1 Persudo Code of Superresolution

Algorithm 1 Dictionary-Learning Process

STEP 1. Load training images.
STEP 2. Converts images from RGB color space to YCbCr color space and save the illuminance(Y) value.
STEP 3. Crop the images and save as **high resolution images** set.
STEP 4. Downsampling the high resolution images to get **low resolution images** set.
STEP 5. Upsampling the low resolution images to get **middle resolution images** set.
STEP 6. Call *collect* function to extract features for each image in middle resolution set and get **features** matrix.
STEP 7. Upsampling the low resolution images to get **interpolated images** set.
STEP 8. Subtract each images in high resolution set and in interpolated images set to get patches set.
STEP 9. Call *collect* function to extract features for each image in patches set and get **patches** matrix.
STEP 10. Implement dimensionality reduction on features matrix based on PCA and get **features_pca** matrix.
STEP 11. Call *ksvd* function using features_pca to train for the **low resolution dictionary** as well as **gamma** matrix.
STEP 12. Calculate high resolution dictionary D_h using formula : $D_h = PQ^T(QQ^T)^{-1}$ (P: patches matrix Q: gamma matrix)