

## Group 6 Proposal

Problem: Dog Breed Identification

You are provided a strictly canine subset of ImageNet in order to practice fine-grained image categorization. How well can you tell your Norfolk Terriers from your Norwich Terriers? With 120 breeds of dogs and a limited number of training images per class, you might find the problem more, err, ruff than you anticipated.

Dataset: ImageNet - Dog Breed Identification

<https://www.kaggle.com/competitions/dog-breed-identification/overview>

10222 images in the training set. 120 breeds of dogs in total

Deep Network Selection: ResNet. Dog-breed classification is fine-grained, so the model must extract subtle, high-level texture and shape features. ResNet introduces “skip connections” (identity shortcuts) that let gradients flow directly through layers, so we can train very deep networks without performance degradation.

Framework selection: Pytorch. Pytorch integrates a dynamic computation graph and huge ecosystem, and a lot of pretrained models are available. Pytorch also uses GPU to accelerate the training process, especially with large datasets.

Reference Materials: [Deep Residual Learning for Image Recognition](#)

Metrics:

1. Top-1 Accuracy: Percentage of test images for which the predicted class with the *highest* probability matches the true label.
2. Top-5 Accuracy: The true label appears within the top 5 predicted probabilities.
3. Per-Class Precision, Recall, and F1-Score
4. Confusion Matrix

Rough Schedule:

Week 1: Read the article. Download the dataset and build up the environment.

Week 2: Start to find out models that fit our dataset and adjust the model accordingly.

Week 3 : Tune for better performance. Prepare for the report and presentation.