Dog breed recognition

Task: recognize dog's breed by it's image.

The most commonly used machine learning technique for image recognition is convolutional neural network(CNN).

To train neural network we need a good training dataset. We can use Stanford Dogs Dataset, which contains 20 580 images of 120 dog breeds - that gives us about 150 images per class.
Link: http://vision.stanford.edu/aditya86/ImageNetDogs/
We will split it into training and testing sets. We can augment our data by randomly shifting or cropping images - this will give us many different variations when training the model.

However, this data set is not big enough to train our neural network. Also, teaching CNN properly may be a difficult task that would take a lot of computational resources. Luckily, we can use an already pre-trained deep neural network on a larger dataset.

Transfer Learning

We can create our model using this pre-trained neural network - it will identify simple shapes and more complex visual patterns. We need to cut the prediction layer of pre-trained CNN, and then attach our layers at the end. These are to build "classifier" that makes sense of the patterns previous layers provide.
Just before an output layer, we will add the Softmax layer, which will assign decimal probabilities to each class(breed). We need to make sure that pre-trained layers are not changed when we train our classifier (with our prepared dataset). After creating and training the model we need to test it and check how accurate it is, we probably will need to experiment with some parameters.

Tools
We will be using Keras: Google's library for working with Neural Networks. Probably sklearn, pandas and numpy libraries will be useful too.