

CS 256 Section 2 - Homework 3

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1 Introduction

The program uses kNN and K-Means clustering algorithm to classify image data. The program is bundled with more than 500 images (landscapes and headshots combined) for this purpose. It extracts image features and classifies an image as landscape or headshot based on the training set. Additionally, the kNN algorithm is validated using a 3-fold validation set.

2 kNN Algorithm

The environment uses Pillow library to apply the "FIND EDGES" filter on an image and then computes the RGB mean and standard deviation of every pixel to build up the training set. Following are the results of view predictions that the agent performed on previously unseen images.

File	Expected	Prediction
test1	Landscape	Landscape
test2	Landscape	Landscape
test3	Landscape	Headshot
test4	Headshot	Headshot
test5	Headshot	Landscape
test6	Landscape	Landscape
test7	Headshot	Landscape

It is interesting to see that the files test3 and test7 were misclassified as Headshot and Landscape respectively. Following are my observations on this:



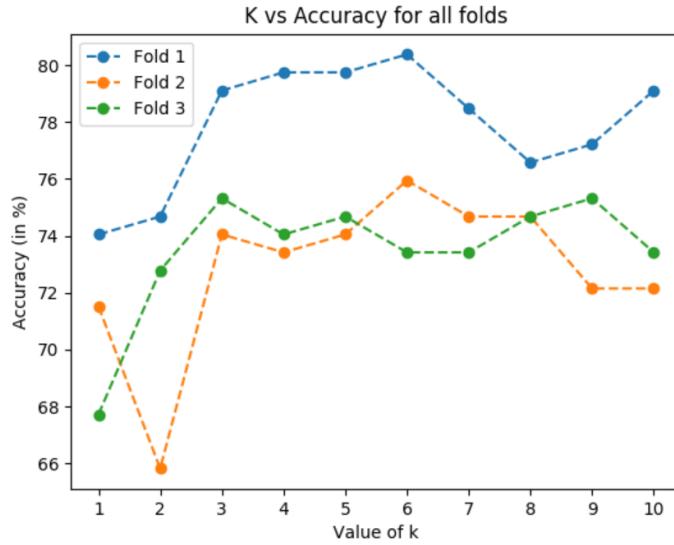
The above image got misclassified as a headshot. In my opinion, the heavy brown shade of the grass and the trees confused the agent to think that this dominant color resembled the skin tone of a person.



The above image got misclassified as a landscape. In my opinion, the prominent blues in the background tricked the agent and blues and skies are very dominant across the canvas in landscapes.

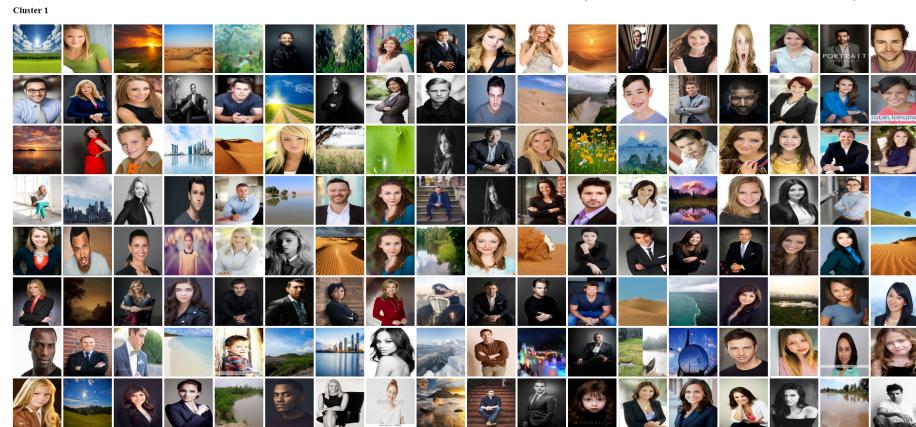
3 3-fold validation

The 3-fold validation was performed by creating 3 training sets of size 344 each. The 3 validation sets were of the sizes 172 each. Interestingly, fold 1 gave the maximum accuracy whereas folds 2 and 3 remained similar to each other. Almost all the folds gave good accuracy near $k=5$.



4 K-Means Clustering

Cluster 1 of K-Means Clustering consisted of many headshots, whereas the cluster 2 was dominated by landscapes. On carefully looking at them, I observed that images in cluster 2 are more inclined towards shades of blues and green, whereas the first cluster consists of a lot of dark (especially black shades).



Cluster 2

