

Instruction

To generate a video based on the video provided, simply run the code. It will first extract all the frames into a specified folder, then use the frames to produce frames with motion estimation, finally output them into a new video file.

As for the hyper parameters of the algorithm, in the function `find_the_grids` (`current_frame`, `reference_frame`, `frame_height`, `frame_width`, `k`, `neighbour_radius`, `Tmin`, `Tmax`). `K` represents `k` where the width&height of the block is $2*k + 1$. And the `neighbour_radius` represents the searching area, where for example 1 represents the 3*3 neighbour and 2 represents 5*5 neighbours. And `Tmin` represents the lower bond of SSD and `Tmax` represents the higher bond.

PS:

Though I have tried my best to optimize all the processes, the running time is pathetically long, which is about 10 seconds per frame. So, if you tend to run my code entirely, please do optimize it firstly otherwise it would take about 2 hours in total.

Discussion about experimenting

At the beginning, I was using snippets from movie, however because the camera was constantly moving which significantly influence the performance of the algorithm. I decide to use some video footage downloaded from the web.

Then by setting the `Tmin` to 70 and `Tmax` to 200, there appears too many unwanted arrows in the images.



And changing the T_{min} to 150 gives no arrow in the image which is also unwanted.

Therefor at last I set the range of SSD as $[100, 200]$.

At the middle of the video, the arrows seem to be messy, I think it might because of the bouncing grass. I might be improvable by setting T_{min} a bit higher, however due to the running time of my algorithm, I didn't make it fully optimized.