

Project Proposal – Image Classification

Classification of Images: Dog Breed Identification

1. Objective:

The goal is to classify an image which is nothing but assigning a **human identifiable** label say alphabets, book, cat, human or dog etc. This identification is very easy for a human being but is very difficult for Computer (Computer Vision). If Computer Vision can attain human accuracy, then practical applications are limitless. In this project we use computer vision and machine learning techniques to predict dog breeds from images.

An image classification model takes an image and assigns a probability to a label. An image is a 3-dimensional array such as X (pixels width) * Y (pixels height) and three color channels (RGB) thus X * Y * 3. Please note that each number in pixel has a range from 0 (presence of light i.e. black) to 255 (all colors white light). In Computer terms – Computer has to assign a **human identifiable** label to this large 3D array.

2. Challenges

The task of identifying or labeling an image is trivial for human as we have trained our brain (associating an image with a label) since birth. And over time Humans have perfected their neural model(neurons) to overcome challenges like viewpoint/scale variation, deformation, disguise (person wearing a mask), partially visible, bad light, clutter and hidden in plain sight. But these cases are extremely challenging for Computer Vision and are out of scope of this project.

3. The Client

The client for this project is Kaggle.com.

<https://www.kaggle.com/c/dog-breed-identification>

4. Data source and Credits

The dataset was provided by Kaggle, Stanford and ImageNet. The Stanford Dogs dataset contains images of 120 breeds of dogs from around the world. This dataset has been built using images and annotation from ImageNet for the task of fine-grained image categorization.

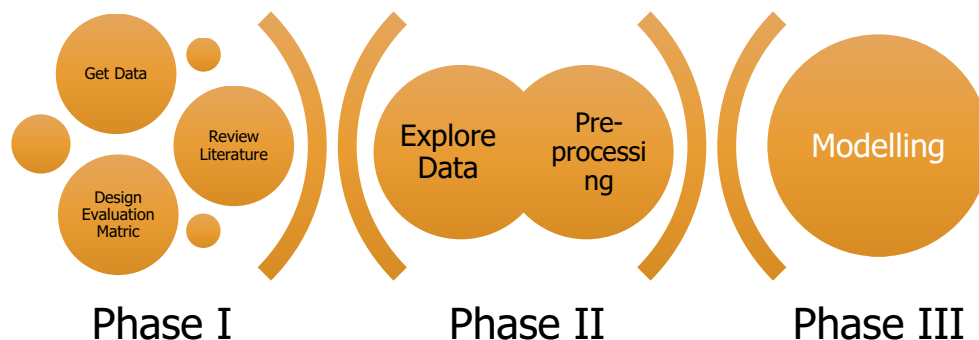
- Kaggle: <https://www.kaggle.com/c/dog-breed-identification>

- Stanford: <http://vision.stanford.edu/aditya86/ImageNetDogs/>
- ImageNet: <http://image-net.org/download-API>

5. Solution Approach

The solution plans to use CNN to help with image selection and dog breed identification. A deep learning algorithm will be developed using Keras with Tensorflow as the backend and will be trained with training data. Specifically, a CNN will be implemented in Keras and will be optimized to minimize multi-class logarithmic loss. Predictions will be made on the test data set and will be evaluated.

It is specifically designed to address large dataset with biodiversity and quality issues like image quality, multiple faces, missing key features etc. The solution is sub-divided into three phases as listed below.



- Data Assembly - Phase I:** This phase of the project is designed to gather and do basic cleanup like join, merge, add or update attributes.
- Explore and Preprocessing – Phase II:** This phase of the project is designed to validate and explore the dataset for all the problems listed in the “Problem” section of this proposal.

- c) **Modelling and Evaluation Phase III**: This phase of the project will focus on exploring various machine learning algorithms and finding the right model architecture to find the best model to classify the Dog Breed.

6. Project Deliverables

a) Project deliverables are listed below.

1. All project artifacts like – IPython Notebook with code, description and charts.
2. Project Presentation (.pptx)