2/22/15

The results generated by Sifei’s implementation of Liu07 algorithm on non-upright frontal faces are too bright. Why?

2/21/15

I find a problem in Sifei’s code that her landmarks are generated by the uncompressed images. Now I run the UCI face detection algorithm on the compressed input and the detected landmarks are wrong and useless. Thus our algorithm does not work.

If I cherry picking the good detected images. We need to move come images from the training set to the test set. Thus the training set changes so that we need to re-train the prior for Liu07 and Jianchao08 algorithm. It will be troublesome.

I also find that Sifei does use the Lab color space to smooth the face if the Quality value of the input image is not 100.

I check Sifei’s Ma10 implementation because I need to generate the non-upright frontal faces. However when I trace her code for upfronal faces, I find a small bug in her dataset. 001 (Simon Baker) is included in the folder fullfile('Data','Sele\_TrainingFaces\_LRGray'); I do not understand. We use 2184 upfrontal faces as our training set, but why Sifei only use 480 upfrontal face images as her training set? In fact, Sifei only uses 50 example images randomly selected from the 480 training set. She told me that Ma's algorithm cannot work if the number of example images exceeds the number of pixels in a patch.

It is weird that Sifei uses a training set different from our CVPR datasaet.

There is another point I do not understand. I remember the Ma10 results are very smooth, but why are there many sharp artifacts generated in Test2 and Test3?

Where is the learned data of the Liu07 method on non-upright frontal faces?

2/20/15

My code Test18 still relies on Sifei’s folder (Code\Sifei). It is a complex case. I had better clear it when Sifei comes back. I stop running Sifei’s code on PubFig dataset because her code generate color blocks for Q=25. She did not response my email and I did not know how to handle this problem.

For non-upright frontal faces, we have 283 landmark instances labeled on many people including 001 002 003 006 008 011 017 019 029 035 036 038 042 044 046 047 049 050 053 054 055 057 064 068 070 071 079 080 083 105 111 117 117 124 126 127 137 138 139 143 145 149 156 157 161 169 175 181 184 185 186 190 191 198 199 202 209 220 227 240.

Sifei’s code for Compressed Face Hallucination is at 120801SRForFace\Code\Sifei\JPEG\_SR\code rather than 120801SRForFace\Code\Sifei\Ours2. The Sifei\Ours2 generate CVPR13 results on JPEG files.

The exemplar face images used by Sifie for upright frontal faces is 120801SRForFace\Code\Sifei\PIE\Upfrontal3\_training\Training\_LR\_JPEG\PreparedMatForLoad\_color\ExampleDataForLoad\_L.mat. The file contains a single data named exampleimages\_lr, which is a 4D uint8 format. It looks like the low-resolution example images in ycbcr space. Does she have another file for the non-upright frontal faces? I do not see such a file in 120801SRForFace\Code\Sifei\PIE\NonUpfrontal\_training\PreparedMatForLoad\_color.

There is a major difference between CVPR13 and ICIP14 algorithm. In the CVPR13 method, we only use grayscale exemplar images, but in the ICIP14 method color exemplar images are required because the CbCr channels have been severely damaged.

2/8/15

I would like to make a record of the coordinate of the left and right eyes in the upright frontal faces.

lefteye.x = 295.4005 lefteye.y = 194.2261

righteye.x = 367.5484 righteye.y = 194.2261

eyedistance = 72.1480

eyecenter.x = 331.4744

image size: height: 480, width: 640. This is the raw Multi-PIE image.

It is too complicated and I have no time to figure out the details. Check it next time in the PP2 series.

2/3/15

The Test18\_CompressedFaceHallucination and Test19\_NearestNeighborUpsampling run successfully so that the Q25, Q50, and Q75 results are successfully generated. I try to update Sifei’s Liu07 code by removing the out-of-date setting and turning parameters. The updated file is Test5\_PAMI\_Website in the Liu07 folder.

2/1/15

In order to run all the 342 upright frontal faces on Linux machine. I need to create a new matlab Test file without the imshow function.

1/27/15

I am going to generate Q100 results of 150\_02\_01\_051\_05 to full fill the page of Fig. 7 of the PAMI draft. The code has to run on a Linux machine due to the UCI face detection library. The Test13 file can not run on this version of Matlab (2013b) on a linux machine due to a known Matlab bug no 961964 “MatLab error: cannot open with static TLS”. Test13 file is interrupted. I am going to use another Linux machine to run the Test13 file. U61 can run Test13. The bug is tricky as the Linux and Matlab versions are the same on U19 and U61. Test13 frequently encounters errors on U61 due to a missing lab in the parallel computing.

I have to generate images using the LSF methods, but I encounter a problem. Where and how to call Sifei’s code to generate those image?

1/25/15

I generate new image for the updated Fig.3 (Edge restoration). Compared with the old version, the new version face (Simon Baker) is aligned and cropped based on the head region. The new images are in the folder Test17\_. In order to generate those images quickly, many hard-code statements are inserted in the file F21f. Be careful if I need to use the file in the future.

1/22/2015

In order to update and combine the Fig. 3 and Fig. 4 of the PAMI15 v2 draft. I create a new Test17 file to generate the intermediate images of directional-preserving upsampled images. Since the Test17 call the UCI face detection algorithm on the fly, I need to run it on a Linux machine. I found there is a hard coded section F27a, which generates images in 120801SRForFace\PaperWriting\CVPR13\manuscript\figs\Illustration\SmoothnessPreservingUpsampling. It is a poor practice and I need to revise it if I have time.

4/16/14

I need to know how Sifei reconstruct the CbCr channels using the PatchMatch algorithm.

According to the Help, Matlab cannot control chroma subsampling.

Does Sifei have any demo file processing a 4:2:0 JPEG input?

If an input JPEG file is chroma subsampled, how does Matlab reconstruct the full CbCr channels? Does it use nearest neighbor? By the way, how is full CbCr channels subsampled during encoding? Is it averaged by 2 or 4 Cb/Cr pixels?

4/15/14

I am confused about code generating img\_texture because Sifei does not do anything for the JPEG blocky artifacts, which automatically disappear after the PatchMatch upsampling. I guess the reason is the YCbCr domain.

4/12/14

Since I can use Sifei’s code to generate images, I return to trace the code again to finish the remaining PAMI draft.

The function F40fs\_GetTexturePatchMatch\_Aligned() uses YCbCr LR image img\_y (in fact it is YCbCr) and PatchMatch algorithm to generate a SR image. Since the input format is YCbCr, Sifei uses the same format for exempleimages\_hr and exempleimages\_lr, which are different from our CVPR13 setting. Why does she change it? Is there any advantage? Does she mention this conversion in the draft?

In T1\_Img2Grad\_Blockcompensate(), the refined gradients are

Grad\_o(:,n-1,m)+Grad\_o(:,n+1,m)+Grad\_v(:,n,m))/3; It is different from the /2 described in the manuscript. Maybe it is better to ask Sifei.

What is the meaning of the vmask in the T1\_Shiftblock.m?s

4/10/14

Comparisons of UCI and IntraFace

UCI: RGB/ double / Linux

IntraFace: RGB/ uint8 / Windows

4/9/14

After tracing Sefei’s code, I need to discuss several questions with her.

1. There should be a FAST\_NLM\_II.m file, right? Do we need to mention we use NLM in our algorithm?

2. The TVD\_dpreserve\_mm2.m causes Out of Memory.

B = -beta \* spdiags(ones(N-1,1),0,N-1,N-1) + ...

(lam\* spdiags(ones(N-1,1),0,N-1,N-1)) / vk;

The problem seems the vk is too large (76799x76799). How should I handle the exception?

3. Do you use the landmarks computed from non-compressed inputs?

4. Why do you interpolate gradient maps?

5. I read the paper “On total-variation denoising: A new majorization-minimization algorithm and an experimental comparison with wavalet denoising”. It performs worse than [10]. Why should we use it?

6. In the F4b\_GenerateIntensityFromGradJpeg.m, how can Sifei know the quality index from a JANUS input?

7. In the F4b\_GenerateIntensityFromGradJpeg.m, is it correct to backproject the difference of JPEG images?

4/8/14

I am confused in the description of the usage of the MM algorithm in section 3.3. I need to check Sifei’s code tomorrow.

4/6/14

For revising the related work, I spend time on studying the paper of 2008 ICME Xiong.

4/5/14

Sifei re-organizes her code and writes a readme at D:\Projects\FACE HR. Her password is 87829470.

03/27/14-03/2/30/14

I spent a lot of time on editing Sifei’s sections to integrate to our PAMI draft. I need to discuss with her to figure some technique details. Does she use the quantization table or not? I may need to re-run experiments to unify figures in the PAMI draft.

03/26/14

In order to solve the problem of ineffective example, I should filter out face images taken under different illumination. Can I compute the illumination distance in the same way as the face swapping paper? What is the meaning of the beta in Eq. 3 of the paper?

Reading the paper “A User’s Guide to Spherical Harmonics”, I finally understand the definition of the function. I hope to figure out its application for relighting tomorrow.

03/24/14

I can not find an algorithm addressing the problem of classifying illumination directions of face images. I have to develop a simple algorithm by myself.

I will extract 2526 labeled face images from the Multi-PIE dataset, and align them at the eyes. I will apply a mask covering the facial components to extract difference features. I will compute the sample spaces of the 19 illumination directions using PCA models to classify test images.

Therefore, I need a pair of standardized eye locations. I have them, in the folder LocationOfTwoEyesForAlignment.

Can I relight face images to generate effective component exemplars? How does the 08 SIGGRAPH paper estimate the illumination differentce?

03/23/14

The next problem: How to reduce the artifacts of the jaggy collars in the image Barack\_Obama\_0161\_test10.png? I need to figure out the used cluster centers and the generated HR patches. It is best to analyze the training data to figure out the reasons that the regressed results do not match my expectation.

The right eye of the generated image, Barack\_Obama\_0161\_test10.png, is blurry. The reason is that the right eye of the retrieved example image is dark, so that the gradients are small and unable to generate an eye with sufficient contrast. In other words, the retrieved exemplar image is not good enough to generate a good right eye. The deeper reason is that the images of the exemplar dataset are all from illumination 13 and do not match the test image Barack\_Obama\_0161.

The possible ways to solve this problem are: (1) to expand the exemplar dataset to contain all 20 illumination directions and (2) to figure out the illumination direction of the test image (if possible).

The first way will significantly increase the computational load.

The second way is very interesting. I may need to check whether the problem has been addressed in the literature. Maybe it is not difficult. Since I have a lot of Multi-PIE face images, it may be easy to train a multi-object classifier to predict the illumination direction. Although the classifier may be imperfect, I can still know the approximate direction.

Within the 15 camera positions, the 05\_1 folder contains upright frontal faces which are most important. Although a folder contains 20 images, there are only 19 illumination directions because neither the first nor last image is taken with directional light source.

03/22/14

Since points 61 and 65 are unavailable in the IntraFace outputs, I need to copy point 49 to 61 and 55 to 65.

I use the ICCV 13 algorithm to generate better background with less artifacts.

03/21/14

Ralph Gross gave me two tgz files, mpei\_labels and mpei\_label\_frontal. Ideally the mpei\_labels should be a superset of mpei\_label\_from, but it is not because a file 219\_03\_01\_051\_05\_lm.mat is not contained in the mpei-label file.

There are 2527 files in the mpei\_label\_frontal file, which is equivalent to the 051 folder of the mpei\_labels file plus the 219\_03\_01\_051\_05\_lm.mat file. Since the 010\_01\_01\_051\_07\_lm.mat is wrongly labeled, I have 2526 effective frontal landmarks.

03/20/14

I solve a problem about the error message of

%Invalid MEX-file '\\CHIH-YUAN-PC\120801SRForFace\Code\Lib\FacialFeatureDetection&Tracking\_v1.3\+cv\private\CascadeClassifier\_.mexw64': The

%specified module could not be found.

The solution is to copy the OpenCV dll files from Lib\FacialFeatureDetection&Tracking\_v1.3 to Ours2 so that the MATLAB can load them.

The landmark formats are the same for UCI and Multi-PIE, but different between Multi-PIE from IntraFace.

Landmarks of UCI: 68 points;  
1-5:wing of a nose, 1:center, 2:left, 3:leftmost, 4:right, 5:right most  
6-9: bridge of a nose: bottom-up  
10-15: left eye, order in clock: 3, 5, 7, 1, 11, 9

Landmarks of Multi-PIE: 68 points;   
1-17: cheeks and jaw,   
18-22: left eyebrow,   
23-27: right eyebrow,   
28-31: bridge of a nose, top to center  
32-36: wing of a nose, left to right  
37-42: left eye,  
43-48: right eye,   
49-68 (20 pts): mouth, 49-55 (7 pts): upper bound of a upper lip, 56-61 (5 pts): lower bound of a lower lip, 61-65 (5 pts): lower bound of a upper lip, 66-68 (3 pts): upper bound of a lower lip

Landmarks of IntraFace: 49 points;  
1-5: left eyebrow, from left to right  
6-10: right eyebrow, from left to right  
11-14: bridge of a nose, top to center  
15-19: wing of a nose, left to right  
20-24: left eye, starts from 9 o’clock, clockwise  
26-31: right eye, starts from 9 o’clock, clockwise  
32-49 (18 pts): mouth, 32-38 (7pts): upper bound of a upper lip, 39-43 (5 pts): lower bound of a lower lip, 44-46 (3 pts): lower bound of a upper lip, 47-49 (3 pts): upper bound of a lower lip

How many manually landmark files are given by Ralph Gross?  
Totally 6152 files  
upfrontal (051) : 2526 files. Within the set, one file (010\_01\_01\_051\_07\_lm.mat ) is wrong.  
30 degree right (041) : 285 files

There are too many backup folders to figure out the active ones. I need to re-organize them.

120801SRForFace\Ours2\Backup

120801SRForFace\Code\_backup

Now all backup files are moved to 120801SRForFace\_retired\Code\Ours2\Backup

03/19/14

Create a new file Test2 on Ubuntu to check the effectiveness of a localization algorithm. I am looking for a more robust one.

The landmark format I am using is AAM containing 68 points.

I have a question. What is the performance of the face detector of OpenCV? Can it localize facial landmarks?

09/09/13

I stop the development for JANUS faces. I have to focus on the SR benchmark work. I do not know whether Ming-Hsuan still needs them. I develop the JANUS set until PP2f. I solved a problem where the cropped HR faces are misaligned. I saw the same problem in PubFig dataset, but I was just confused why it happened but did not solve it. The problem is caused by the function imtransform(). When the raw image is too small, my previous usage

img\_aligned = imtransform(img\_raw,tform,'XData',XData,'YData',YData);

generates a too small img\_alinged, so that the cropped faces are misaligned. There is a warning when such a problem occurs.

I solved this problem by add an extra argument 'XYScale',1, which enforces the output image as large as the expected size.

img\_aligned = imtransform(img\_raw,tform,'XData',XData,'YData',YData,'XYScale',1);

08/17/13

The manually labeled landmarks are labeled for raw images, so they have to be scaled and rotated as the aligned test images. It is best for me to save the two coordinate points so that I can further align other images in the future.