CS 256 Assignment 3
Image Classification
by Abhishek Manoj Sharma

Contents

Setting up Python environment:

The program uses two third party libraries. Pillow for image processing and matplotlib for plotting graphs.

Open Terminal and run the following 3 commands:

Number	Command	Description
1	sudo apt install python-pip	This command installs 'pip' which is a package management system for Python
2	pip install matplotlib	This command installs matplotlib
3	Pip install Pillow	This command installs the Python Pillow library.

Setting up program components:

The assignment contains the following 3 Python files:

1. abhishek_sharma_hw3.py
2. abhishek_sharma_hw3_environment.py
3. abhishek_sharma_hw3_agent.py

Please ensure that all the above mentioned 3 files are placed together in the <u>same directory</u>.

Additionally, the program is bundled with 517 images (headshots and landscapes combined). These images are in the "images/headshots" and "images/landscapes" directories respectively. Images can be added or removed from these directories, however, the folder structure should not be changed.

The program will read only those images which are present in **"images/headshots"** and **"images/landscapes"** directories.

Also, please note that the program will refuse to perform 3-Fold clustering if the number of headshot and landscape images are less than 10 each.

How to run:

Kindly execute the program using the following steps:

1. Open terminal and navigate to the path containing the 3 Python (.py) files mentioned in the previous section.

2. Execute the following command:
python abhishek_sharma_hw3.py

Program in execution:

Following are some screenshots of the program:

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```
C:\Users\abhis\OneDrive\Documents\Courses\Fall 2017\CS 256 by Prof. Natalia Khuri\Assignment 3>python abhishek_sharma_hw3.py

--------------------
Type the corresponding number and press enter
1. Predict image (Landscape or Headshot)
2. Test agent accuracy using 3-folds
3. K-means clustering clustering (K=2)
4. Quit
Enter the number: 1

--------------
Enter image path with extension: test_4.jpg
Enter the value of k: 3
Retrieving image data from: ['images/landscapes/', 'images/headshots/']
---------------------
Prediction (k = 3): headshot
---------------------
Press N to search new image, or any key to go back to main menu:
```

```
Type the corresponding number and press enter
1. Predict image (Landscape or Headshot)
2. Test agent accuracy using 3-folds
3. K-means clustering clustering (K=2)
4. Quit
Enter the number: 2
Building training and validation sets with image attributes.
Please wait, this may take about a minute.
Training sets built of sizes: 344, 344, 344
Validation sets built of sizes: 172, 172, 172

----------------------
Accuracies for fold 1
----------------------
K = 1: 72.09% (124 out of 172)
K = 2: 71.51% (123 out of 172)
K = 3: 75.58% (130 out of 172)
K = 4: 75.00% (129 out of 172)
K = 5: 78.49% (135 out of 172)
K = 6: 77.33% (133 out of 172)
K = 7: 79.65% (137 out of 172)
K = 8: 79.07% (136 out of 172)
K = 9: 79.65% (137 out of 172)
K = 10: 77.33% (133 out of 172)
```
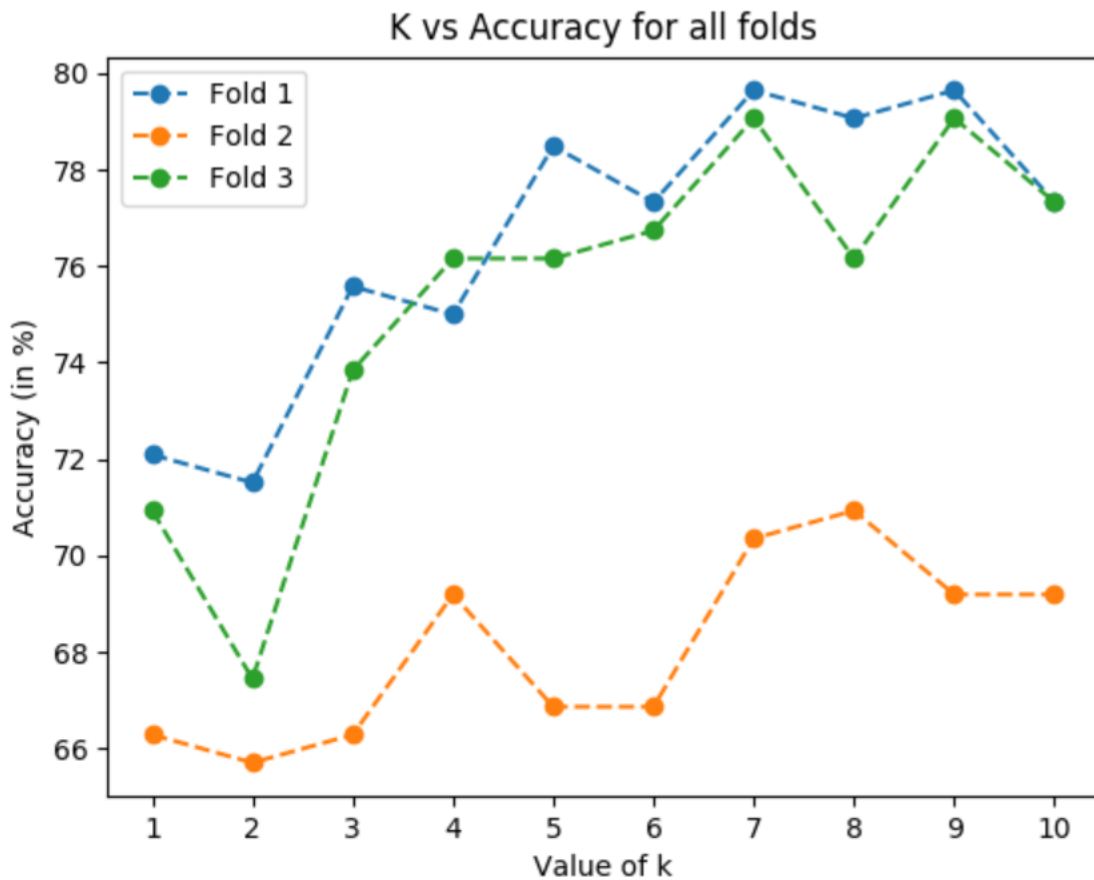
K vs Accuracy for all folds


```
Type the corresponding number and press enter
1. Predict image (Landscape or Headshot)
2. Test agent accuracy using 3-folds
3. K-means clustering clustering (K=2)
4. Quit
Enter the number: 3
K-Means Clustering
K-means clustering results opened as webpage in browser

Cluster 1:
156 headshots
233 landscapes

Cluster 2:
102 headshots
26 landscapes

Press C to perform K-means cluster again, or any key to go back to main menu:
```

K-Means Clustering, K=2

Cluster 1

Cluster 2

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