Lab 9: Project Progress Report

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Abstract. This is the lab 9 project progress report. We only show the tasks left. Github: https://github.com/YingnanMa

1 Modify Robust PCA method using average angle method (Done)

1.1 File

BS_robust_avg_angle.py

1.2 Description

This method first takes angle difference matrix of optical flow as input. Then, we run robust pca and find out the background result. Using background results, we calculate the average pixel values with some constant thresholding value. Then this pixel can be recognized as foreground when pixel value is greater than the thresholding value.

1.3 Result

Fig. 1: Robust PCA with Average Angle Method

2 Modify Robust PCA method using average magnitude method (Done)

2.1 File

BS_robust_avg_mag.py

2.2 Description

This method first takes magnitude difference matrix of optical flow as input. Then, we run robust pca and find out the background result. Using background result, we calculate the average pixel values with some constant thresholding value. Then this pixel can be recognized as foreground when pixel value is greater than the thresholding value.

2.3 Result

Fig. 2: Robust PCA with Average Magnitude Method

3 Combine Robust PCA with both average magnitude method and average angle method (Done)

3.1 File

BS_robust_avg_angle.py, BS_robust_avg_mag.py, make_video.py

3.2 Description

From previous two methods, we find that both average angle and average magnitude methods have their own advantages. For robust PCA with average angle method, it has good performance when the camera moves without changing focal length. For robust PCA with average magnitude method, it has good performance when the camera moves with changing focal length. However, this method cannot perform as good as average angle method when the camera moves without changing focal length. Therefore, we design an algorithm that can detect which method is more suitable for current frame. Then, we use the result from that method for current frame.

3.3 Result

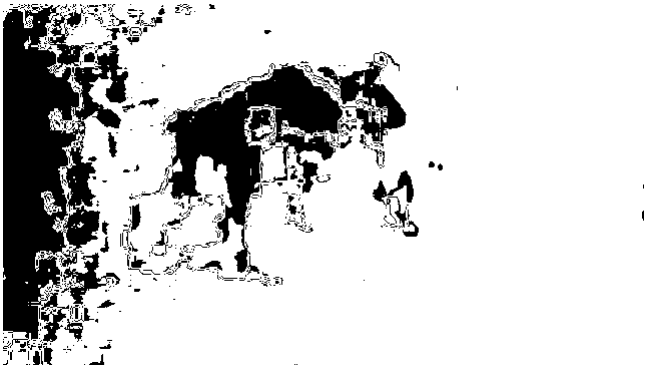

Fig. 3: Result Before Replaced

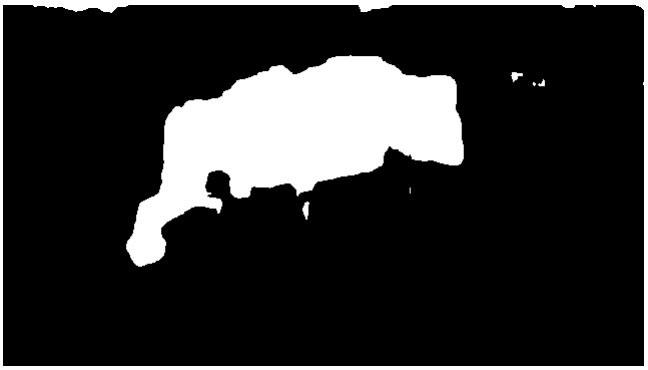

Fig. 4: Result After Replaced

4 Make video that combines results of different methods (Done)

4.1 File

compare video.mp4

4.2 Link

https://www.youtube.com/watch?v=Pylzb-DujSw&feature=youtu.be

4.3 Description

For the analysis and presentation purposes, we make a video that contains original video, video of PCA method, video of Robust PCA method, video of Robust PCA with angle optimization method, video of Robust PCA with magnitude optimization method and video of Robust PCA combined both angle and magnitude method.

4.4 Result

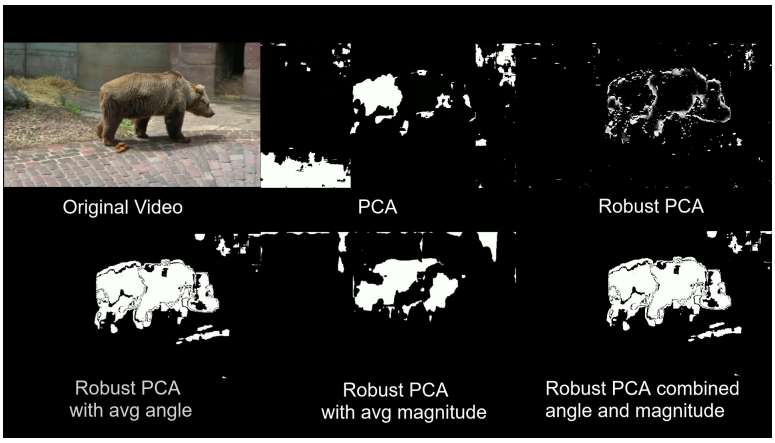

Fig. 5: Combined video