

AUTOMATIC LENS SMEAR DETECTION

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INTRODUCTION

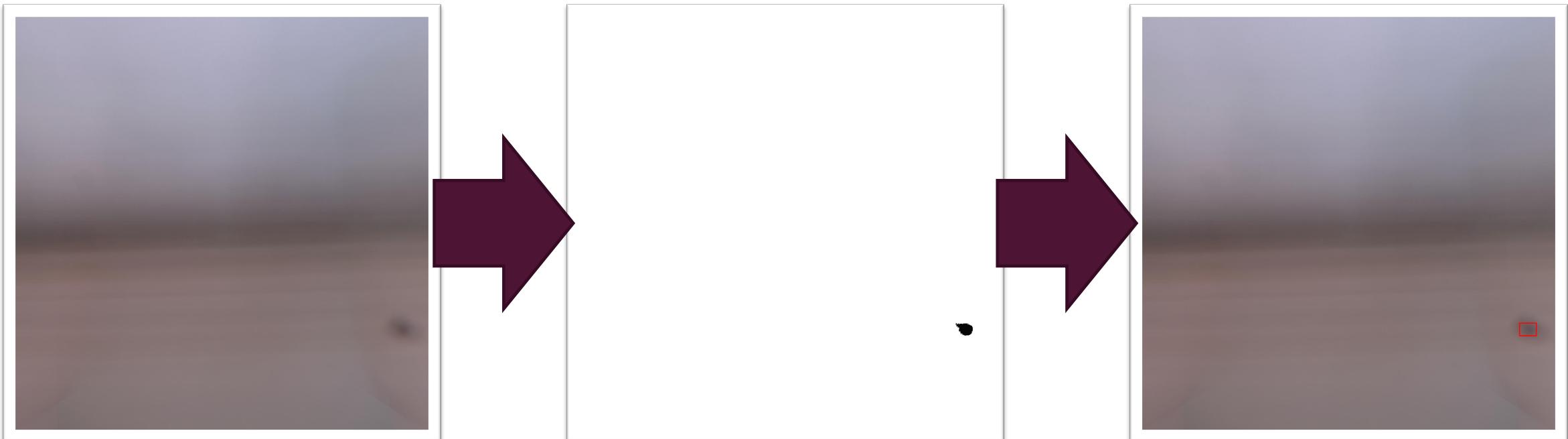
- Digital lens cameras suffer from a well known sensor dust problem due to interchangeable lenses that they deploy.
- The dust particles that settle in front of the imaging sensor create a persistent pattern in all captured images.
- In this assignment, we propose smear detection method based on averaging RGB values of each pixel in collection of all images.
- Experimental results show that the proposed detection scheme can be used in identification of the source digital single lens reflex camera at low false positive rates.

APPROACH

- Given: collection of 4280 images in single cam folder.
- Steps to detect smear:
 1. Create the averaged image over all the frames.
 2. Convert averaged image into GRAYSCALE for Adaptive Thresholding.
 3. Apply Adaptive Gaussian Threshold to GRAYSCALE image which generated in above step. This step will output an image with the smear.
 4. Then, the location of smear is calculated and later mask is applied to image to highlight smear.

APPROACH (CONTINUED...)

CAM-3 OUTPUT



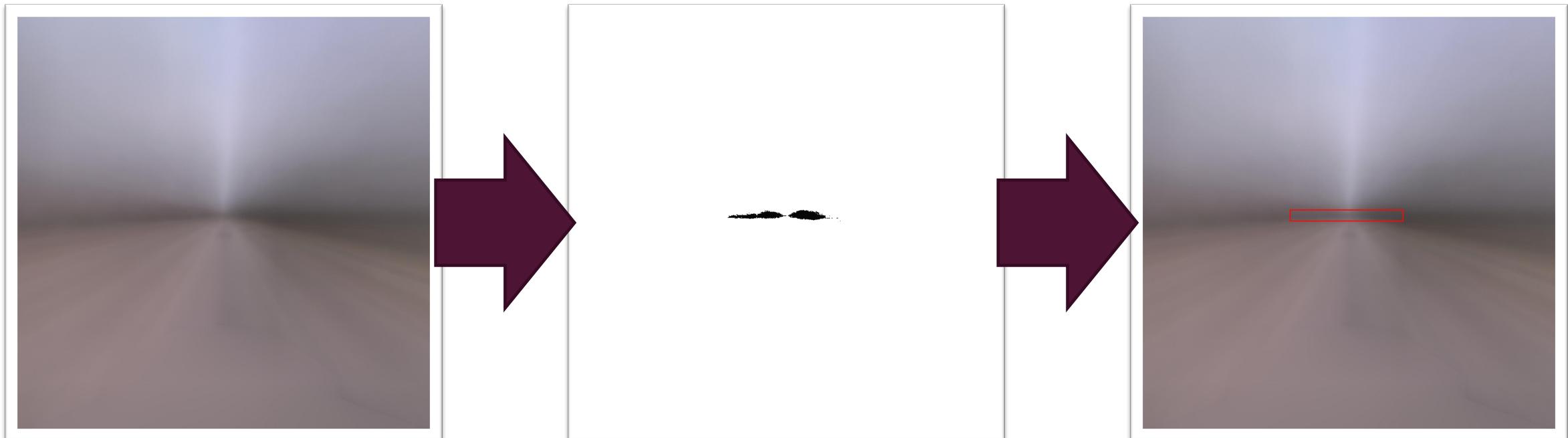
Averaged image

Image after applying
GRAYSCALE and adaptive
threshold

Final image with mask on the
smear

APPROACH (CONTINUED...)

CAM-0 OUTPUT



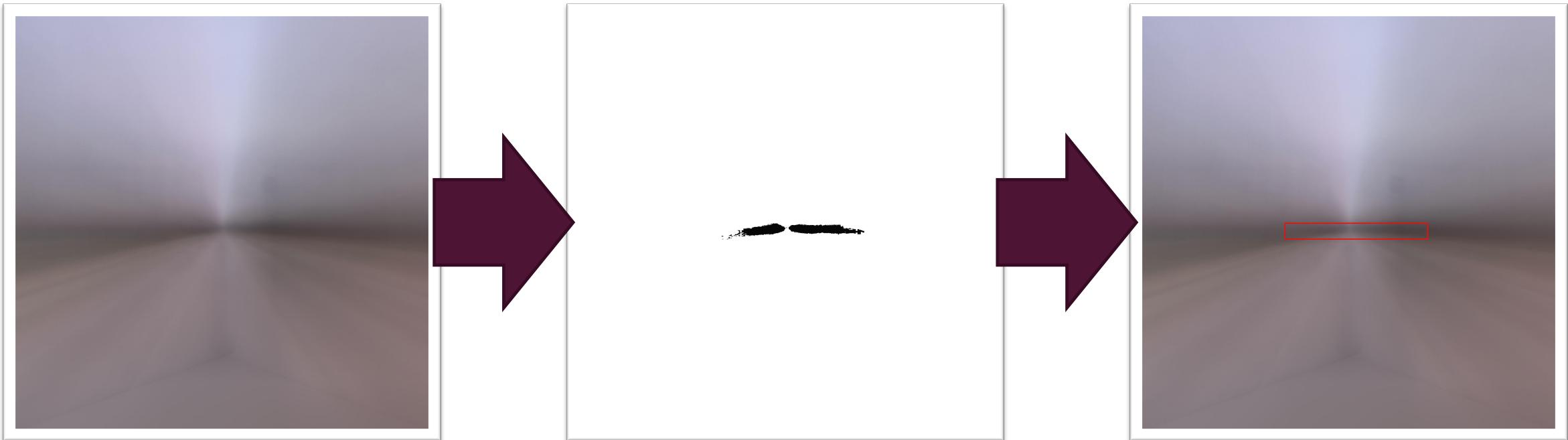
Averaged image

Image after applying
GRAYSCALE and adaptive
threshold

Final image with mask on the
smear

APPROACH (CONTINUED...)

CAM-2 OUTPUT



Averaged image

Image after applying
GRAYSCALE and adaptive
threshold

Final image with mask on the
smear

REFERENCES

- “Removing Image Artifacts Due to Dirty Camera Lenses and Thin Occluders,” *J. Gu, R. Ramamoorthi, P.N. Belhumeur and S.K. Nayar*, ACM Transactions on Graphics (Proceedings of SIGGRAPH Asia)
- “Digital Single Lens Reflex Camera Identification From Traces of Sensor Dust”, *Ahmet Emir Dirik, Husrev Taha Sencar, and Nasir Memon*, IEEE transactions on information forensics and security, vol. 3, no. 3, september 2008