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DS4420 Machine Learning
Class Project - Track 3
April 21, 2023

Application code:

<https://colab.research.google.com/drive/1DJZKTHtFPfTHcU7m-wpc7Qf1hPsOFaVX?usp=sharing>

Github repo with everything:

https://github.com/Solvence/DS4420_class_project

Recording:

<https://drive.google.com/file/d/1Xdqnb0pLbNAC2mL5dH-V172VjZnoyLHE/view?usp=sharing>

Application's Purpose

The purpose of our application is to help users identify photos of their pets. In particular, We will develop an image recognition model to distinguish photos of dogs and cats.

Data Collection and Refinement

We will use the [Dogs vs. Cats dataset from Kaggle](#). The dataset contains 25,000 labeled photos of dogs and cats used to train, as well as a dataset of unlabeled photos of dogs and cats that can ultimately be used for testing. These photos, however, come in many shapes and sizes. Each photo must be reshaped to the same dimensions of a small square image. This is done via a simple resizing operation.

Model Selection and Learning

We will use the convolutional neural network (CNN) architecture to train our machine learning model. We will use TensorFlow and Keras to build and train the model.

Interactive Feature Collection and Prediction

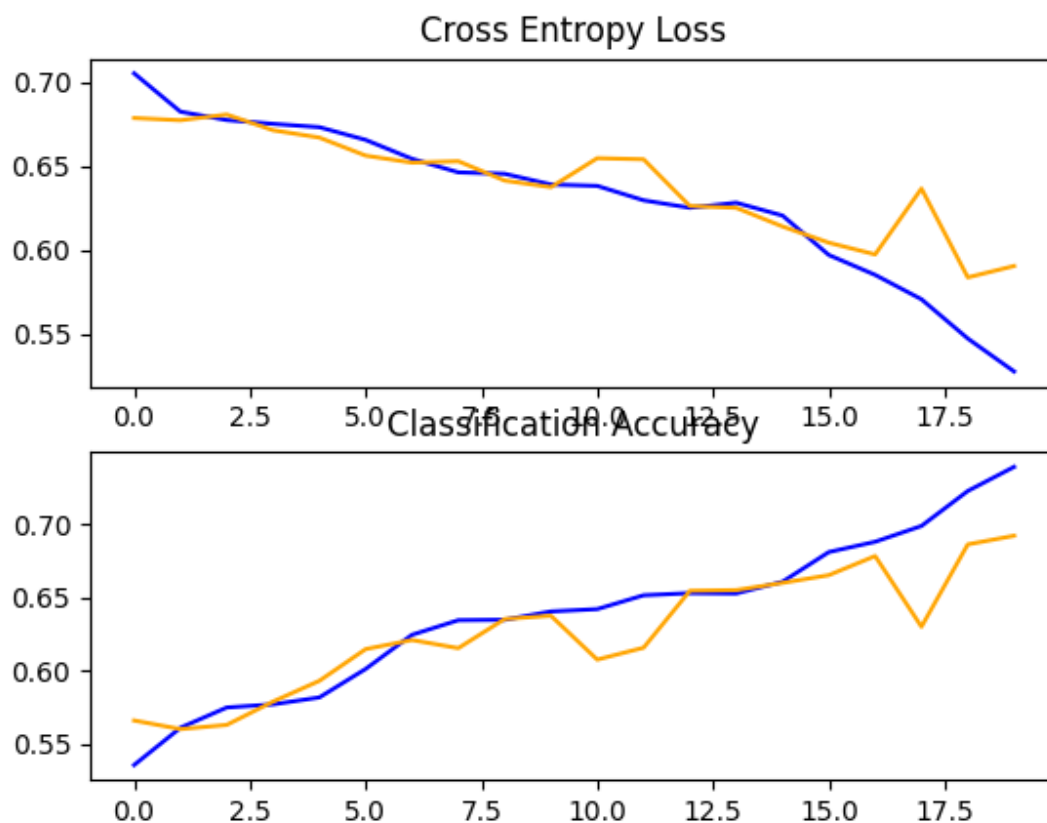
Users will be able to upload an image of a dog or cat into the file system on which the notebook resides. Once uploaded, the user may enter in the directory and file name of the image into the bottom cell of the notebook (some directory changes may be required, as shown by the top few cells of the notebook). Once everything is all set up, the bottom two cells of the notebook can be run and the trained ML model

will be loaded, make a prediction to classify the uploaded image as a dog or a cat, and print the prediction.

How the Prediction Helps the User

The prediction helps the user by identifying the species of animal in the image (cat vs. dog). For users who are vision impaired or unfamiliar with the distinction between cats and dogs, this tool allows them to distinguish pictures of the two species. These predictions may also be helpful when one has a particularly low resolution/blurry image. The species of animal may not be immediately obvious upon human gaze, but the model is able to submit a prediction based on thousands of previous image data. Finally, the predictions are useful when the user wants to make predictions on a wide batch of images. While manually scanning these images by human processes may be tedious, our model can perform the task within minutes.

Here's a graph of our Cross Entropy Loss and Classification Accuracy as a function of the number of images the model was trained on. The x-axis is labeled in thousands of photos:



Works Cited

Brownlee, Jason. "How to Classify Photos of Dogs and Cats (with 97% Accuracy)." *MachineLearningMastery.com*, 7 Dec. 2021, <https://machinelearningmastery.com/how-to-develop-a-convolutional-neural-network-to-classify-photos-of-dogs-and-cats/>.

"Dogs vs. Cats." *Kaggle*, <https://www.kaggle.com/competitions/dogs-vs-cats/data>.

Howard, Jeremy. "Is It a Bird? Creating a Model from Your Own Data." *Kaggle*, Kaggle, 15 Aug. 2022, <https://www.kaggle.com/code/jhoward/is-it-a-bird-creating-a-model-from-your-own-data>.