Project Report

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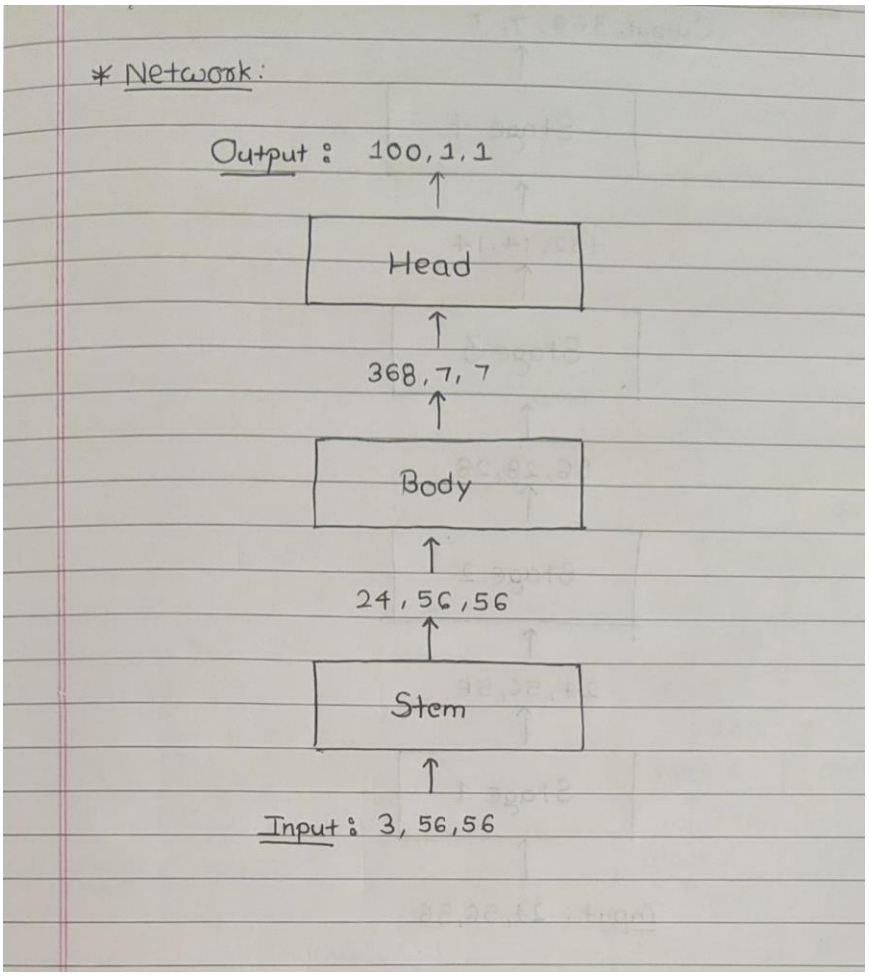
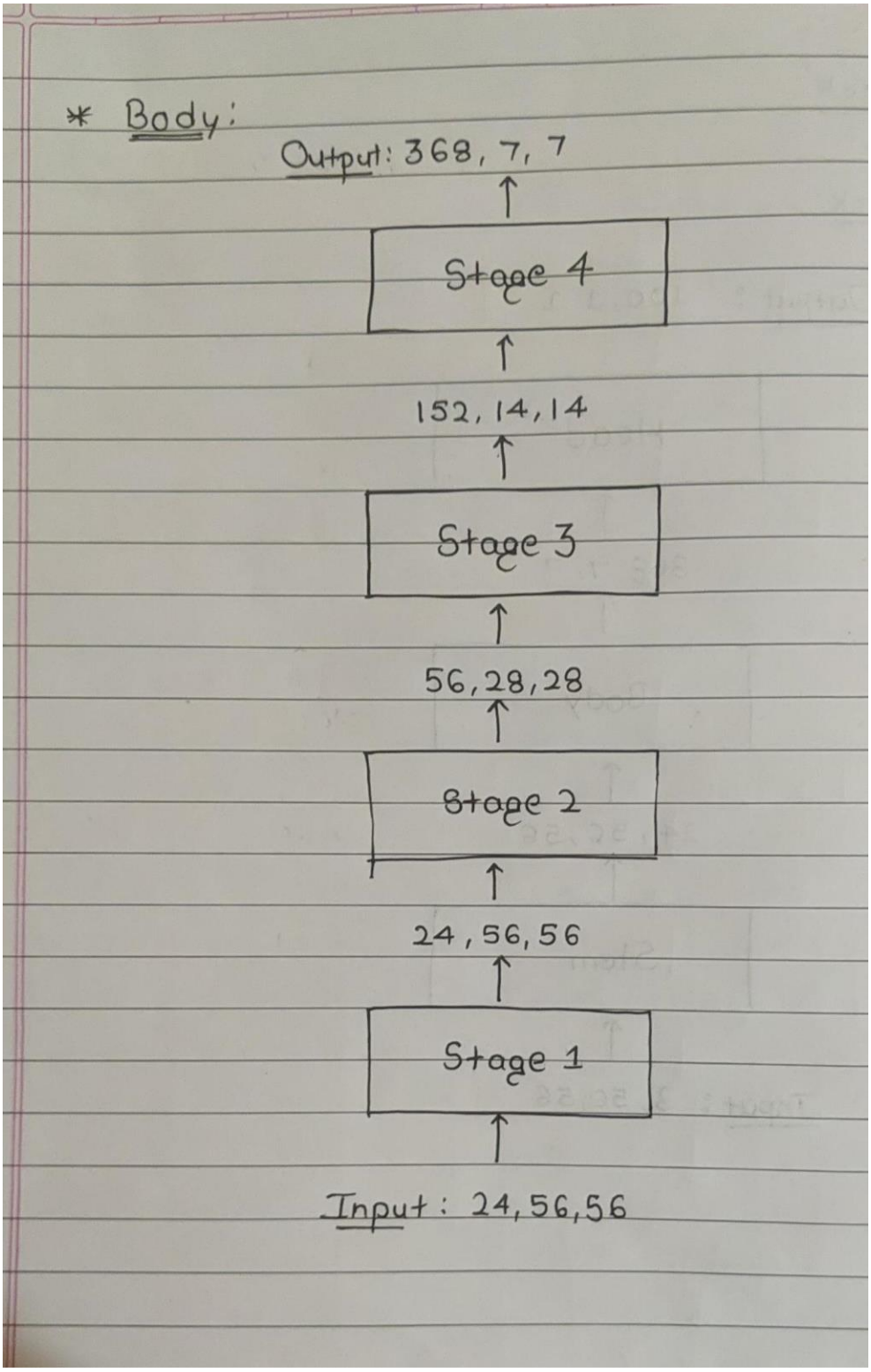
- ## Design

  The following are the network structures which were used to define our Modified RegNetX – 200MF following the parameters provided.

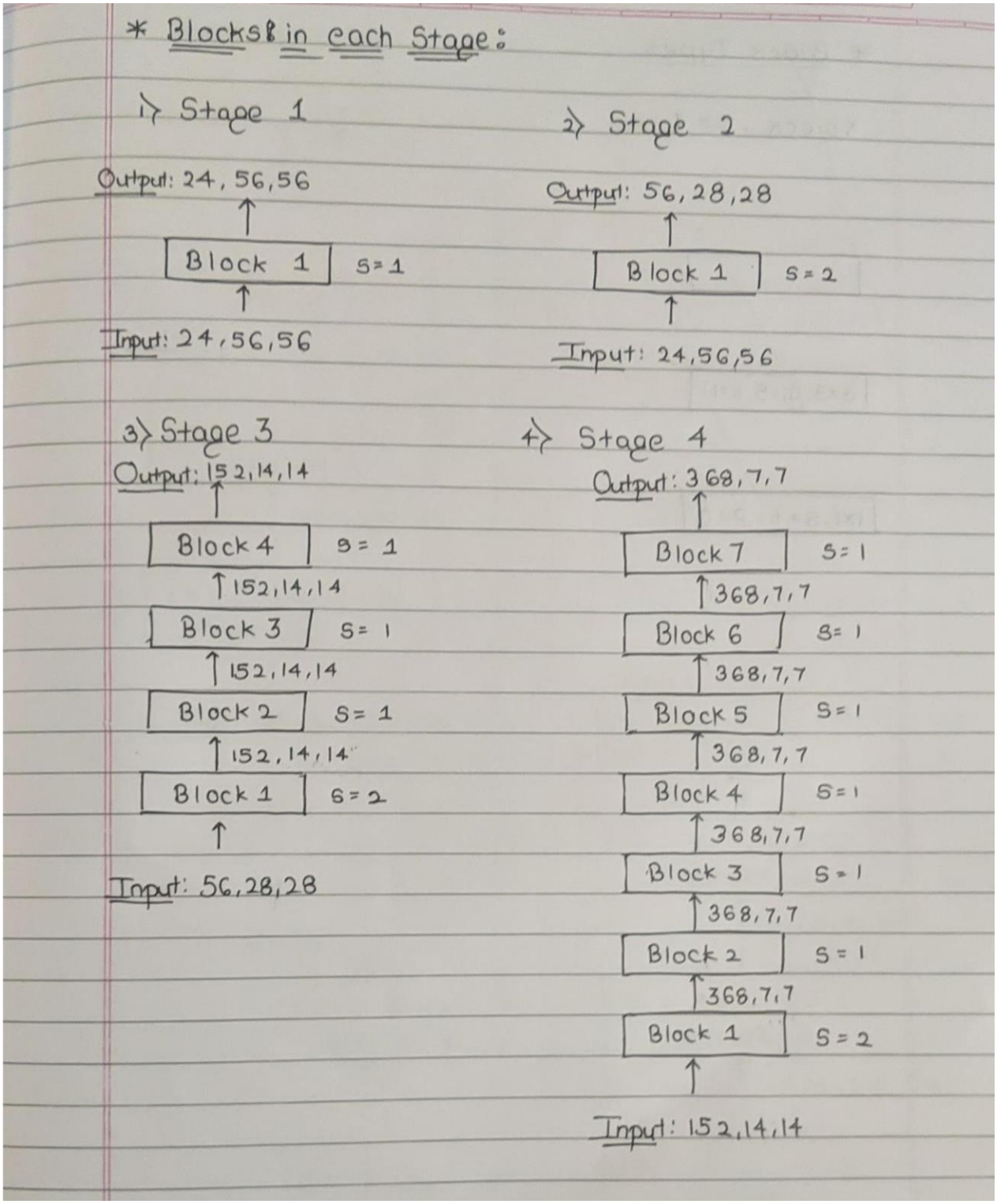
  1. Network



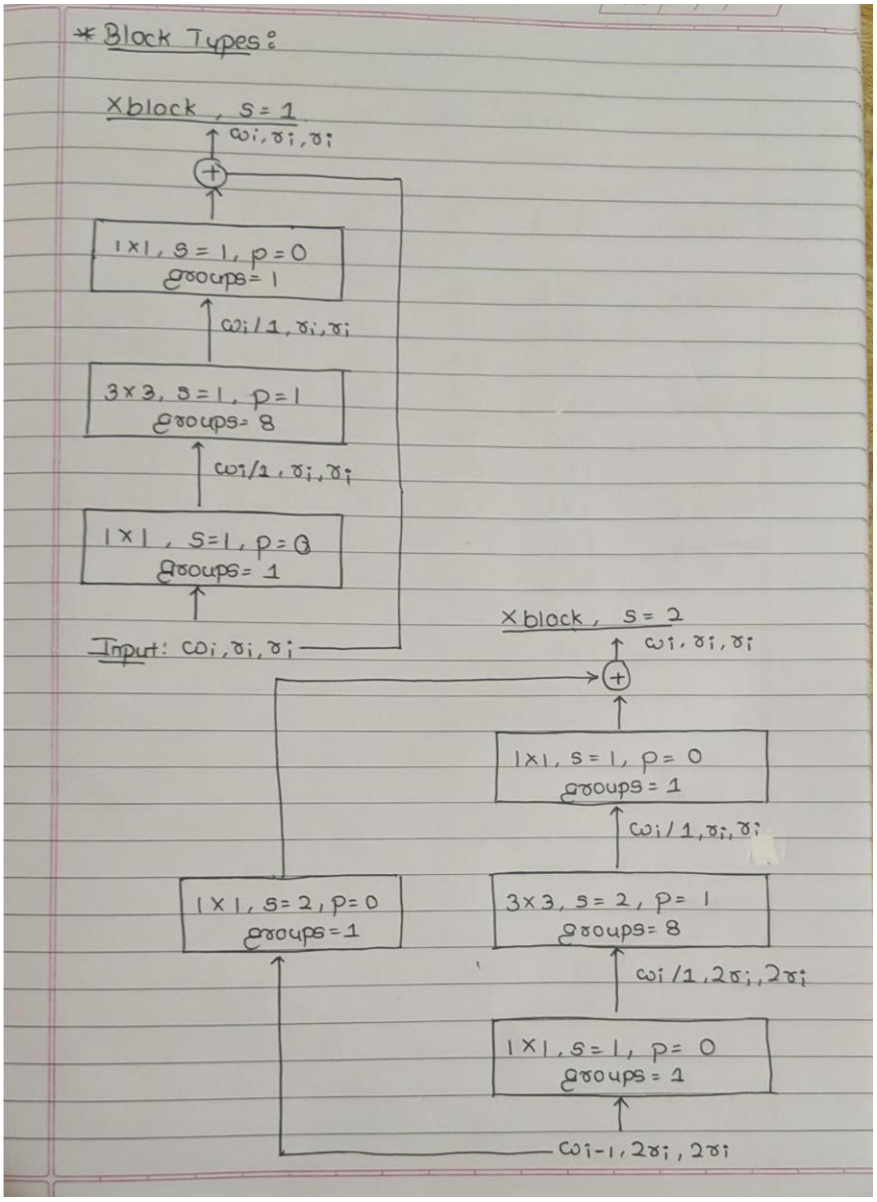
2. Body


* Body:
Output: 368, 7, 7
Stage 4
152, 14, 14
Stage 3
56, 28, 28
Stage 2
24, 56, 56
Stage 1
Input: 24, 56, 56

3. Blocks in Each Stage



4. Block Types



5. Description

The below table sums up all the details of each step like input channel size, output channel size and block number. Each step apart from Head consists of a 2D Convolution and Batch Normalization and ReLU. The Head performs 2D Adaptive Average Pooling and then flatten and apply linear model to it to convert it onto 100 different classes.

Steps in Network	Block Number	Input Channel Size	Output Channel Size
Stem	N/A	3	24
Stage 1	1	24	24
Stage 2	1	24	56
Stage 3	1	56	152
Stage 3	2	152	152
Stage 3	3	152	152
Stage 3	4	152	152
Stage 4	1	152	368
Stage 4	2	368	368
Stage 4	3	368	368
Stage 4	4	368	368
Stage 4	5	368	368
Stage 4	6	368	368
Stage 4	7	368	368
Head	N/A	368	100

- **Training**

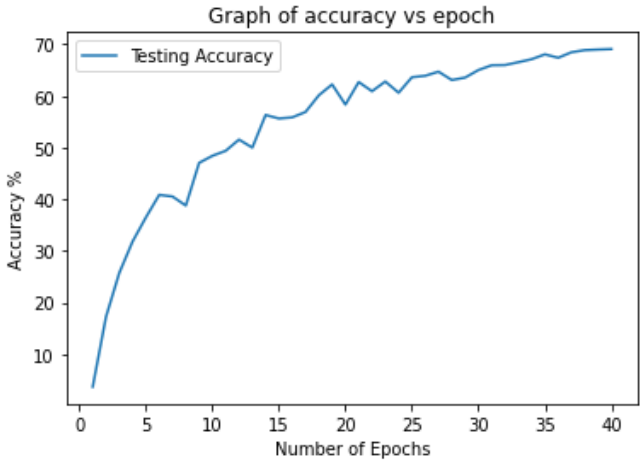
  The following parameters were maintained when executing the RegNetX – 200MF:

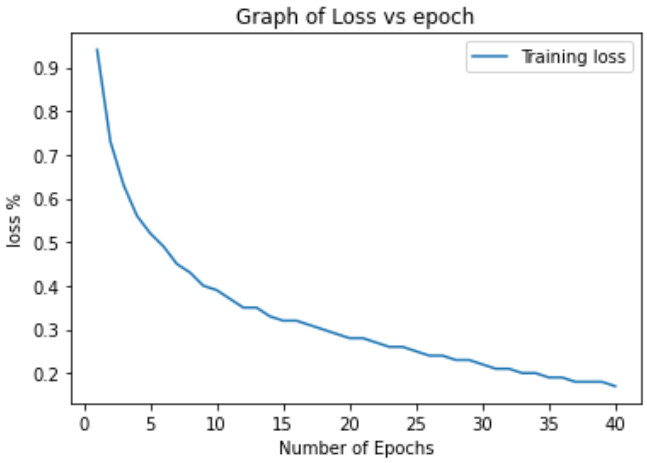
  DATA_BATCH_SIZE = 512
  DATA_NUM_CHANNELS = 3
  DATA_NUM_CLASSES = 100

  MODEL_STAGE_1_BLOCKS = 1
  MODEL_STAGE_2_BLOCKS = 1
  MODEL_STAGE_3_BLOCKS = 4
  MODEL_STAGE_4_BLOCKS = 7
  MODEL_STAGE_1_CHANNELS = 24
  MODEL_STAGE_2_CHANNELS = 56
  MODEL_STAGE_3_CHANNELS = 152
  MODEL_STAGE_4_CHANNELS = 368
  GROUP_WIDTH = 8

  TRAINING_LR_MAX = 0.001
  TRAINING_LR_INIT_SCALE = 0.01
  TRAINING_LR_INIT_EPOCHS = 5
  TRAINING_LR_FINAL_SCALE = 0.01
  TRAINING_LR_FINAL_EPOCHS = 35

  The Plots obtained for the Network are as follows:





The Highest and Final Accuracy obtained for the Test Data for over 40 epochs was 69.08%.

- **Implementation**

Steps	Filter Size/Stride	Input Size	Output Size	Parameters	MACs
STEM	3X3/1	3 X 56 X 56	24 X 56 X 56	0	2.03M
STAGE 1	1X1/1	24 X 56 X 56	24 X 56 X 56	0.6K	1.81M
	3X3/1	24 X 56 X 56	24 X 56 X 56	5K	16.25M
	1X1/1	24 X 56 X 56	24 X 56 X 56	0.6K	1.81M
STAGE 2	1X1/1	24 X 56 X 56	56 X 56 X 56	1.4K	4.21M
	3X3/2	56 X 56 X 56	56 X 28 X 28	28.28K	22.12M
	1X1/1	56 X 28 X 28	56 X 28 X 28	3.19K	2.45M
	1X1/2	24 X 56 X 56	56 X 28 X 28	1.4K	1.05M
STAGE 3	1X1/1	56 X 28 X 28	152 X 28 X 28	8.66K	6.67M
	3X3/2	152 X 28 X 28	152 X 14 X 14	208.1K	40.75M
	1X1/1	152 X 14 X 14	152 X 14 X 14	23.26K	4.52M
	1X1/2	56 X 28 X 28	152 X 14 X 14	8.66K	1.66M
	1X1/1	152 X 14 X 14	152 X 14 X 14	23.26K	4.52M
	3X3/1	152 X 14 X 14	152 X 14 X 14	208.1K	40.75M
	1X1/1	152 X 14 X 14	152 X 14 X 14	23.26K	4.52M
	1X1/1	152 X 14 X 14	152 X 14 X 14	23.26K	4.52M
	3X3/1	152 X 14 X 14	152 X 14 X 14	208.1K	40.75M
	1X1/1	152 X 14 X 14	152 X 14 X 14	23.26K	4.52M
	1X1/1	152 X 14 X 14	152 X 14 X 14	23.26K	4.52M
	3X3/1	152 X 14 X 14	152 X 14 X 14	208.1K	40.75M
	1X1/1	152 X 14 X 14	152 X 14 X 14	23.26K	4.52M
STAGE 4	1X1/1	152 X 14 X 14	368 X 14 X 14	56.30K	10.96M
	3X3/2	368 X 14 X 14	368 X 7 X 7	1219K	59.72M
	1X1/1	368 X 7 X 7	368 X 7 X 7	135.8K	6.63M
	1X1/2	152 X 14 X 14	368 X 7 X 7	56.30K	2.74M
	1X1/1	368 X 7 X 7	368 X 7 X 7	135.8K	6.63M
	3X3/1	368 X 7 X 7	368 X 7 X 7	1219K	59.72M
	1X1/1	368 X 7 X 7	368 X 7 X 7	135.8K	6.63M
	1X1/1	368 X 7 X 7	368 X 7 X 7	135.8K	6.63M
	3X3/1	368 X 7 X 7	368 X 7 X 7	1219K	59.72M
	1X1/1	368 X 7 X 7	368 X 7 X 7	135.8K	6.63M
	1X1/1	368 X 7 X 7	368 X 7 X 7	135.8K	6.63M
	3X3/1	368 X 7 X 7	368 X 7 X 7	1219K	59.72M
	1X1/1	368 X 7 X 7	368 X 7 X 7	135.8K	6.63M
	1X1/1	368 X 7 X 7	368 X 7 X 7	135.8K	6.63M
	3X3/1	368 X 7 X 7	368 X 7 X 7	1219K	59.72M

	1X1/1	368 X 7 X 7	368 X 7 X 7	135.8K	6.63M
	1X1/1	368 X 7 X 7	368 X 7 X 7	135.8K	6.63M
	3X3/1	368 X 7 X 7	368 X 7 X 7	1219K	59.72M
	1X1/1	368 X 7 X 7	368 X 7 X 7	135.8K	6.63M
	1X1/1	368 X 7 X 7	368 X 7 X 7	135.8K	6.63M
	3X3/1	368 X 7 X 7	368 X 7 X 7	1219K	59.72M
	1X1/1	368 X 7 X 7	368 X 7 X 7	135.8K	6.63M
HEAD		368 X 7 X 7	100 X 1 X 1		13.54M

				Total sum for Parameters	Total sum for MACs
Total Computations				11.46M	786.17M