# Project Proposal: Dog Breed Classifier

Chng Yuan Long, Randy

* The project's **domain background** — the field of research where the project is derived;
* A **problem statement** — a problem being investigated for which a solution will be defined;
* The **datasets and inputs** — data or inputs being used for the problem;
* A **solution statement** — the solution proposed for the problem given;
* A **benchmark model** — some simple or historical model or result to compare the defined solution to;
* A set of **evaluation metrics** — functional representations for how the solution can be measured;
* An outline of the **project design** — how the solution will be developed and results obtained.

## Domain Background

Dog breeds can be a confusing especially to anyone who is not a dog owner or a dog aficionado. This is even more so given the number of dog breeds in the world is around 5001. We hope that with the use of an application, identification of the breed of the dog would be fast and accurate and can be an educational tool.

Increasingly, people spend more and more time on their phone2 and our application will return the result in a string along with the confidence of the model for other web developers to be able to consume this data and present this to the user. As proof of concept we will create a stand alone application to consume an image and produce a result along with the confidence level.

The applicable technology behind this problem falls in the realm of computer vision. In one of the imagenet competition, a Deep Neural Network as able to beat the human record of 4.94 error rate with their own of 3.5 classification error3. Needless to say, computer vision is an avenue where it could augment human’s capability to perceive, recognise and detect certain objects in images. Its applicable range from the ubiquitous example of detecting medical anomalies4 like tumour or other undesirables to the ever-inspiring object detection in self-driving cars and everything in between.

Clearly computer vision has high potential to drastically change human’s progress, however it can be argued that computer vision is still in its infancy. Abstract images that can easily be discerned by a child to be just a block of black and yellow stripes is easily mis-classified by computer vision models to be a bus5. Nonetheless, its applications in recognising *intended* objects from a *clearly defined set of training images* is useful here in recognising the different breeds of dogs.

## Problem Statement

I foresee some problems for this application:

Mis-classification of dog breeds:

Insufficient/ Low quality data sets:

## Datasets and inputs

## Solution Statement

Our goal is to create an application that will output the breed of the dog in the image. If there fails to be something that our model can classify, it will return an error. For fun, we will also return a result even if a human face is presented. We intend to proceed with the following steps:

* Develop and algorithm to detect Humans
* Develop and algorithm to detect Dogs
* Create a Deep Neural Network (DNN) using Convolutional Layers to classify dog breeds
* Use a pre-trained DNN to classify dog breeds (transfer learning)
* Assess accuracy

## Evaluation Metrics

Relevant metrics here are:

Accuracy:

F1-score:

## Project Design

## Links

1-Dog breed: <https://petkeen.com/how-many-dog-breeds-in-the-world/>

2-Phone usage: <https://www.bbc.com/news/technology-59952557>

3-Computer vision error rates: <https://venturebeat.com/2015/12/10/microsoft-beats-google-intel-tencent-and-qualcomm-in-image-recognition-competition/>

4-Applications of computer vision in healthcare: <https://www.himss.org/resources/value-computer-vision-healthcare>

5-Misclassifications of state of the art AI models: <https://www.wired.com/2015/01/simple-pictures-state-art-ai-still-cant-recognize/>