

ECGR 5106 Homework 0

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I. PROBLEM 1

Problem 1 focuses on evaluating 5 random images using the Resnet network and finding the top result and the top 5 result. The images used for evaluating are seen in Fig. 1 that include a chicken, fox, hedgehog, panda, and a shark. Resnet was able to correctly label every image except for the shark where it was incorrectly labeled as a hammerhead shark. The reasoning behind this is when the image was cropped it removed the snout on the shark and it could not correctly predict which type of shark it is. The output of that image can be seen in Out[29] in the code report.

Label	Percentage
'porcupine, hedgehog'	99.72889709472656
'hen'	99.72811889648438
'red fox, Vulpes vulpes'	94.83055877685547
'giant panda'	99.96420288085938
'hammerhead, hammerhead shark'	49.9366569519043

Table I: Top results for each image

Label	Percentage
'hen'	99.72811889648438
'partridge'	0.08102461695671082
'cock'	0.051276251673698425
'flamingo'	0.023376919329166412
'goose'	0.016361577436327934

Table II: Top 5 results for chicken

Label	Percentage
'porcupine, hedgehog'	99.72889709472656
'echidna, spiny anteater, anteater'	0.08287858963012695
'meerkat, mierkat'	0.022194799035787582
'polecat, fitch, foulmart, foumart, Mustela putorius'	0.020525071769952774
'weasel'	0.006436034105718136

Table III: Top 5 results for hedgehog

Label	Percentage
'red fox, Vulpes vulpes'	94.83055877685547
'kit fox, Vulpes macrotis'	3.430546522140503
'grey fox, gray fox, Urocyon cinereoargenteus'	0.7153975367546082
'Arctic fox, white fox, Alopex lagopus'	0.5389819145202637
'coyote, prairie wolf, brush wolf, Canis latrans'	0.10537964105606079

Table IV: Top 5 results for fox

II. PROBLEM 2

Problem 2 focuses on using the ResNet CycleGan to convert horses into Zebra's. The input and output images are seen in



(a) Chicken



(b) Fox



(c) Hedgehog



(d) Panda



(e) Shark

Figure 1: Images used in the Resnet and Mobile Net network

Label	Percentage
'giant panda, panda'	99.96420288085938
'lesser panda, red panda, panda'	0.015233170241117477
'indri, indris'	0.007301695644855499
'teddy, teddy bear'	0.0019585939589887857
'cougar, puma'	0.0015386644518002868

Table V: Top 5 results for panda

Label	Percentage
'hammerhead, hammerhead shark'	49.9366569519043
'tiger shark, Galeocerdo cuvieri'	42.99036407470703
'great white shark, white shark'	5.793252944946289
'electric ray, crampfish, numbfish, torpedo'	0.6328141689300537
'stingray'	0.15629637241363525

Table VI: Top 5 results for shark

Fig. 2 and Fig. 3 respectively. Each horse in the image was able to converted into Zebras except for the one in Fig. 2d. The spotted horse was not able to be given a Zebra like stripes most likely because it already has white fur and black spots, making it appear to have a Zebra like pattern.

III. PROBLEM 3

Problem 3 focuses on the size and the number of multiply-add operations for the Resnet and Resnet CycleGAN Generator models. For the Resnet model, it contained 7.85 G MAC operations and 44.55 M parameters while the Resnet Generator contained 43.55 G MAC operation and 11.38 M parameters. This shows that the Resnet network contains significantly more parameters than the generator, however the generator is significantly more computationally complex than the resnet network.

	MACs	Parameters
Resnet network	7.85 G	44.55 M
Resnet Generator	43.55 G	11.38 M

Table VII: Resnet network and generator MACs and size

IV. PROBLEM 4

Problem 4 is similar to problem 1 I, however it uses Mobilenet v2 instead of Resnet. The results are nearly similar to the same results obtained from Resnet, however the shark was not labeled correctly with a higher percentage of it being a hammerhead shark. The reasoning behind this is because of the preprocessing removed the snout of the shark therefore making the model believe that it might be a different type of shark. Mobilenet v2 is also less computationally complex than Resnet and also smaller in size with a parameter size of 3.5 M and 0.32 G MAC operations.



(a) Horse 1



(b) Horse 2



(c) Horse in snow



(d) Spotted Horse



(e) Three horses

Figure 2: Images used in the Resnet Generator network



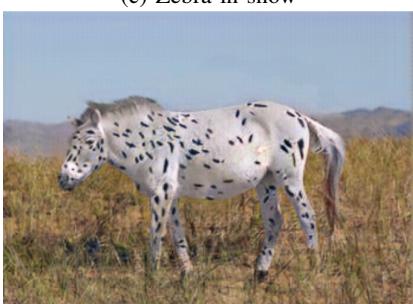
(a) Zebra 1



(b) Zebra 2



(c) Zebra in snow



(d) Spotted Zebra



(e) Three Zebras

Figure 3: Generated images from the Resnet Generator

Label	Percentage
'porcupine, hedgehog'	99.85497283935547
'hen'	99.78340148925781
'red fox, Vulpes vulpes'	94.87842559814453
'giant panda'	99.48255920410156
'hammerhead, hammerhead shark'	79.31352233886719

Table VIII: Top results for each image for Mobilenet

Label	Percentage
'hen'	99.78340148925781
'cock'	0.15116648375988007
'flamingo'	0.012553366832435131
'partridge'	0.008450346998870373
'proboscis monkey, Nasalis larvatus'	0.006501121446490288

Table IX: Top 5 results for chicken for Mobilenet

Label	Percentage
'porcupine, hedgehog'	99.85497283935547
'polecat, fitch, foulmart, foumart, Mustela putorius'	0.05533171445131302
'weasel'	0.026627708226442337
'black-footed ferret, ferret, Mustela nigripes'	0.023999027907848358
'meerkat, mierkat'	0.011314046569168568

Table X: Top 5 results for hedgehog for Mobilenet

Label	Percentage
'red fox, Vulpes vulpes'	94.87842559814453
'kit fox, Vulpes macrotis'	2.2196896076202393
'grey fox, gray fox, Urocyon cinereoargenteus'	1.9752798080444336
'Arctic fox, white fox, Alopex lagopus'	0.3061438202857971
'Pomeranian'	0.1690659373998642

Table XI: Top 5 results for fox for Mobilenet

Label	Percentage
'giant panda'	99.48255920410156
'French bulldog'	0.1480681300163269
'Boston bull, Boston terrier'	0.03717460483312607
'capuchin, ringtail, Cebus capucinus'	0.031766995787620544
'Siamese cat, Siamese'	0.031191986054182053

Table XII: Top 5 results for panda for Mobilenet

Label	Percentage
'hammerhead, hammerhead shark'	79.31352233886719
'tiger shark, Galeocerdo cuvieri'	15.26162052154541
'great white shark'	5.320621490478516
'electric ray, crampfish, numbfish, torpedo'	0.07180054485797882
'killer whale'	0.014228451997041702

Table XIII: Top 5 results for shark for Mobilenet