Department of Electrical and Computer Engineering
The Johns Hopkins University
525.628 Compressed Sensing and Sparse Recovery – Spring 2022

Module 9 - Homework Assignment

Computer Assignment: SRC Face Recognition

1. Implement the face-recognition algorithm as described in Lecture based on the concept of Sparse Representation Classification (SRC).

   The database that we will use to evaluate the performance of your algorithms is the Extended Yale Face Database B which contains 38 human subjects under different poses and illumination conditions. To reduce the computational complexity, we will only experiment with the cropped database whose images have been manually aligned, cropped, and then re-sized to 96×84. This database can be downloaded from blackboard as a mat file.

   The database is stored in one single 3D array named *faces* of size $2414 \times 96 \times 84$. The associated file *facecls* contains the ground-truth information (the correct class) of each face in the database.

   You should randomly partition the set of images into the training set and the testing set (for example, half-half). Sparse-representation dictionary should only be constructed from the training set. Finally, evaluate your algorithms by comparing their classification accuracy percentage.

2. Improve your SRC face-recognition algorithm so that it can handle sparse outliers: random pixel corruptions and random patch corruptions. Purposely add sparse outliers to your test images and repeat your experiment above. Plot your classification accuracy as a function of corruption percentage. Any observation?

3. Take a few selfies!!! Pre-process the images to make them match the style and the format of typical images in the Yale B database. Develop a strategy for outlier rejection (i.e., declare that this person does not exist in the database). Demonstrate the effectiveness of your strategy on your selfies.