 112)	75,264	block5c_se_excit_
block5c_project_bn (BatchNormalizatio...	(None, 14, 14, 112)	448	block5c_project_
block5c_drop (Dropout)	(None, 14, 14, 112)	0	block5c_project_
block5c_add (Add)	(None, 14, 14, 112)	0	block5c_drop[0][_] block5b_add[0][0]
block6a_expand_conv (Conv2D)	(None, 14, 14, 672)	75,264	block5c_add[0][0]
block6a_expand_bn (BatchNormalizatio...	(None, 14, 14, 672)	2,688	block6a_expand_c_
block6a_expand_act_ (Activation)	(None, 14, 14, 672)	0	block6a_expand_b_



block6a_dwconv_pad (ZeroPadding2D)	(None, 17, 17, 672)	0	block6a_expand_a_
block6a_dwconv (DepthwiseConv2D)	(None, 7, 7, 672)	16,800	block6a_dwconv_p_
block6a_bn (BatchNormalizatio...	(None, 7, 7, 672)	2,688	block6a_dwconv[0_
block6a_activation (Activation)	(None, 7, 7, 672)	0	block6a_bn[0][0]
block6a_se_squeeze (GlobalAveragePool...	(None, 672)	0	block6a_activati_
block6a_se_reshape (Reshape)	(None, 1, 1, 672)	0	block6a_se_squee_
block6a_se_reduce (Conv2D)	(None, 1, 1, 28)	18,844	block6a_se_resha_
block6a_se_expand (Conv2D)	(None, 1, 1, 672)	19,488	block6a_se_reduc_
block6a_se_excite (Multiply)	(None, 7, 7, 672)	0	block6a_activati_ block6a_se_expan_
block6a_project_co_... (Conv2D)	(None, 7, 7, 192)	129,024	block6a_se_excit_
block6a_project_bn (BatchNormalizatio...	(None, 7, 7, 192)	768	block6a_project_
block6b_expand_conv (Conv2D)	(None, 7, 7, 1152)	221,184	block6a_project_
block6b_expand_bn (BatchNormalizatio...	(None, 7, 7, 1152)	4,608	block6b_expand_c_
block6b_expand_act_... (Activation)	(None, 7, 7, 1152)	0	block6b_expand_b_
block6b_dwconv (DepthwiseConv2D)	(None, 7, 7, 1152)	28,800	block6b_expand_a_
block6b_bn (BatchNormalizatio...	(None, 7, 7, 1152)	4,608	block6b_dwconv[0_
block6b_activation (Activation)	(None, 7, 7, 1152)	0	block6b_bn[0][0]
block6b_se_squeeze (GlobalAveragePool...	(None, 1152)	0	block6b_activati_
block6b_se_reshape (Reshape)	(None, 1, 1, 1152)	0	block6b_se_squee_
block6b_se_reduce (Conv2D)	(None, 1, 1, 48)	55,344	block6b_se_resha_

block6b_se_expand (Conv2D)	(None, 1, 1, 1152)	56,448	block6b_se_reduc_
block6b_se_excite (Multiply)	(None, 7, 7, 1152)	0	block6b_activati_
block6b_project_co_	(None, 7, 7, 192)	221,184	block6b_se_excit_
block6b_project_bn (BatchNormalizatio...	(None, 7, 7, 192)	768	block6b_project_
block6b_drop (Dropout)	(None, 7, 7, 192)	0	block6b_project_
block6b_add (Add)	(None, 7, 7, 192)	0	block6b_drop[0][_
block6c_expand_conv (Conv2D)	(None, 7, 7, 1152)	221,184	block6a_project_
block6c_expand_bn (BatchNormalizatio...	(None, 7, 7, 1152)	4,608	block6b_add[0][0]
block6c_expand_act_	(None, 7, 7, 1152)	0	block6c_expand_c_
block6c_dwconv (DepthwiseConv2D)	(None, 7, 7, 1152)	28,800	block6c_expand_b_
block6c_bn (BatchNormalizatio...	(None, 7, 7, 1152)	4,608	block6c_expand_a_
block6c_activation (Activation)	(None, 7, 7, 1152)	0	block6c_dwconv[0_
block6c_se_squeeze (GlobalAveragePool...	(None, 1152)	0	block6c_bn[0][0]
block6c_se_reshape (Reshape)	(None, 1, 1, 1152)	0	block6c_activati_
block6c_se_reduce (Conv2D)	(None, 1, 1, 48)	55,344	block6c_se_squee_
block6c_se_expand (Conv2D)	(None, 1, 1, 1152)	56,448	block6c_se_resha_
block6c_se_excite (Multiply)	(None, 7, 7, 1152)	0	block6c_se_reduc_
block6c_project_co_	(None, 7, 7, 192)	221,184	block6c_activati_
block6c_project_bn (BatchNormalizatio...	(None, 7, 7, 192)	768	block6c_se_expan_
block6c_drop (Dropout)	(None, 7, 7, 192)	0	block6c_se_excit_
			block6c_project_

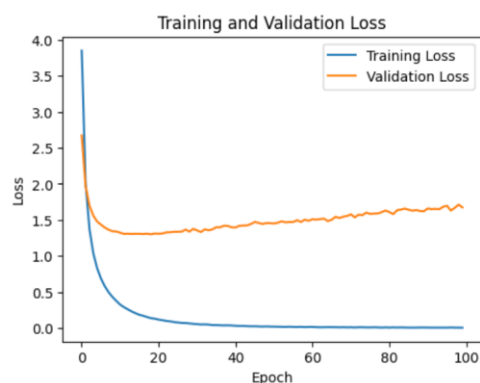
block6c_add (Add)	(None, 7, 7, 192)	0	block6c_drop[0][_block6b_add[0][0]
block6d_expand_conv (Conv2D)	(None, 7, 7, 1152)	221,184	block6c_add[0][0]
block6d_expand_bn (BatchNormalizatio...	(None, 7, 7, 1152)	4,608	block6d_expand_c...
block6d_expand_act_ (Activation)	(None, 7, 7, 1152)	0	block6d_expand_b...
block6d_dwconv (DepthwiseConv2D)	(None, 7, 7, 1152)	28,800	block6d_expand_a...
block6d_bn (BatchNormalizatio...	(None, 7, 7, 1152)	4,608	block6d_dwconv[0...
block6d_activation (Activation)	(None, 7, 7, 1152)	0	block6d_bn[0][0]
block6d_se_squeeze (GlobalAveragePool...	(None, 1152)	0	block6d_activati...
block6d_se_reshape (Reshape)	(None, 1, 1, 1152)	0	block6d_se_squee...
block6d_se_reduce (Conv2D)	(None, 1, 1, 48)	55,344	block6d_se_resha...
block6d_se_expand (Conv2D)	(None, 1, 1, 1152)	56,448	block6d_se_reduc...
block6d_se_excite (Multiply)	(None, 7, 7, 1152)	0	block6d_activati_ block6d_se_expan...
block6d_project_co_ (Conv2D)	(None, 7, 7, 192)	221,184	block6d_se_excit...
block6d_project_bn (BatchNormalizatio...	(None, 7, 7, 192)	768	block6d_project_...
block6d_drop (Dropout)	(None, 7, 7, 192)	0	block6d_project_...
block6d_add (Add)	(None, 7, 7, 192)	0	block6d_drop[0][_block6c_add[0][0]
block7a_expand_conv (Conv2D)	(None, 7, 7, 1152)	221,184	block6d_add[0][0]
block7a_expand_bn (BatchNormalizatio...	(None, 7, 7, 1152)	4,608	block7a_expand_c...
block7a_expand_act_ (Activation)	(None, 7, 7, 1152)	0	block7a_expand_b...
block7a_dwconv (DepthwiseConv2D)	(None, 7, 7, 1152)	10,368	block7a_expand_a...

block7a_bn (BatchNormalizatio_	(None, 7, 7, 1152)	4,608	block7a_dwconv[0_
block7a_activation (Activation)	(None, 7, 7, 1152)	0	block7a_bn[0][0]
block7a_se_squeeze (GlobalAveragePool_	(None, 1152)	0	block7a_activati_
block7a_se_reshape (Reshape)	(None, 1, 1, 1152)	0	block7a_se_squee_
block7a_se_reduce (Conv2D)	(None, 1, 1, 48)	55,344	block7a_se_resha_
block7a_se_expand (Conv2D)	(None, 1, 1, 1152)	56,448	block7a_se_reduc_
block7a_se_excite (Multiply)	(None, 7, 7, 1152)	0	block7a_activati_ block7a_se_expan_
block7a_project_co_ (Conv2D)	(None, 7, 7, 320)	368,640	block7a_se_excit_
block7a_project_bn (BatchNormalizatio_	(None, 7, 7, 320)	1,280	block7a_project_
top_conv (Conv2D)	(None, 7, 7, 1280)	409,600	block7a_project_
top_bn (BatchNormalizatio_	(None, 7, 7, 1280)	5,120	top_conv[0][0]
top_activation (Activation)	(None, 7, 7, 1280)	0	top_bn[0][0]
global_average_poo_ (GlobalAveragePool_	(None, 1280)	0	top_activation[0_
dense_18 (Dense)	(None, 200)	256,200	global_average_p_

- Model Summary:

**Total params: 4,818,173 (18.38 MB)**  
**Trainable params: 256,200 (1000.78 KB)**  
**Non-trainable params: 4,049,571 (15.45 MB)**  
**Optimizer params: 512,402 (1.95 MB)**

- Graphs:



- Number of epochs = 100
- Train accuracy at the final epoch = 99.98%
- Validation accuracy at the final epoch = 67.61%
- Test accuracy = 68.12%
- Checkpoint: [Final model checkpoint](#)
- Github link: [Link](#)

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