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Deep Learning Project Write-Up

Machine Learning Module

**Abstract**

The intent behind this project was to be able to correctly classify a given image of a dog by its breed. The data was the Stanford Dogs Dataset ([Here](http://vision.stanford.edu/aditya86/ImageNetDogs/)), which contained prelabeled images of 120 distinct breeds. A predictive model was then formed on the base of the ImageNet weights of VGG16 to create the final classifier.

**Design**

The project was designed to work synergistically with a previous project in which physical and genetic characteristics of Canines were used to determine the likelihood of additional tumorous growth/recurrence or particularly aggressive cancers given any known presentation of cancer on said animal. This classifier could aid in identifying potential breed mixes without the need for expensive genetic testing, assisting in making preventative care more accessible for more dog owners.

**Data**

The dataset was comprised of a total of 20,580 images separated across 120 distinct breeds with at least 150 images per breed.

**Models**

*Data Handling*

Database construction and integration via Google Drive to allow Colab GPU usage

Reusable pipeline built for easy reimplementation

*Models*

VGG16 was selected for ease of implementation, and the ImageNet weights were selected because the images in the Stanford Dogs dataset originated from the ImageNet dataset. As such they had been seen precisely by VGG16 in the past.

RMSprop and Adam tested with multiple hyperparameters before deciding on Adam, with both the highest initial accuracy as well as the best increase in accuracy per epoch

I split the images into a 75/25 Train/Test split with validation done on external images not included in the original dataset in order to introduce completely unseen patterns.

**Tools**

* Numpy, Keras, tarfile for data manipulation
* Keras for Modeling
* Matplotlib and for plotting