

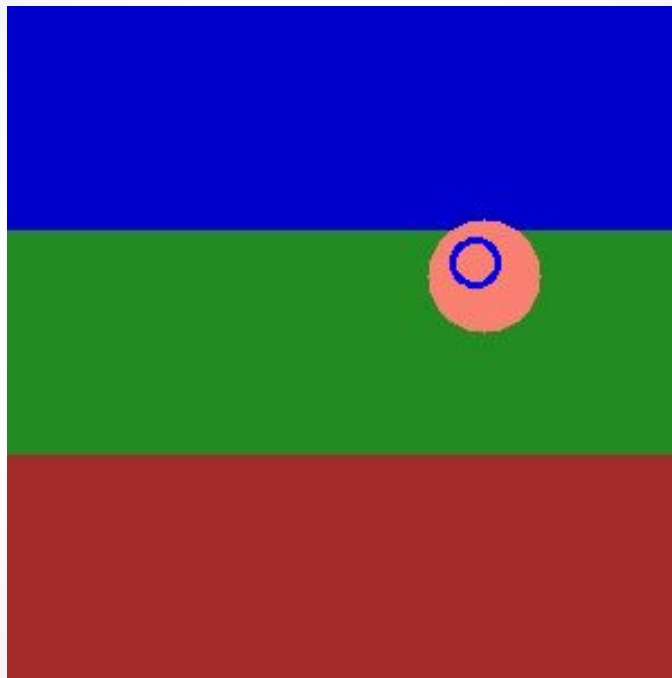
Computer Vision

Fall 2017

Problem Set #5

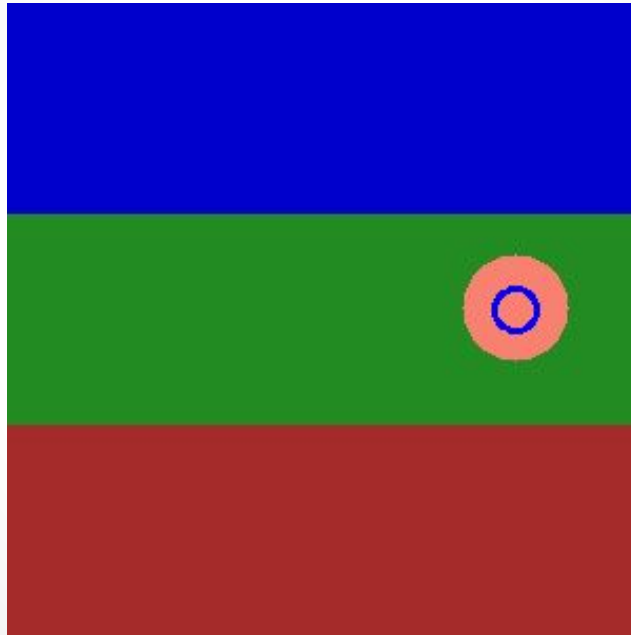
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1b: KF Tracking a circle



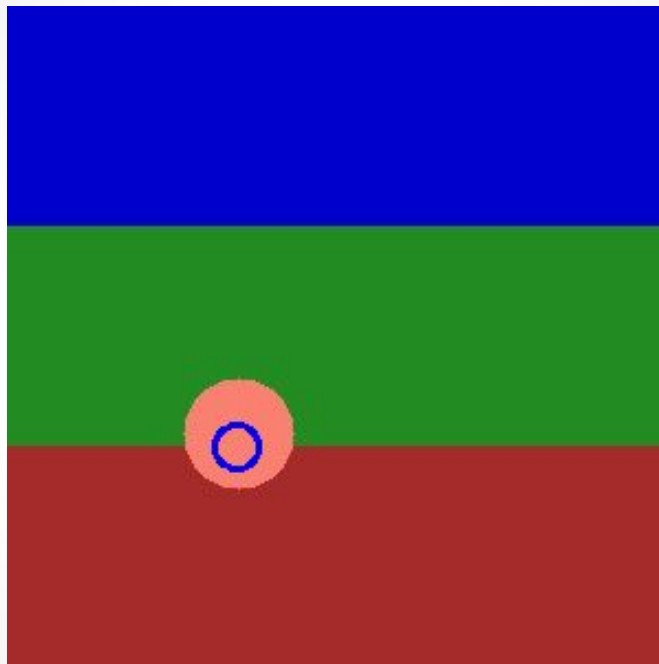
ps5-1-b-1.png

1b: KF Tracking a circle (cont.)



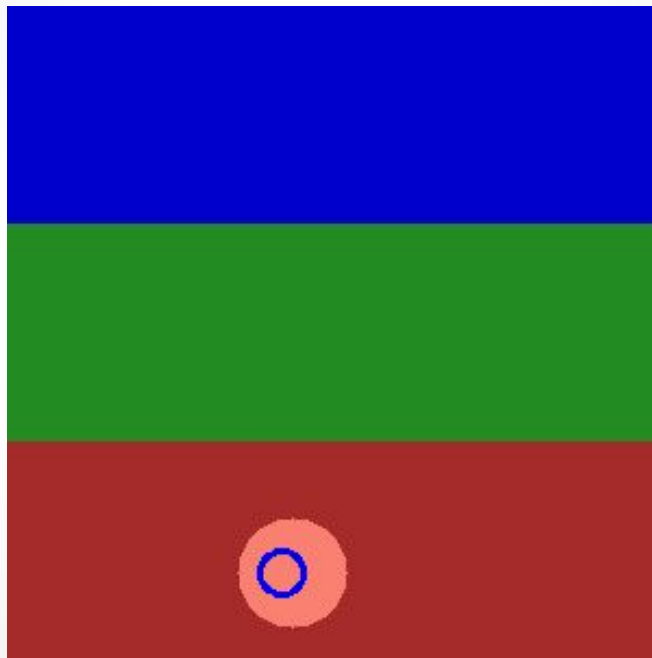
ps5-1-b-2.png

1b: KF Tracking a circle (cont.)



ps5-1-b-3.png

1b: KF Tracking a circle (cont.)



ps5-1-b-4.png

1c: KF Tracking pedestrians



ps5-1-c-1.png

1c: KF Tracking pedestrians



ps5-1-c-2.png

1c: KF Tracking pedestrians



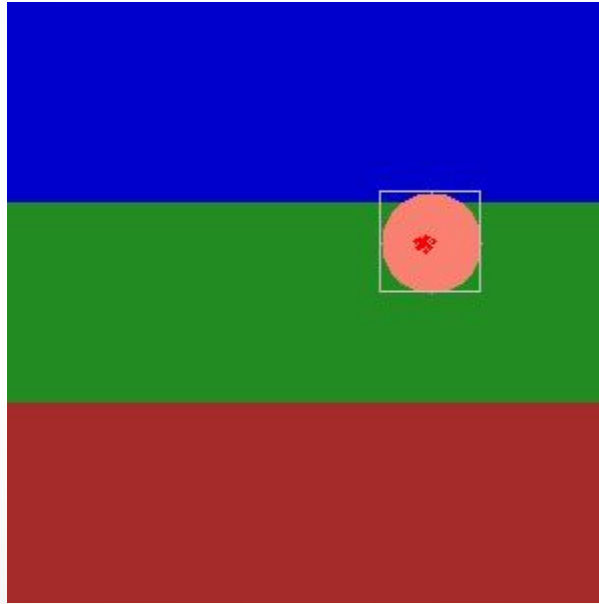
ps5-1-c-3.png

1c: KF Tracking pedestrians



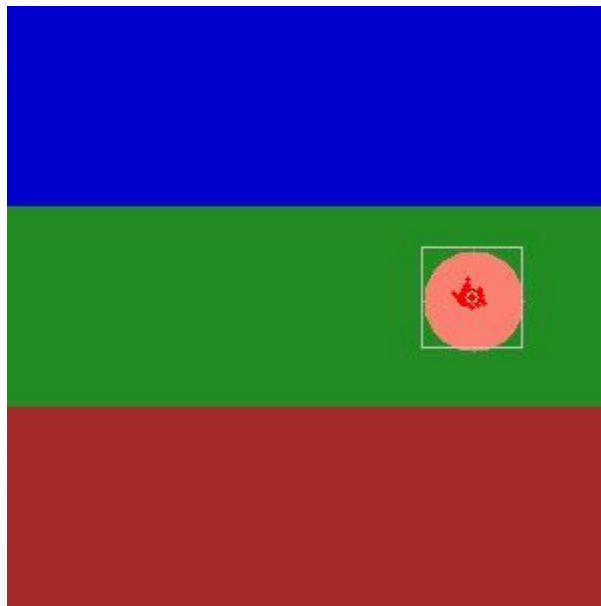
ps5-1-c-4.png

2a: PF Tracking a circle



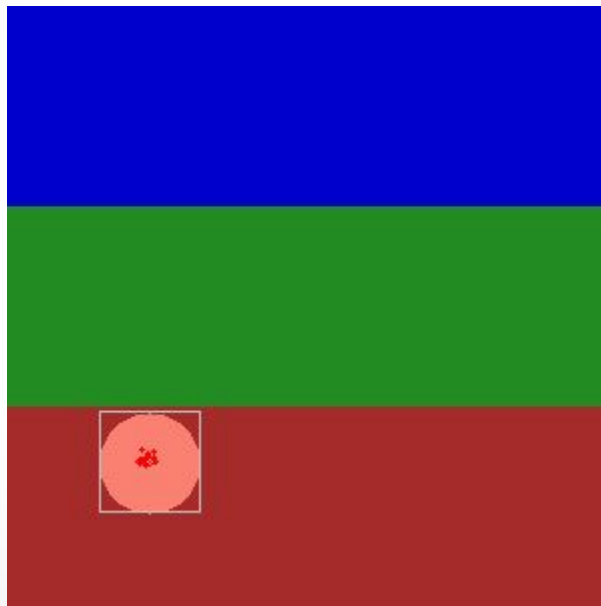
ps5-2-a-1.png

2a: PF Tracking a circle (cont.)



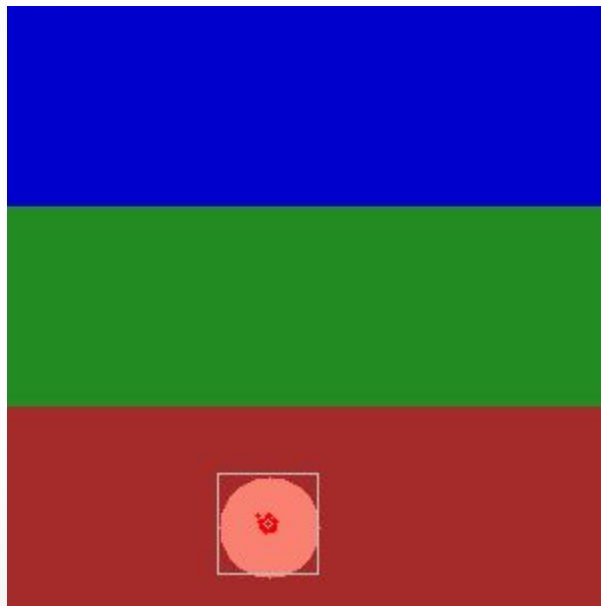
ps5-2-a-2.png

2a: PF Tracking a circle (cont.)



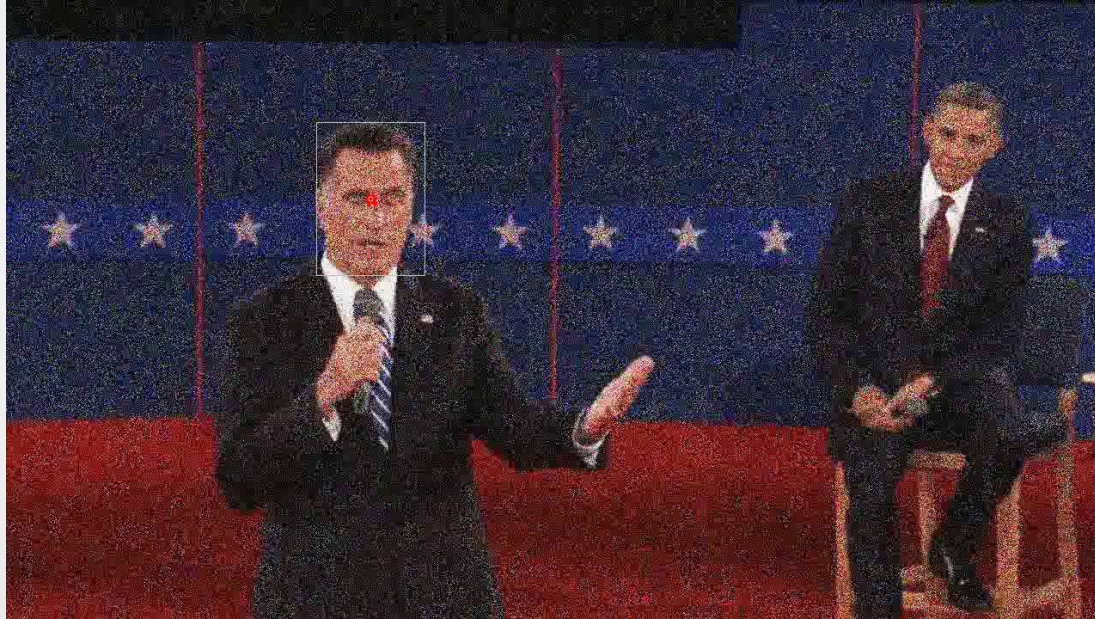
ps5-2-a-3.png

2a: PF Tracking a circle (cont.)



ps5-2-a-4.png

2b: PF Tracking noisy video



ps5-2-b-1.png

2b: PF Tracking noisy video (cont.)



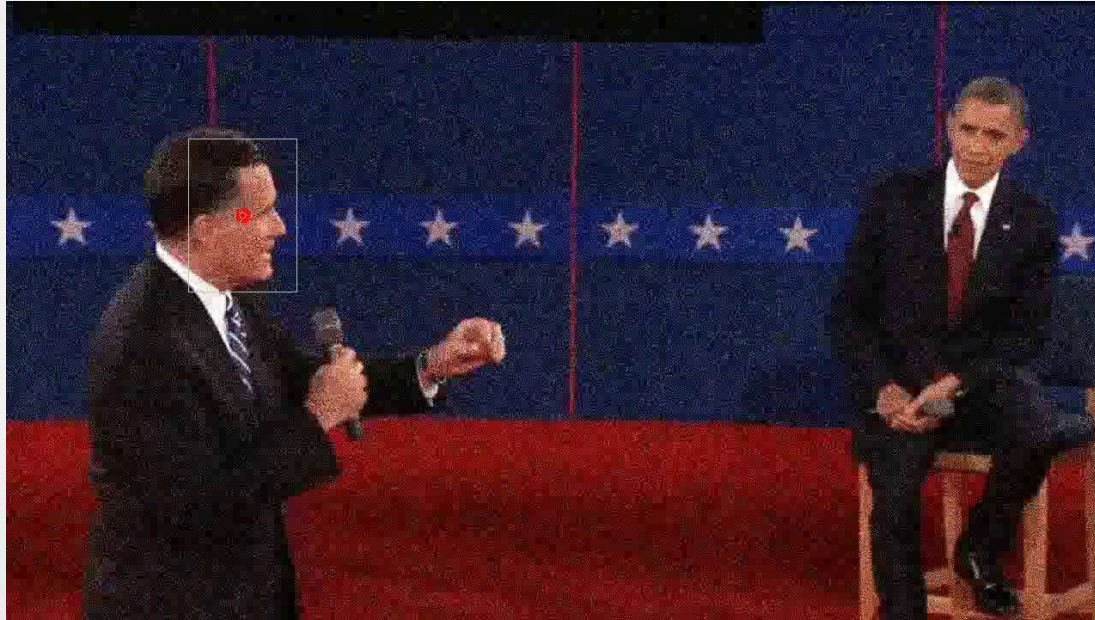
ps5-2-b-2.png

2b: PF Tracking noisy video (cont.)



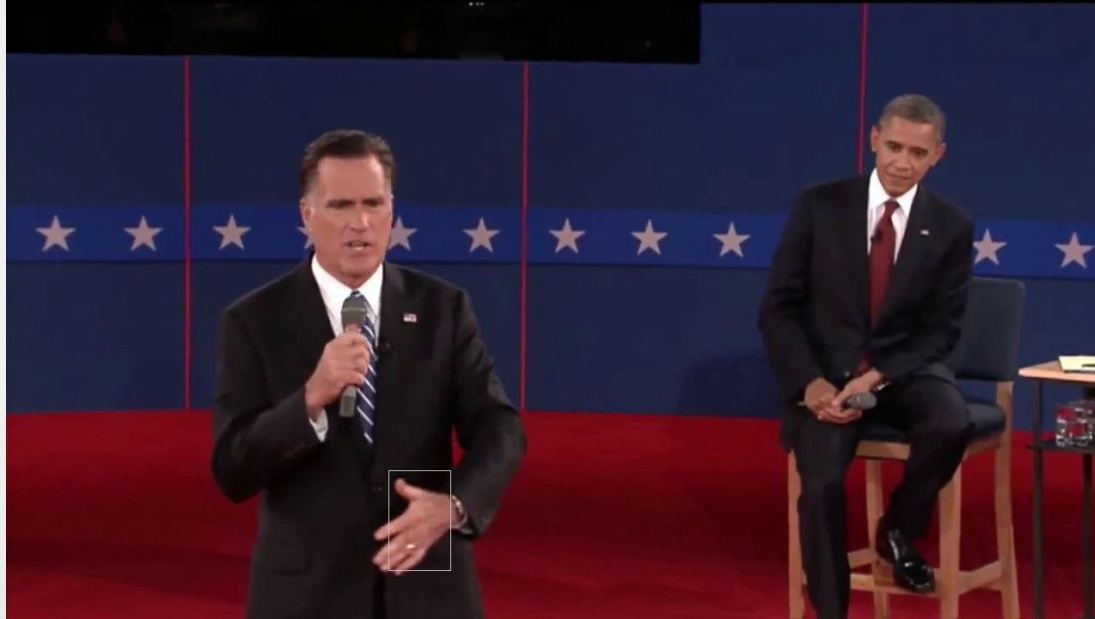
ps5-2-b-3.png

2b: PF Tracking noisy video (cont.)



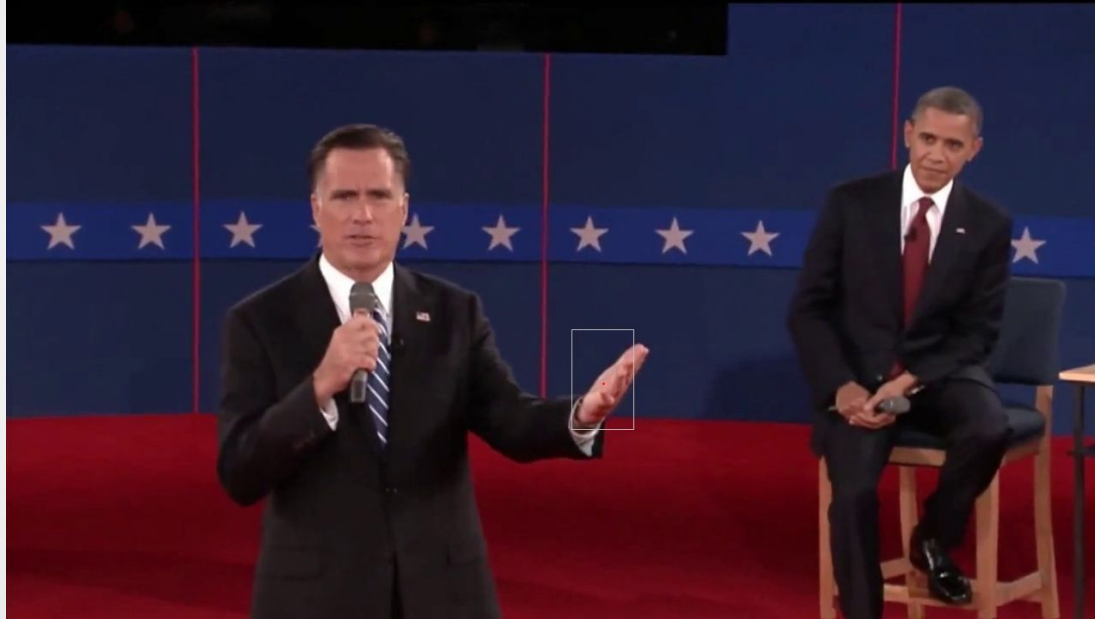
ps5-2-b-4.png

3a: PF Changes in Appearance



ps5-3-a-1.png

3a: PF Changes in Appearance (cont.)



ps5-3-a-2.png

3a: PF Changes in Appearance (cont.)



ps5-3-a-3.png

4a: PF Occlusions



ps5-4-a-1.png

4a: PF Occlusions (cont.)



ps5-4-a-2.png

4a: PF Occlusions (cont.)



ps5-4-a-3.png

4a: PF Occlusions (cont.)



ps5-4-a-4.png

4: Text response

Describe what you did. How did you modify the Particle Filter class to continue tracking after occlusions?

I had to account for an MSE threshold that would not update the state of the particle filter (center x , y) until the MSE values reached a level that indicated no occlusion. I had some issue with rendering the image--scaling the box down to make it appropriate but I figured that was not the focus of the assignment.

I also had to scale down the image while the object (woman) was walking away, since there was little to no deformation to increase the quality of my measurements. This helped immensely, as well fine tuning the sigmas and particle sizes to develop a consistent tracking algorithm.

5: Tracking multiple targets



ps5-5-a-1.png

5: Tracking multiple targets (cont.)



ps5-5-a-2.png

5: Tracking multiple targets (cont.)



ps5-5-a-3.png

5: Text response

Describe what you did. How different it was to use a KF vs PF? Which one worked best and why? Include details about any modifications you had to apply to handle multiple targets.

Since the assignment stated to choose one or the other, I did not test the KF as I figured it would not do well with the occlusion of the third member of the video frames.

I decided to use a Appearance Model Filter (with varying kwargs, alphas, sigma_md, sigma_dyns...) to track 2 out of the three members in the frame. I did not have enough time to handle the third person (right to left, background) but I did have a few ideas towards tracking that individual which include using the MDParticleFilter we used in class.

If I had enough time, I would have scoped a positional changes across each frame (velocity, or change in x and y per frame) and used that when the MSE thresholds were too high (due to the occlusion of foreign objects).

6: Challenge Problem



ps5-6-a-1.png

6: Challenge Problem (cont.)



ps5-6-a-2.png

6: Challenge Problem (cont.)



ps5-6-a-3.png

6: Challenge Problem Text response