Project Proposal - It's Raining Cats and Dogs

Project Type
We will complete default project 1.1 Explore Transfer Learning, starting with the E part and moving on to the default extensions (C/D or B/A or both).

Brief Project Description
Using transfer learning, we want to adapt a pre-trained (convolutional) network to our dataset of cat and dog images. As suggested in the proposal, we will try ResNet networks as our pre-trained models. For the E part ResNet18 may suffice, while for the extensions we may explore a deeper version, such as ResNet32 or ResNet50. For reference, the different depth ResNet networks were introduced and discussed in [1]. Our approach is to follow the FINETUNING TORCHVISION MODELS tutorial for Pytorch, for guidance on how to implement the transfer learning and optimizations. If time allows, we would like to try both Adam and NAG optimizers to gain experience and compare the different approaches.

Datasets
For training, validation and testing we will use the labelled The Oxford-IIIT Pet Dataset (https://www.robots.ox.ac.uk/~vgg/data/pets/).

Deep Learning Software Packages
We will use the Pytorch module for python (https://pytorch.org/), which provides a framework for ResNet networks of different depths.

Software implementation
Since fully training a deep neural network is very computationally costly, we will, for the basic training, rely on an open-source implementation (through PyTorch tutorial), which we will then manipulate. We will replace and change layers of the pre-trained network to better adapt to our purposes, as well as changing the hyper parameter settings and applying optimizers. In essence, we are doing a top-down implementation.

Initial Experiments and Baselines
The baseline for this project will be the results that can be achieved with the downloaded pre-trained model without any fine-tuning (only using open-source implementation). For the initial set of experiments, we will follow the proposed experiments described in the default project 1 proposal.

Milestones for Grades
        a) E grade: See Default project 1 steps. (1.1.1)
        b) D-C range: See Default project 1 steps. (1.1.2)
        c) B-A range: See Default project 1 steps. (1.1.3)

Desired (human) Learning Outcome
Cajsa: In practice choose and adapt a deep network to a given problem.
Leo: Deep knowledge into the practices of adapting a pre-trained model to another dataset, as well as Pytorch.
Andreas: Practice in adapting deep learning pre-trained to other datasets. Obtain knowledge in Pytorch and the usage of semi-labeled data.

Desired Project Grade
As a group we are not dead set on any specific grade. Instead, we will focus on starting with a default

grade E project, which we intend to extend to achieve a higher grade (D/C or B/A). We will try to achieve as high a grade as possible within the given timeframe.

References
[1] He, K., Zhang, X., Ren, S., & Sun, J. (2016). Deep residual learning for image recognition. In Proceedings of the IEEE conference on computer vision and pattern recognition (pp. 770-778).

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