Friend-Blend

Project Id: 37

1 Team Members

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2 Github Link

`https://github.com/Rudrabha/FriendBlend`

3 Goals For The Project

The main goal of this project is to implement [1]. Friend-Blend is an application that merges two portraits of different people to create a single, multi-person photo. To do this, Person A takes a photo of Person B, and Person B takes a photo of Person A with the same background. Given these two input images, our goal is to create a third image with both Person A and Person B in the photo together.

4 Problem Definition

The core image processing relies primarily on registration using homography and segmentation techniques. In this project we want to register two images with similar background and blend them together to form a single

image. An example of our goal is given in Figure 5. In the subsequent sub-sections we try to explain our plan to achieve the above said goal. For implementing all of th

4.1 Colour Correction

For solving this problem we would first need to colour correct the images to make sure that background of both of the input images have similar lighting conditions and effects in the background. This is crucial to make sure that there is no artifact introduced due to the abrupt change in lighting conditions of the background. To achieve this we would perform Contrast Limited Histogram Equalization on the intensity channel in some colour space which seperates the Chroma component from the Achroma component. Authors of FriendBlend [1] had used L channel from the LAB colour space to achieve this.

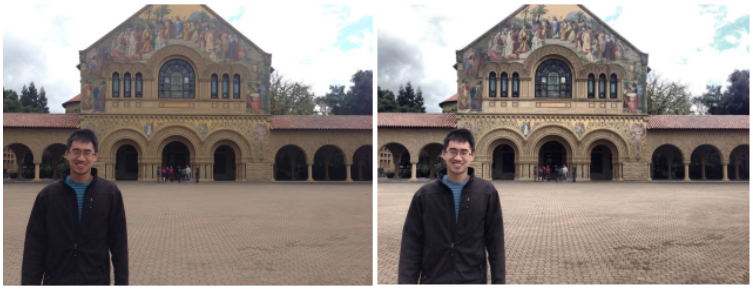

Figure 1: Expected Colour Corrected Result

An example of our expected output after colour correction is given in Figure 1.

4.2 Face and Body Detection

Next we would detect the face and the body to estimate the location of the person present in the image. The authors of [1] assumed the presence of only a single person in an image to simplify things. We would also assume the same initially but if time permits then try to improve the algorithm to work for group photos as well.

4.3 Keypoint Estimation & Homography

To register both the images properly, it is very important to have both of them in the same orientation to reduce the chance of getting undue artifacts. We plan to detect keypoints using ORB [2] keypoint detectors.

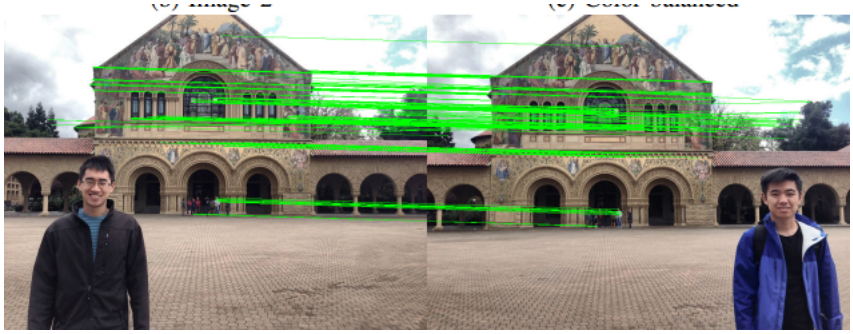

Figure 2: Expected Keypoint Matching

We will then try to match these keypoints based on hamming distance (example in Figure 2) and then try to use RANSAC [3] algorithms for computing homography that best warps the two images. Expected result after homography is given in 3.

Figure 3: Expected result after homography

4.4 Image Blending

Image Blending can be implemented using two techniques depending on the relative location of the subjects in the output image. If the locations of subject in the image are relatively far, then alpha blending would be applied, and for cases where both the subjects are close to each other then grabcut [4] shall be used. The image from which the the subject is to be extracted using grabcut is estimated depending on the size of the face in the image, the one with larger face dimension is extracted and pasted in the final output image.Expected result after blending given in 4.

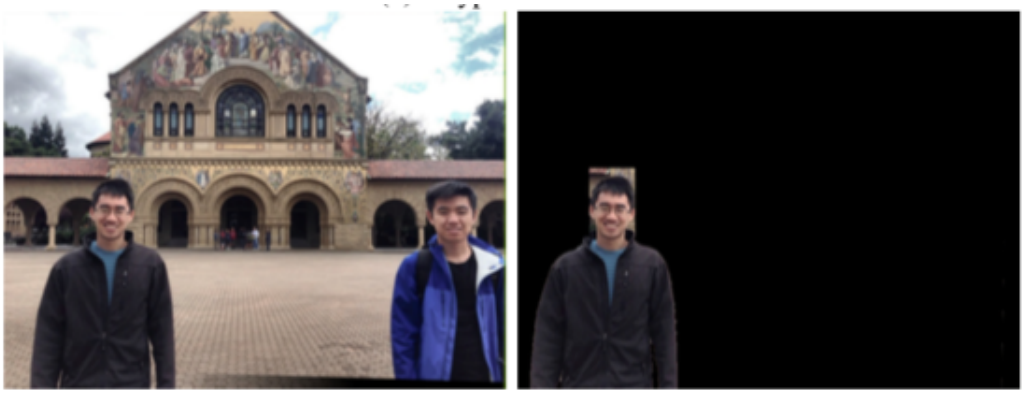

Figure 4: Expected result for Alpha Blending and Grabcut

5 Final Expected Result

Figure 5: Final Expected Result

6 Division of Work

Work will be divided equally between both the member.
Tentative division is -

- Color correction - Sangeeth
- Face and body detection - Rudrabha
- Feature point detection and matching - Rudrabha

- Homography - Sangeeth
- Blending - Rudrabha + Sangeeth

7 Time-line

The tentative time-line for the project will be -

- Week 1 - Color Correction
- Week 2 - Face Detection
- Week 3 - Key Point Matching
- Week 4 - Homography
- Week 5 - Blending
- Week 6 - Improvements on the above techniques.

If time permits then we would also like to extend the application to Android smartphones.

References

[1] Kevin Chen, David Zeng, Jeff Han *FriendBlend*
https://web.stanford.edu/class/ee368/Project_Spring_1415/Reports/Chen_Zeng.pdf

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ORB: An efficient alternative to SIFT or SURF.
ICCV 2011: 2564-2571.

[3] M. A. Fischler and R. C. Bolles,
Random sample consensus: A paradigm for model fitting with applications to image analysis and automated cartography,
Commun. ACM, vol. 24, no. 6, pp. 381395, 1981.

[4] C. Rother, V. Kolmogorov, and A. Blake,
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ACM Trans. Graphics, vol. 23, no. 3, pp. 309-314, 2004