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CS-583
Homework #3 – Report

lucas_kanade(H,I):

1. To find the partial dertivatives in terms of time, I used two 3x3 sobel filters and applied it to image I
2. Then used the given calculated mask over various products.

$$\underbrace{\begin{bmatrix} \sum I_x I_x & \sum I_x I_y \\ \sum I_x I_y & \sum I_y I_y \end{bmatrix}}_{A^T A} \begin{bmatrix} u \\ v \end{bmatrix} = - \underbrace{\begin{bmatrix} \sum I_x I_t \\ \sum I_y I_t \end{bmatrix}}_{A^T b}$$

3. Found the values for AtA and Atb using the products computed above.
4. There is a bug in my code for lucas kanade. It is that the values are a little off and where it is not off, the signs are different.

iterative_lucas_kanade(H,I,steps):
Ran a copy of the image I and translated it with the displacement and then ran lucas kanade and extracted the top row to get a updated displacement.

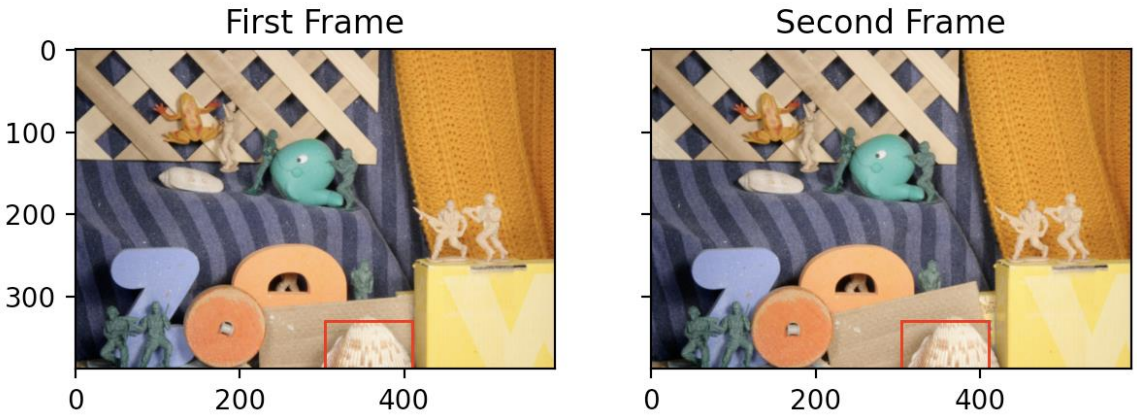
gaussian_pyramid(image,levels):
making a gaussian pyramid to make smaller motions by reducing the resolution of the pyramid.

pyramid_lucas_kanade(H,I, initial_d, levels, steps)
used gaussian pyramid to compute updated displacement at each level using lucas kanade.

track_object(frame1, frame2, boundingBox, steps)
was not clear what is this meant for at first. Realised that it is the bridges the main function and the tracking algorithm.

Ran the given command and got the below output:

```
python3 hw3.py --visualize --boundingBox 304,329,106,58  middlebury/Army/frame07.png
middlebury/Army/frame14.png
```


First Frame
Second Frame
0
100
200
300
0
200
400
0
200
400