



Assignment 1

Smear Detection

Group members

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Introduction

- The smear that was detected on the camera lens by the photographers not only causes irritation but also provides hindrance to computer vision and digital forensics.
- Therefore, it is very important to preprocess the picture by removing the smear from the pictures, which makes detection the first task.
- Smear will cause camera to defocus and make these areas low-frequency.



Background

- Smear will blur some areas in the picture, the defocus blur for lens dirties so large that the artifacts are always presented as a low frequency pattern in images.
- Smear is almost fixed on camera, so the amount of scattered light is fixed since the integral of the outside illumination is unchanged.
- An intermediate cause by smear between the target scene and the camera lens affects the image irradiance in two ways:

Attenuation - Where the scene radiance is reduced by absorption.

Intensification - Where the intermediate layer itself will contribute some radiance to the image sensor by scattering the light from other directions.



Approach

- Calculated the average of images for each camera.
- Thresholding the images at 100
- Making an assumption, that central part of the image which is horizontal will contain only road patterns, we exclude that horizontal part from the mask.
- Include everything in the mask
- Dilate the mask using a kernel of 5x5



Results

Average of all images for the cameras

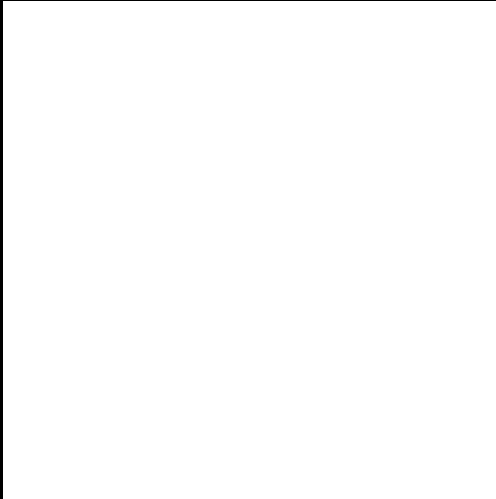
Cam_0

Shape of smear mask in cam_0



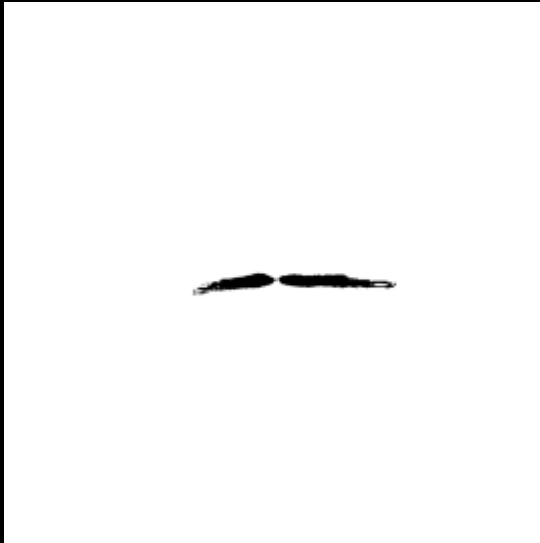
Cam_1

No smear mask detected in cam_1



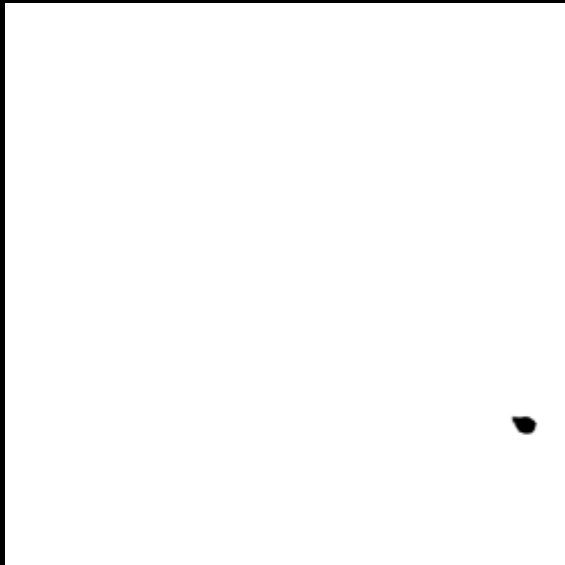
Cam_2

Shape of smear mask in cam_2



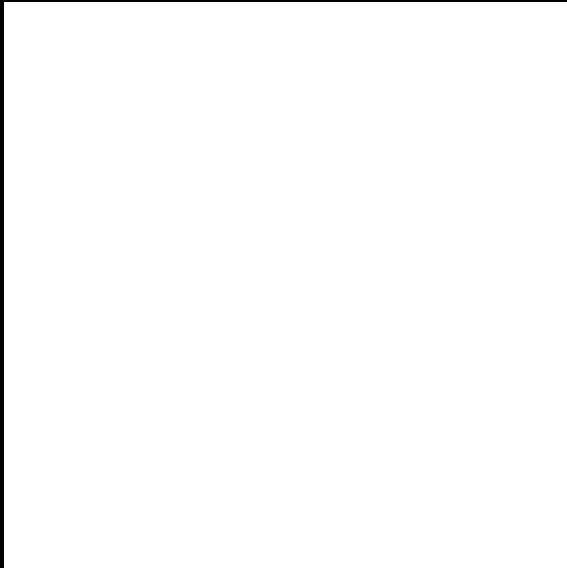
Cam_3

Shape of smear mask in cam_3



Cam_4

No smear mask detected in cam_4





Conclusion

One of the drawback which can be sorted out in future is that, the smear will only be detected if it absorbs light, for example dirt on the lens, etc.



THANKS!