Q1 - Zhangsheng Lai (1002554)

October 7, 2018

Q1. Formulation as a classification problem and different feature vectors

```
In [1]: import cv2
        import os
        import numpy as np
        import seaborn as sns
        import matplotlib.pyplot as plt
        sns.set()

        import keras
        from keras import callbacks
        from keras.datasets import mnist
        from keras.models import Sequential
        from keras.layers import *
        from keras.optimizers import RMSprop, SGD

        from matplotlib.colors import ListedColormap
        %matplotlib inline
```

```
Using TensorFlow backend.
```

Change to the directory containing the images

```
In [2]: path = "C:/Users/zlai/Documents/repo/HomeworkTex/ML/hw/homework 1/data/train/airplane"
        os.chdir(path)
```

Q1. Formulation of the classification problem The classification problem here is to classify the images in the different folders into one of the classes from the set $\{\text{airplane}, \text{automobile}, \text{bird}, \text{cat}\}$.

The input image can be converted into a *feature vector* with one of the following examples listed below:

1. Using the raw pixel values For each `.jpg` image, we can extract the raw pixel values using `cv2.imread` which returns an array representing the raw RGB intensities of the image. Using `.flatten()` we convert the raw image from a multi-dimensional array into a single array of values with dimensions `(3072,)`, which can be used as the input for the classification problem.