

Assignment 2: Training Convolutional Neural Networks

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Objective:

The goal for this assignment is to explore how convolutional neural networks perform in image classification. Using the cats vs dogs dataset I am evaluating how the model works from scratch compared to pretrained networks. On top of the untrained/trained strategies I also evaluated how the training size affected it. There is a very wide range of the number of images I could use but the focus is to find the ideal number that best optimizes the accuracy of the model.

Methodology:

The project was split into two main settings:

- Training from scratch: Designing and training a convnet architecture from the ground up.
- Using pretrained models: Leveraging a pretrained convnet with transfer learning and fine tuning.

For both settings I tested how different training sizes affected the accuracy.

Experiment and Results:

Question	Image Amount	Accuracy
Question 1: Scratch	1000	0.540
Question 2: Scratch	1500	0.572
Question 3: Scratch	2000	0.613
Question 4: Pretrained	2000	0.869

- Epochs used: 25
- Steps per epoch: 20

Conclusion:

Training size appears to have a significant impact on when training convnets from scratch. The less images the less accurate the model had. At 1000 it only had an accuracy of .54 while doubling the number of images in the training gave a .613 accuracy. Larger datasets are important to reduce overfitting and lead to better performance. However, when the data is limited the pretrained networks perform much greater than the untrained. The best performing model that I found was the 2000 image pretrained model. It had an accuracy score of .869, significantly better than the untrained with 2000 images at only .64. For most practical applications, using the pretrained network with transfer learning is more efficient and yields better results with less images. In conclusion, it is best practice to use the most amount of images possible to train your model and if possible use a pretrained model especially on datasets with low amount of images.