

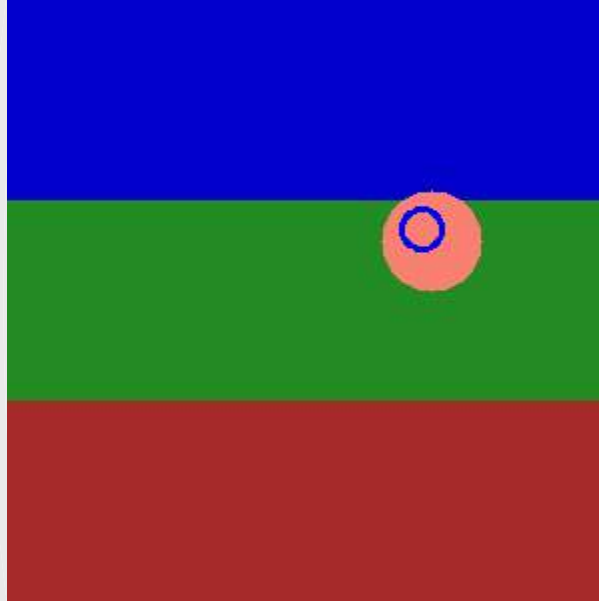
Computer Vision

Fall 2018

Problem Set #5

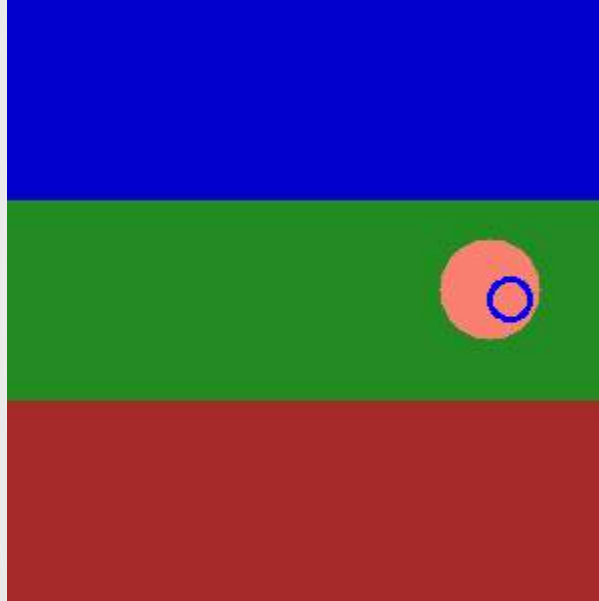
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1b: KF Tracking a circle



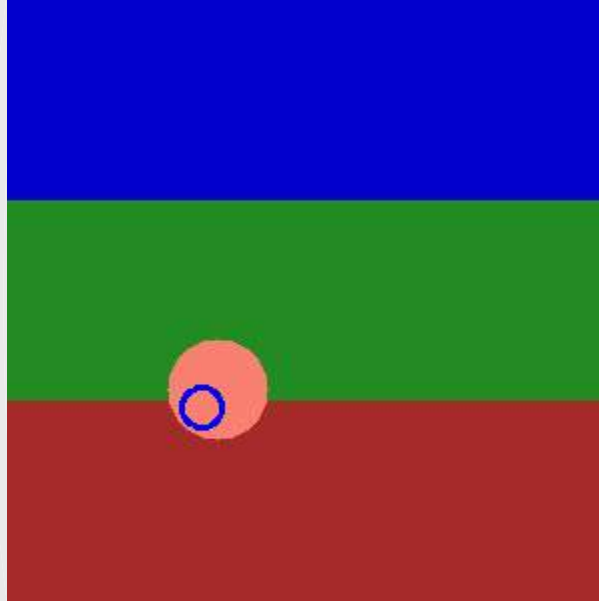
ps5-1-b-1.png

1b: KF Tracking a circle (cont.)



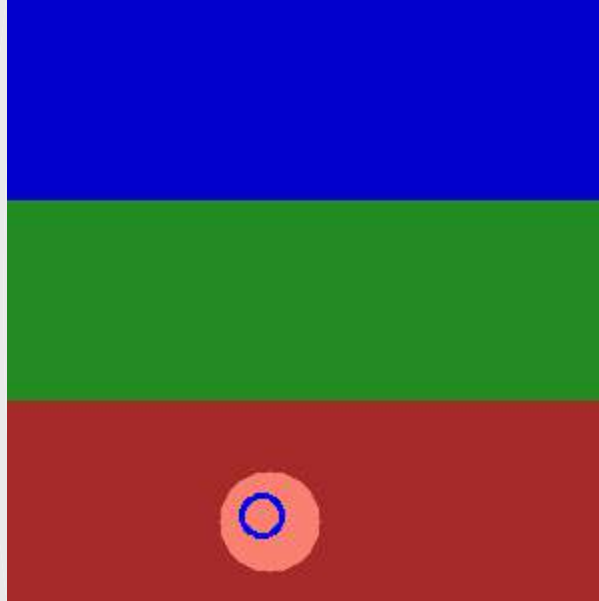
ps5-1-b-2.png

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



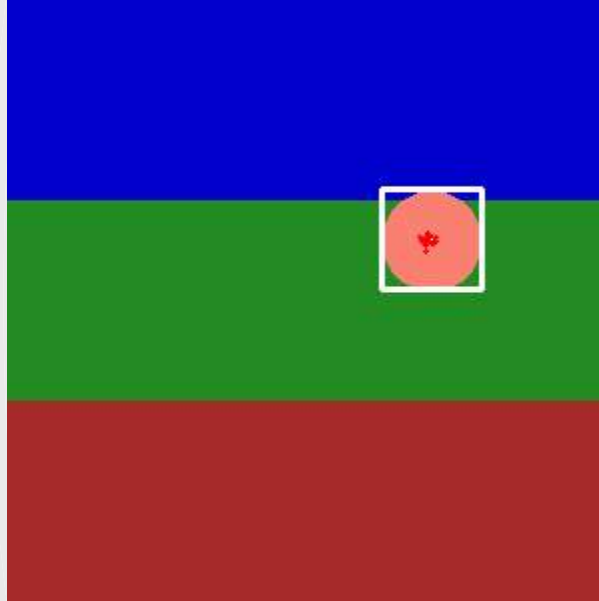
ps5-1-c-3.png

1c: KF Tracking pedestrians



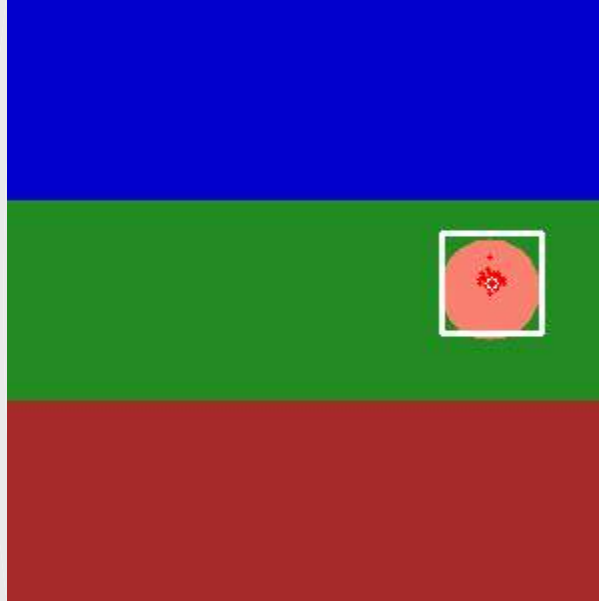
ps5-1-c-4.png

2a: PF Tracking a circle



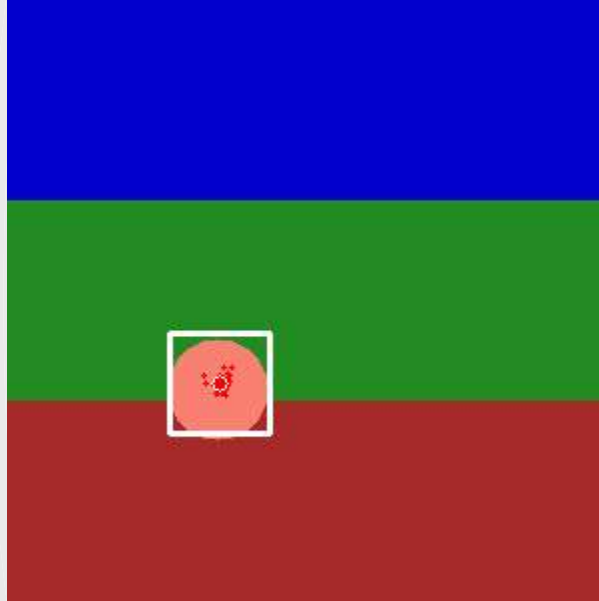
ps5-2-a-1.png

2a: PF Tracking a circle (cont.)



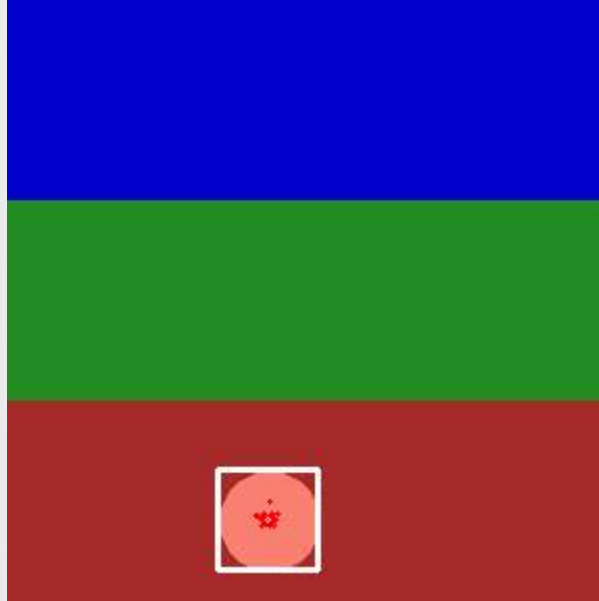
ps5-2-a-2.png

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.)



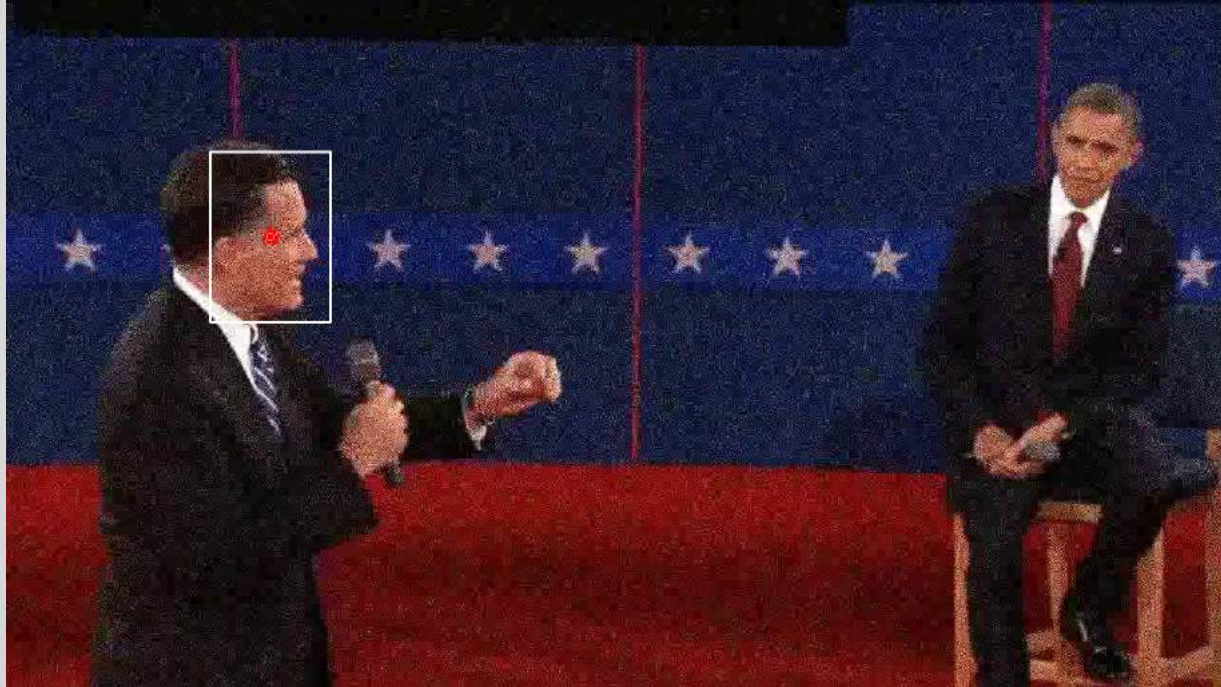
ps5-2-b-2.png

2b: PF Tracking noisy video (cont.)



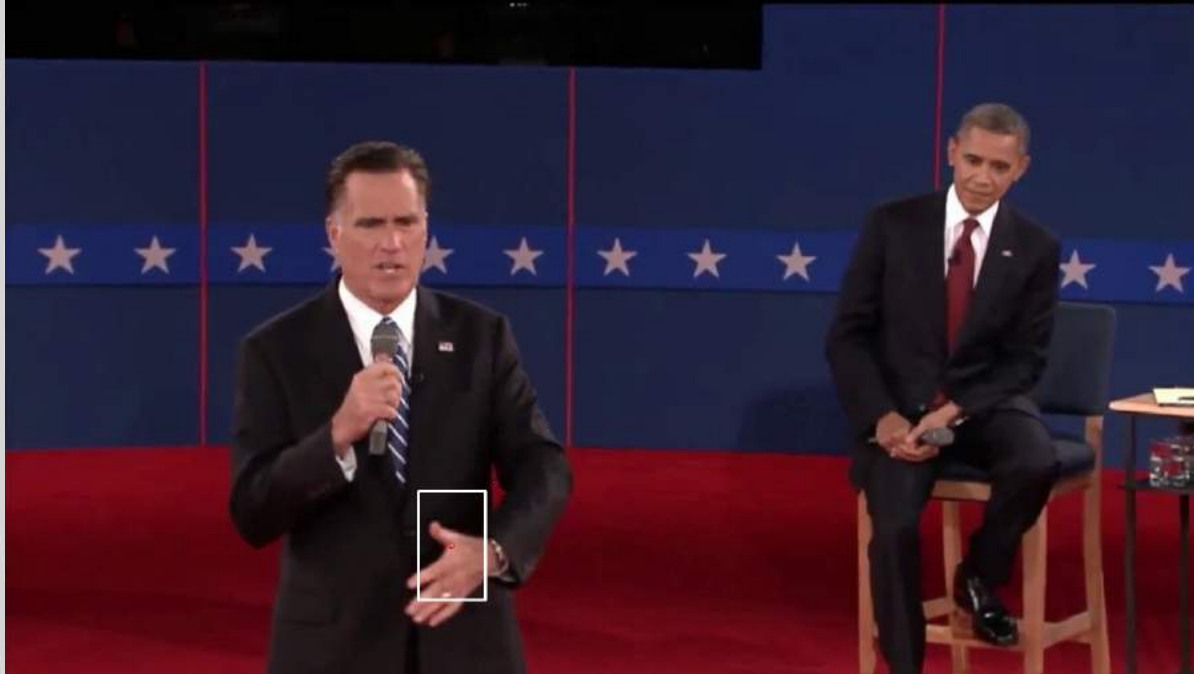
ps5-2-b-3.png

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 tried to resize the template for different particles then reset the template size at the particles where the error from the mean was the least.
- For Occlusion, I tracked historical positions, and based on the error I was getting in the more recent frames I either took a more recent; or a much earlier position as the position for the center of the box. By taking a weighted average over the frames I avoided losing the person when someone passed in front of them. But it also meant that the box did not move much.

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. --- I ran the algorithms once for each object, extracted the relevant frames and then merged the frames together. So for frame 29, I had 3 images, one which caught each respective person. I indexed out where the box and the particles are; based on the colors; and added this to a final image. When running for each individual person, I passed in different algorithms and functions.
- How different it was to use a KF vs PF? Which one worked best and why? Particle filter worked much better than Kalman filter; Kalman filter seemed to get confused by the surroundings in the box.
- Include details about any modifications you had to apply to handle multiple targets.

I colored the box and particles around each person differently. For the man in the black jacket I tried the Appearance model as his appearance changed due to him turning around. I also tried occlusion – this did not work well.

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

- The challenges in this video seemed to be that the man and the bag were zoomed in very close; so the distinguishing features in some frames were completely different to the distinguishing features in other frames.