

# Dog Breed Classifier Project Proposal

## 1. The project's domain background

This project is based on AI neural network, which shows very promising accomplishment recent years and launch a revolution on technology.

Computer vision is one of fields in AI. A very important net in Computer Vision is convolutional neural network. In fact, in ImageNet competition, models that using convolutional neural network surpassing human-level performance, that is a great accomplishment in the human histories!

So, convolutional neural network is a very important net, and Computer Vision is a very promising domain.

## 2. A problem statement

Given an image of a dog, identify an estimate of the canine's breed. If supplied an image of a human, the code will identify the resembling dog breed.

## 3. The datasets and inputs

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

There are 8351 total dog images, 133 classes.

Suppose num\_per\_class\_list represent numbers of images in each class, then this list has mean 62.79, standard deviation 14.80, min 33, max 96. so, this is a little imbalanced dataset.

This dataset is input to the model to train to classify dog breed.

b) human dataset : <https://s3-us-west-1.amazonaws.com/udacity-aind/dog-project/lfw.zip>

There are 13233 total human images, 5749 total different human.

We use OpenCV's implementation of Haar feature-based cascade classifiers to detect human faces in images, so this dataset is just for test.

## 4. A solution statement

- a) use OpenCV's implementation to detect human faces in images
- b) use model pre-trained on ImageNet to Detect Dogs
- c) use transfer learning to classify dog breeds

## 5. A benchmark model

The task of assigning breed to dogs from images is considered exceptionally challenging, so we use a random-guess-model as a benchmark model. Dog dataset have 133 classes, so random-guess-model have an accuracy of  $1/133 \approx 0.75\%$

## 6. A set of evaluation metrics

This is a classification problem, we only need accuracy as our evaluation metrics, which is  $\text{correct\_num} / \text{total\_num}$

correct\_num: the number of correct classification in test dataset

total\_num: the number of total images in test dataset

## 7. An outline of the project design

Step 0: Import Datasets

Step 1: Detect Humans

Step 2: Detect Dogs

Step 3: Create a CNN to Classify Dog Breeds (from Scratch)

Step 4: Create a CNN to Classify Dog Breeds (using Transfer Learning)

Step 5: Write Algorithm

Step 6: Test Algorithm

# References

1. <https://github.com/udacity/deep-learning-v2-pytorch/tree/master/project-dog-classification>
2. <https://github.com/udacity/deep-learning-v2-pytorch/blob/master/project-dog-classification/README.md>
3. [https://github.com/udacity/deep-learning-v2-pytorch/blob/master/project-dog-classification/dog\\_app.ipynb](https://github.com/udacity/deep-learning-v2-pytorch/blob/master/project-dog-classification/dog_app.ipynb)