

CMSC733 Project 3

Video Manipulation

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1 Part A

In this part we have to replace the banner in the given video with our own banner. The banner is planar. So we can compute the homography between banners in successive frames.

1. The banner is occluded in some parts the the skater. So first we have to prepare a model for the banner which has the actual complete banner without any occlusions. We use the same technique used in Project 1 to remove the wooden dowels. First one of frames is selected as the reference (center frame). The homography is computed between this frame and all other frames. We need not manually identify corners for this step as would be required since I am using RANSAC and by setting a low threshold only correspondences in the planar region will be selected. They we can rectify all other images to the reference frame and make a mosaic of the scene. However we take the median of all the frames to compute the mosaic. As a result the banner is present without any occlusions. Then we convert this median mosaic to a fronto parallel view and manually extract the banner. Figure 1(a), (b) and (c) shows the mosaic, the median mosaic and the median mosaic with the banner fronto parallel. Figure 2 shows the model of the banner extracted.
2. Now we prepare the new banner to be inserted. Figure 3 shows the banner to be inserted. The banner is resized to the size of the model banner.
3. So now using the computed homographies we rectify each image, make it fronto parallel, and using the marked corners in the rectified image insert the new banner. Once the banner is inserted it is inverse rectified back to its original frame.
4. We need to find out whether the skater is occluding the banner. We take the squared difference of the model banner and the actual banner. I also smoothed the error with a Gaussian filter. Error will be high in the region of occlusion. By appropriate thresholding we can find the occlusion region and replace it with the original skater. Figure 4 shows these steps.
5. Figure 6 shows the original and the replaced for one frame.



(a)



(b)



(c)



(d)

Figure 1: (a) The mosaic of the skater sequence (b) the median mosaic and (c) the median mosaic with the banner fronto parallel. (d) The reference frame with the corners marked.



Figure 2: Model of the banner extracted.



Figure 3: New banner to be inserted.

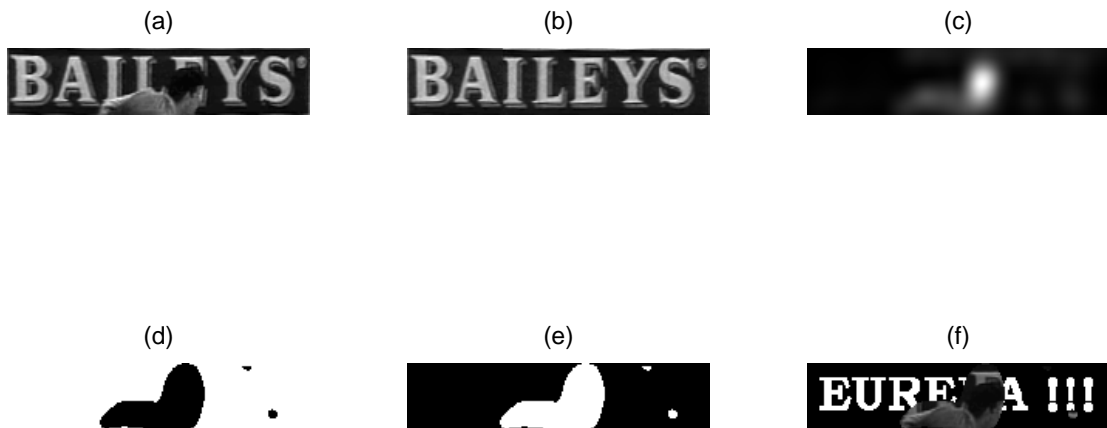


Figure 4: (a)Banner in the image with skater occluding (b) The model banner (c) The smoothed square error (d) (e) the masks (f) the final banner to be inserted.



Figure 5: (a) Original Frame (b)Manipulated Frame



Figure 6: (a) Original Frame (b)Manipulated Frame