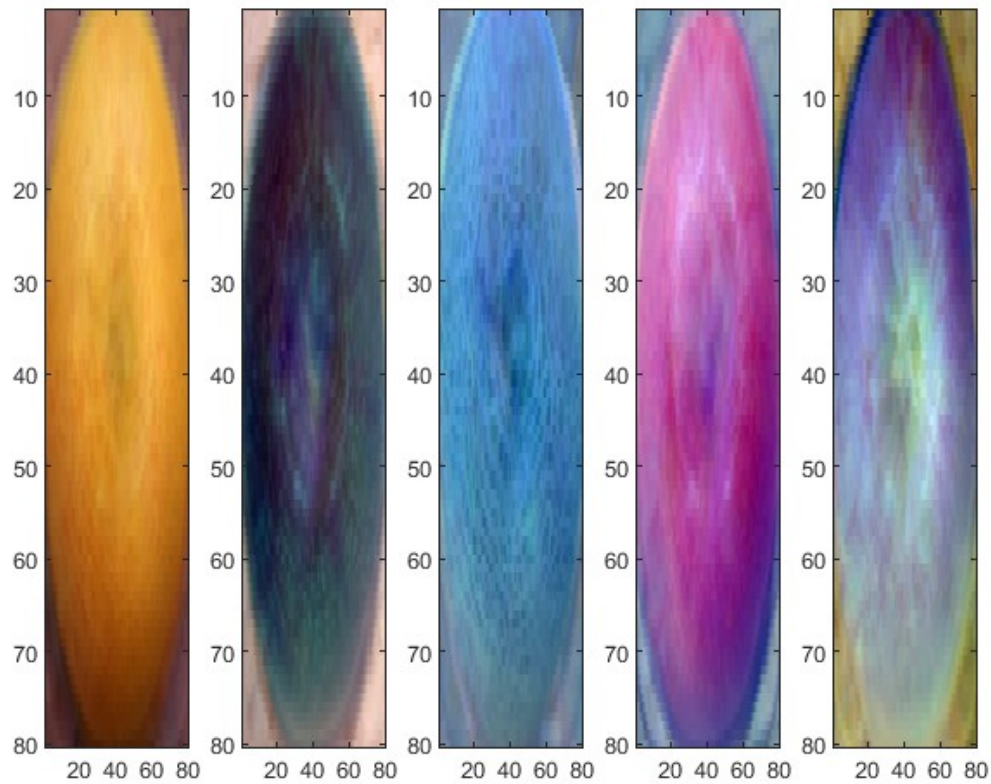# CS215 Assignment-2

210050115 Patil Vipul Sudhir

210050119 Hari Prakash Reddy
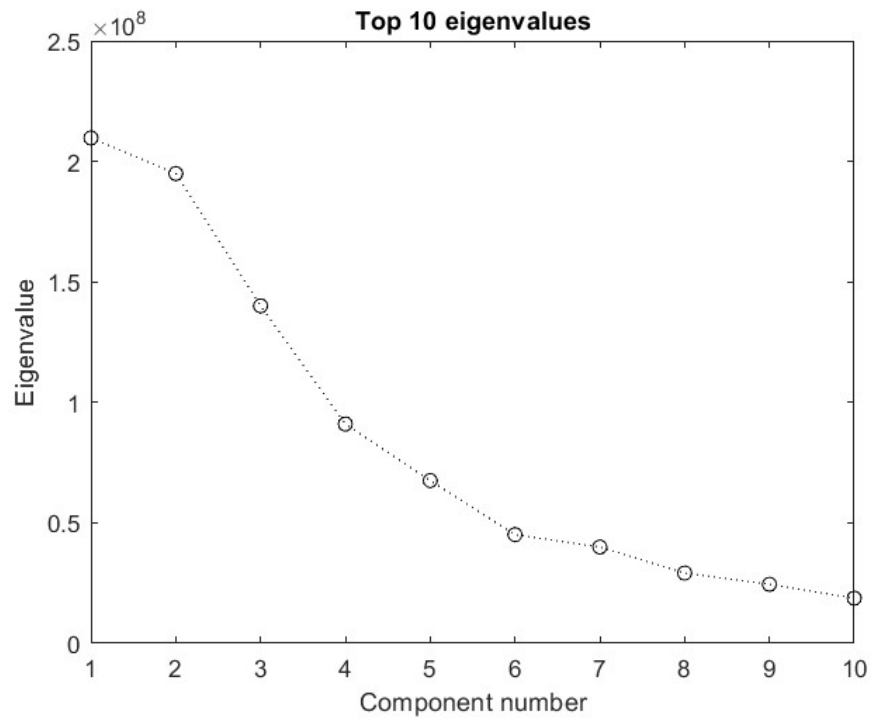
1 Principal Component Analysis (PCA) for fruit dataset

1.1 Image of Mean vs Images of top 4 Eigenvectors

Instructions to run the code:
Run q6a1.m from code folder of Q6

1.2   Plot of Top 10 Eigenvalues

Instructions to run the code:
Run q6a2.m from code folder of Q6

1.3 Reconstructing Images using mean and Eigenvectors

1.3.1 Description of Algorithm

1. Took the images and stored them inside a 19200*16 matrix so that all images are stored inside the same matrix for further computation.

2. Found mean by using sum() function, found Covariance, found top 4 eigenvectors(with highest eigenvalue), using eigs() function on covariance.

3. Found the component of every specific image given in the top 4 eigenvectors and with the help of those computed the new matrix Summ

4. Rescaled reshaped Summ matrix into original 80*80*3 matrix and gave the image as output.

1.4 Explanation

Took the top 4 eigenvectors as asked, and found the components of image-mean(difference from mean image) on these 4 vectors, as these are the vectors representing the principal mode of variation in these 16 images, finding components and adding back to the mean image gives an approximate image of the selected fruit.

1.5 Images
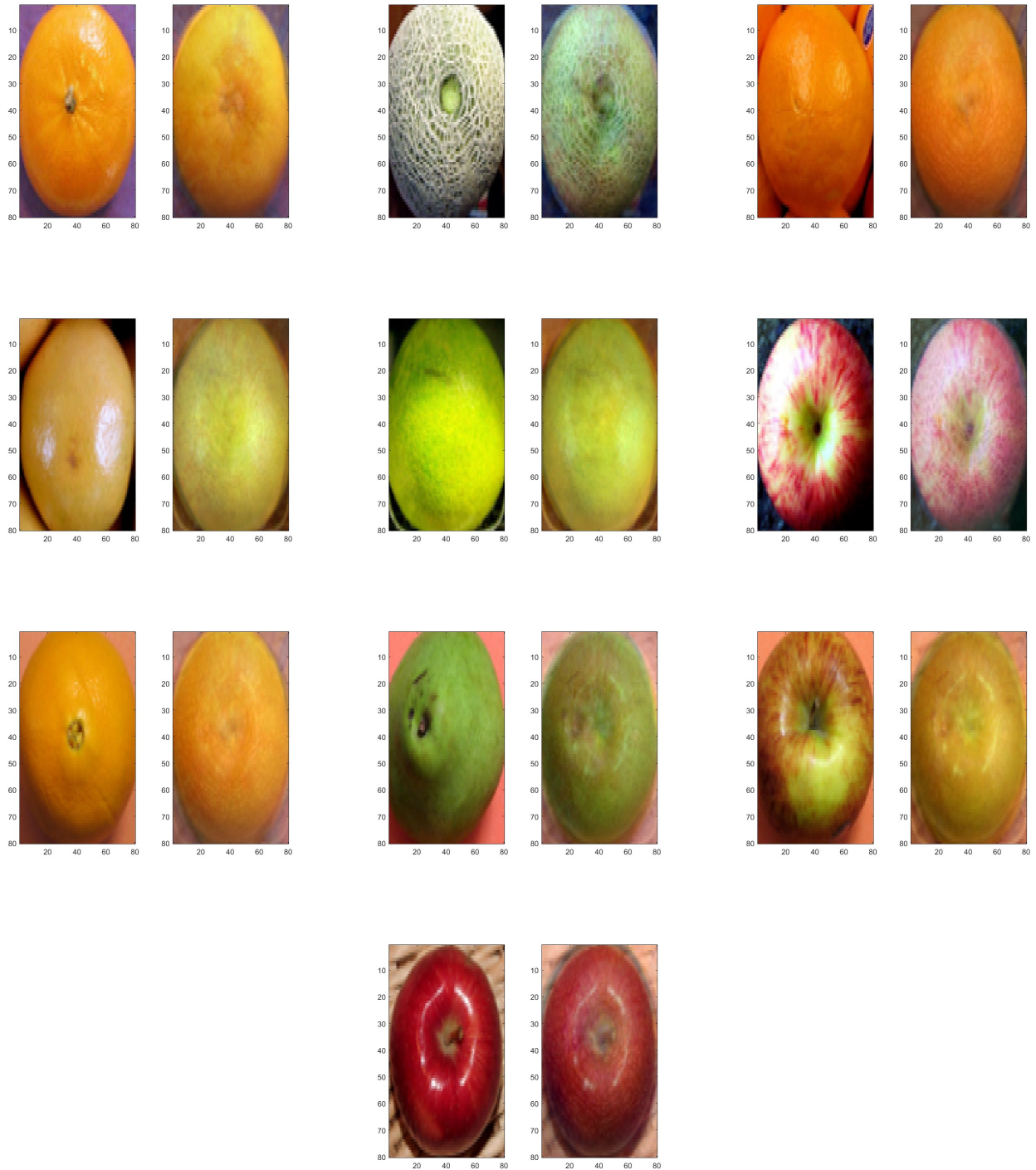
Instructions to run the code:
Run q6b.m from code folder of Q6

1.6 Sample random Images

Created images from the set of images using their mean and covariance matrix, found the range of coefficients of the top 4 eigenvectors, and using rand() got a uniform distribution from min to max of each coefficient as it should be inside the data set, the images resultant might be the same, weird combination of different fruits or a new fruit, so with hit and trial used some seeds and selected pictures which are looking as new fruits and different from the images already existing.
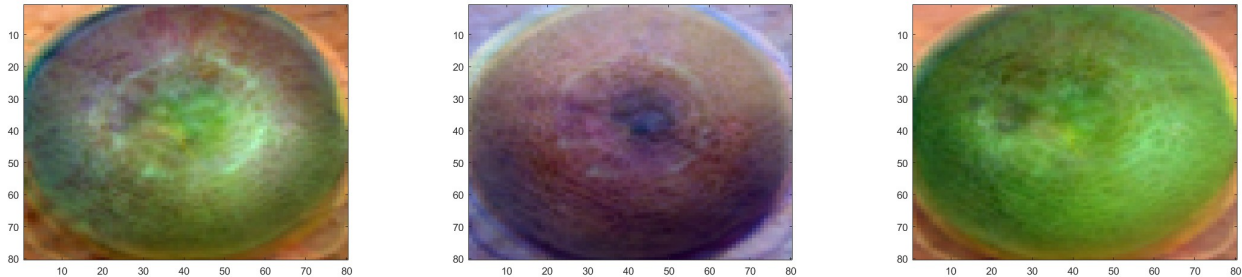
Instructions to run the code:
  Run q6c.m from code folder of Q6