



Udacity Capstone Proposal : Dog Breed Classifier

PROPOSAL

Domain Background

Convolutional Neural Networks are specialized kinds of neural networks that have been very successful particularly at computer vision tasks, such as recognizing objects, scenes, and faces, among many other applications. CNNs work by discovering low-level and high-level features and use them to classify images. They are most effective when classifying different types of objects say human faces from backgrounds or vehicles from traffic. However when we do use CNNs for classifying different types of the same object, the task becomes difficult to delineate higher features.

Problem Statement

The problem being tackled in this project is to pickup a type of breed of dogs from a given set of dog pictures. It can also be stated that the problem here is to classify dogs using a CNN according to the the type of breeds and use this model to take in a picture of the Dog and predict the breed of dog. Further on given an image of a human face, the nearest type of matching dog breed will be predicted.

Datasets and Inputs

Dog dataset provided by Udacity deep learning v2 PyTorch repository.

(<https://s3-us-west-1.amazonaws.com/udacity-aind/dog-project/dogImages.zip>)

Human dataset provided by Udacity deep learning v2 PyTorch repository.

(<http://vis-www.cs.umass.edu/lfw/lfw.tgz>)

Solution Statement

The solution of this project shall consist of the following

- A CNN model built using PyTorch to distinguish Dog breeds.
 - A web application that accepts a picture of a dog and predicts the breed type. If human face is detected it shall output the nearest dog breed match.
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Benchmark Model

No.	Methods used	Data sets used	Training (Images/%)	Testing (Images/%)	Accuracy
1	Transfer learning with AlexNet, GoogleNet, ResNet50	CIFAR10	50000	10000	GoogleNet-68.95%, ResNet50-52.55%, AlexNet-13%
		CIFAR100	50000	10000	
2	Proposed a network contains 5 convolutional and 3 fully connected layers	ImageNet Fall 2011, 15M images, 22K categories	7.5M	7.5M	Error rates top-5 : 37.5%, top-1 : 17.0%.
3	Transfer learning, web data augmentation technique with Alex, vgg16, res net-152	Flowers102	8189		92.5%
		dogs	20580		79.8%
		Caltech101	9146		89.3%
		event8	1579		95.1%
		15scene	4485		90.6%
		67 Indore scene	15620		72.1%
4	Transfer Learning with Inceptionv3 model	CIFAR10	50000	10000	70.1%
		Caltech Face	12150		65.7%
					500 epochs-91%
					4000 epochs-96.5%
5	CNN deep learning	Caltech 101	9146		96%

Ref : <https://www.ijrte.org/wp-content/uploads/papers/v7i5s4/E10900275S419.pdf>

Project Design

We shall follow the steps as given below to realize our solution.

1. Import Datasets. We shall import the given dog and human datasets.
 2. Detect Humans. We shall use OpenCV's implementation of Haar feature-based cascade classifiers to detect humans.
 3. Detect Dogs. We shall detect the Dogs using VGG-16 model.
 4. Creating CNN We shall create a CNN for detecting Dogs.
 5. Creating CNN using Transfer Learning. We shall now create a CNN using transfer learning.
 6. Algorithm. No we shall write an algorithm that accepts a file path to an image and first determines whether the image contains a human, dog, or neither. Then,
 - if a **dog** is detected in the image, return the predicted breed.
 - if a **human** is detected in the image, return the resembling dog breed.
 - if **neither** is detected in the image, provide output that indicates an error.
 7. Testing. Finally we shall test this algorithm on at least six sample images.
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