Question 1

PCA-based (EigenFace) Face Detection

1. Implement face detection based on PCA. There is a nice (python) eigenface recognition implementation here, https://github.com/vutsalsinghal/EigenFace . You are allowed to use any code segment in this repository. However, you have to implement face detection by your self.
2. **Training dataset**: use the images in the "Dataset" folder of the Github repository as a part of your training images. Also, taking four pictures of your face with a little bit different facial expressions as the other part of the training dataset. (Hint: try to take the pictures of your face with clear background and crop your face images which are similar to the images in "Dataset" folder). Use these images to compute(train) mean face and eigenface.
3. **Testing dataset**: Take another two pictures of your face. One with clear background and the other one with unclear background. Take two pictures of your friend's face, One with clear background and the other one with unclear background. Take two pictures which are not face. (Hint: crop face images which are similar to the images in "Dataset" folder). Use these images and your face detection implementation to calculate the distance/error between the raw testing images and reconstructed images.
4. **Submission**: 1. Submit your code. 2. Write a report (pdf file), which includes all testing images, their corresponding reconstructed images and the error between raw images and reconstructed images. 3. Write down the order of images from small errors to large errors by your expectation/guess before running the program. Is there any result which is different from your expectations and discuss why.

Question 2

Motion History Image

1. Implement motion history image algorithm.
2. **Testing videos**: You should use three different clips to test your implementation. Download videos from `http://users.umiacs.umd.edu/~zhuolin/PrototypeTree/Keck_Dataset.zip` . Use the first 3 second clip of person1_gesture7_com.avi, first 2 seconds of person2_gesture5_com.avi and the first 4 seconds of person4_gesture7_com.avi to calculate MHIs.
3. **Hint**: You can calculate pixel-wise difference between two consecutive grayscale images in videos and set a threshold to detect motion pixels.
4. **Submission**: 1. Submit your code 2. Submit a report (pdf file) which includes the three motion history images.