

CARNEGIE MELLON UNIVERSITY 07-280

HOMEWORK 8

DUE: Thursday, March 19, 2026

<https://www.cs.cmu.edu/~07280>

INSTRUCTIONS

- **Format:** Use the provided LaTeX template to write your answers in the appropriate locations within the *.tex files and then compile a pdf for submission. We try to mark these areas with STUDENT SOLUTION HERE comments. Make sure that you don't change the size or location of any of the answer boxes and that your answers are within the dedicated regions for each question/part. If you do not follow this format, we may deduct points.

You may also digitally annotate the pdf. Illegible handwriting will lead to lost points. However, we suggest that try to do at least some of your work directly in LaTeX.

- **How to submit written component:** Submit to Gradescope a pdf with your answers. Again, make sure your answer boxes are aligned with the original pdf template.
- **How to submit programming component:** See section Programming Submission for details on how to submit to the Gradescope autograder.
- **Policy:** See the course website for homework policies, including late policy, and academic integrity policies.

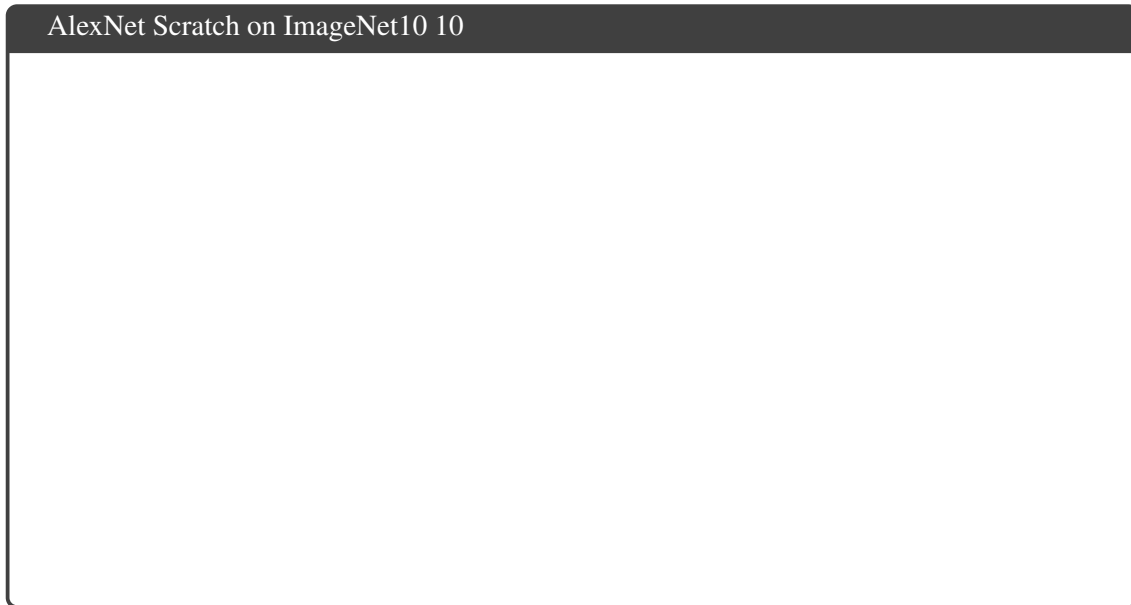
Name	
Andrew ID	
Hours to complete all components (nearest hour)	

1 [48 pts] Programming Experiments

Complete this written section after finishing the programming notebook `hw8_student.ipynb` (Questions 3, 4, 5b, 6b). Use your own generated outputs and printed statistics from those sections.

1. [18 pts] Training AlexNet on Small ImageNet (Programming Q3)

You have just trained your AlexNet from scratch on the small `ImageNet10_10` dataset with 100 epochs, and produced 2 plots, 1 on loss and 1 on accuracy. Put your plots here.



Look at both plots, and consider these questions (you do not have to write down anything):

- Does the training accuracy increase quickly?
- Does the validation curve lag behind?
- Do the plots show the kind of overfitting you would expect from such a small dataset?

Then, you also trained your AlexNet on the larger `ImageNet10_100` (also 100 epochs) and produced loss and accuracy plots. Put your plots here. They should look different than the plots you produced on `ImageNet10_10`.

AlexNet Scratch on ImageNet10 100

Do these training curves look better or worse than the ones for ImageNet10_10? Explain why you think that is (what changed about our training process, and how does that affect the training?).

☐ Better ☐ Worse

Explain

If you wanted to further improve the performance of this model, name one thing you could try doing, and why you think that might help. Credit will be given for any answer that is well-supported by your explanation.

Improving Performance

2. [6 pts] Comparing AlexNet and MobileNet (Programming Q4)

How many parameters are in AlexNet Scratch? Torchvision AlexNet? Torchvision MobileNet? How many Conv2d and Linear layers are in each of these? Fill in the table below.

Parameters and Layers			
Model	# Parameters	# Conv2d Layers	# Linear Layers
AlexNet (Scratch)			
TorchVision AlexNet			
TorchVision MobileNet			

Why does our AlexNet from scratch have the same number of layers but less parameters than TorchVision AlexNet?

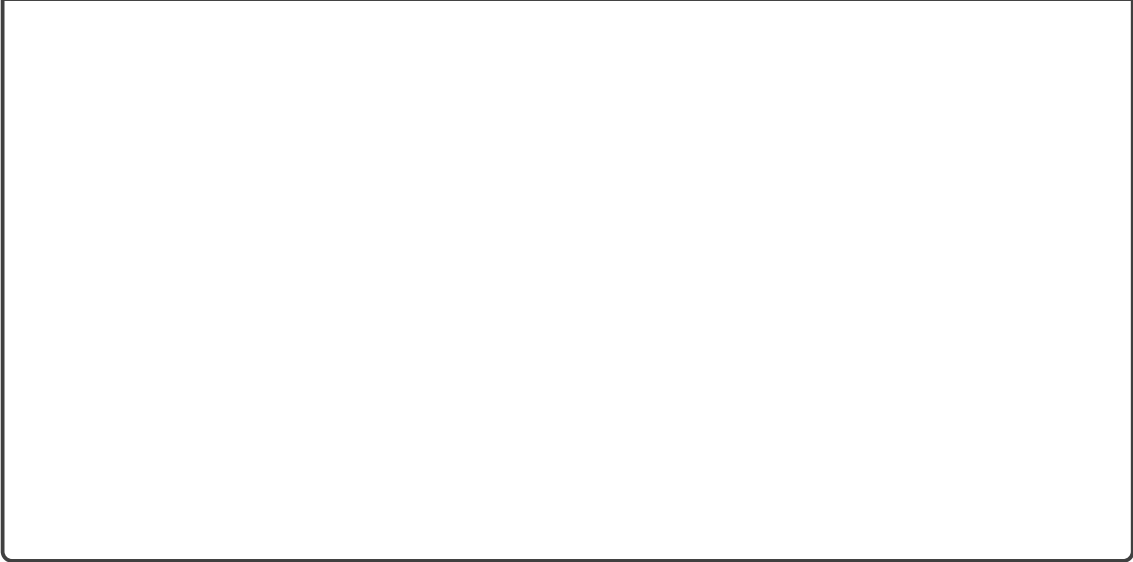
Answer

3. **[18 pts]** Fine-tuning Experiments on a Larger 10-Class ImageNet Subset (Programming Q5b)

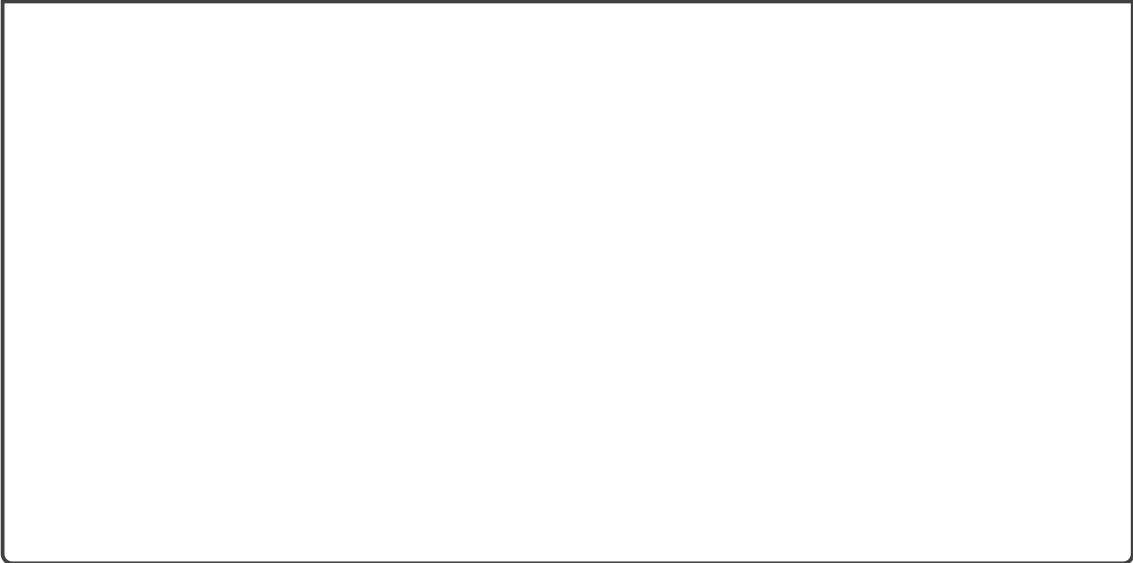
You ran 4 tests: AlexNet Unfrozen, AlexNet Frozen, MobileNet Unfrozen, and MobileNet Frozen.

Put the plot you produced for each test in the corresponding boxes below:

AlexNet Unfrozen



AlexNet Frozen



MobileNet Unfrozen

MobileNet Frozen

If you were to pick one of the four fine-tuned models above, which one would you pick, and why? Consider the following questions to help guide your decision: What metrics are you using to decide the best model? Are there any red flags that are more prominent in some models more than others?

☐ AlexNet Unfrozen ☐ AlexNet Frozen ☐ MobileNet Unfrozen ☐ MobileNet Frozen

Explain

4. [6 pts] Transfer Learning Experiments (Programming Q6b)

Put your plots from Q6b here:

AlexNet pretrained + frozen on ASL



MobileNet pretrained + frozen on ASL



2 Collaboration Policy

After you have completed all other components of this assignment, report your answers to the following collaboration questions.

1. Did you receive any help whatsoever from anyone in solving this assignment? If so, include full details including names of people who helped you and the exact nature of help you received.

Your Answer

2. Did you give any help whatsoever to anyone in solving this assignment? If so, include full details including names of people you helped and the exact nature of help you offered.

Your Answer

3. Did you find or come across code that implements any part of this assignment? If so, include full details including the source of the code and how you used it in the assignment.

Your Answer