Image Classification Project E

Train a neural net that is able to classify images from the Open Images Dataset into three categories: **Bee, Ant, Bear**

Dataset

https://storage.googleapis.com/openimages/web/visualizer/index.html?type=detection

Base model

ResNet50

Tasks

- **Explore the dataset**
    - What classes? Distribution of images? Any imbalances? What did you notice about the images that could affect the model training and performance?
- Preparation: Split dataset into a **75/25** Train/test split
- Train a **ResNet50** network from scratch (randomly initialized weights) and estimate the testset accuracy.
- **Experiment transfer learning**: Use a imagenet pretrained **ResNet50** architecture, train the model and estimate the testset accuracy. Show the differences in loss and accuracy of the plain and pre-trained network over the first 10 epochs.
- **Experiment data augmentation:** Add data augmentation and train again, discuss results
    - Random zoom
    - Random crop
    - Random translation
- **Experiment with architecture:** Rebuild ResNet50. After layer conv3_block4_out (17, 17, 512):
    - Add inception layer (output filter 512)
    - Add conv layer (kernel 1x1, filters 1024, padding valid, stride 1, activation leaky relu)
    - Add conv layer (kernel 3x3, filters 1024, padding same, stride 2, activation leaky relu)
    - No backpropagation for conv1 layers and before
- Test a few of your own images from the internet and show the **activation maps** (how did the neural net come to its conclusion)
- Answer the following questions:
    - What accuracy can be achieved? What is the accuracy of the train vs. test set?
    - On what infrastructure did you train it? What is the inference time?

- What are the number of parameters of the model?
- Which categories are most likely to be confused by the algorithm? Show results in a confusion matrix.

Compare the results of the experiments.