MATH 637: Mathematical Techniques in Data Science
Science
Neural networks Lab

Dominique Guillot

Departments of Mathematical Sciences
University of Delaware

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Dog or Cat?

The goal of the lab is to train a feedforward neural network model to distinguish pictures of cats and dogs.

- Download the dog vs cat dataset available at:

https://drive.google.com/open?id=1XwNiXfsH8bXkVOSwL9khYgAOV13Sgzby

The dataset contains 12,500 pictures of cats and 12,500 pictures of dogs. Pictures are in color and of different sizes.

- You are advised to work with $n = 2000$ pictures (1000 cats, 1000 dogs) for training your model. Write your code so that this value could be increased later.
- You can re-use your code from the keras tutorial:

https://www.tensorflow.org/tutorials/keras/classification

Details

- Before a neural network can be fitted, the data will need to be processed. More specifically, you will need to:
  - Load and convert each image to grayscale.
  - Resize each image (e.g. $p \times p$ with $p = 50$). You can make p a value that can be changed later.
  - Convert the data to a $(2n) \times p^2$ `numpy` array that can be passed to `keras`.

- Use `train_test_split` to train your model on 75% of your data.

- Test the accuracy of your model on the remaining 25% of the data.

- A tutorial to learn how to manipulate images in Python:

  https://machinelearningmastery.com/how-to-load-and-manipulate-images-for-deep-learning-in-python-with-pil-pillow/

- Optional (if you are motivated): explore how the background of the images can be automatically subtracted using tools such as `opencv-python`.

- Please submit your work on Canvas before

  Monday, May 4th, 11:59 PM.

- Submit only one file per team.