Université de Bordeaux
Image & Son

DLCV Lab 1

Report

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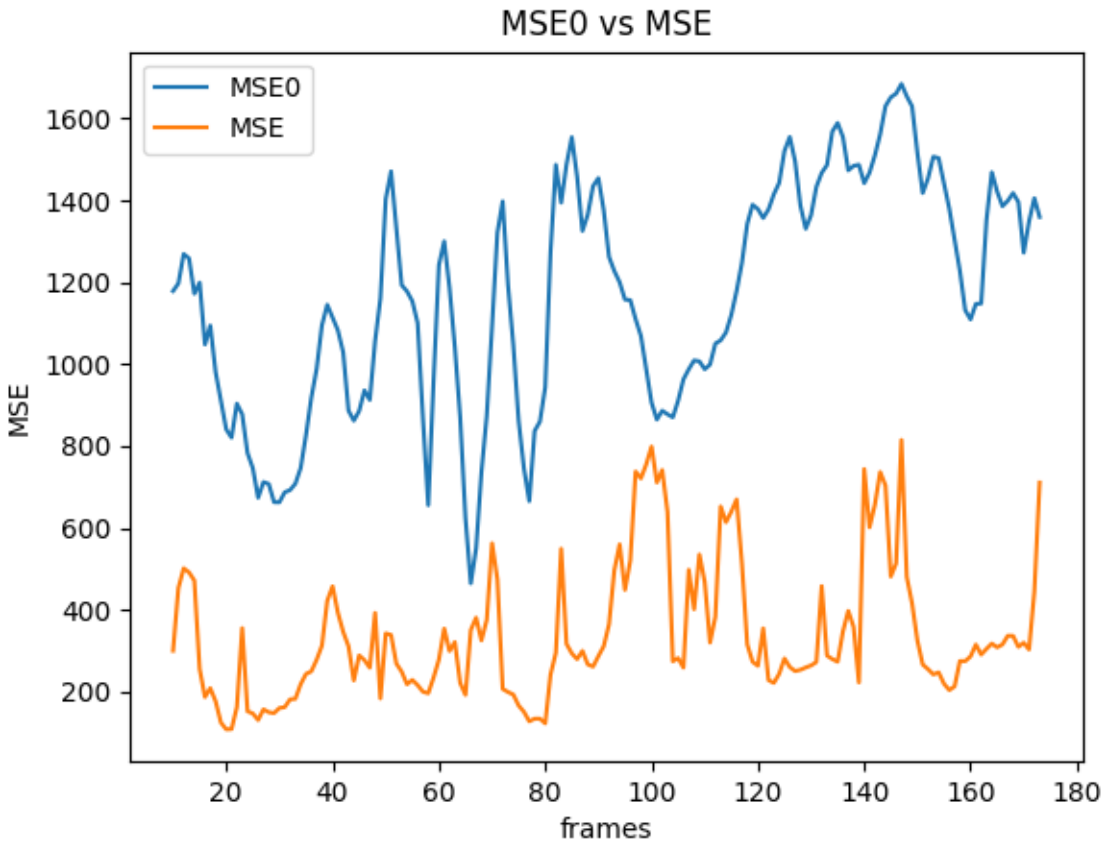
Because of the pandemic context affecting our working capacity in the CREMI, and of our computers lacking an aptitude to work on heavy videos, we couldn't provide consistent results with the **PersonConvergence_720.MOV video**.
We therefore worked on both the **v_SkateBoarding_g25_c01.avi** and the **v_Taichi_g25_c01.avi** which were much lighter.
Sorry for the inconvenience.

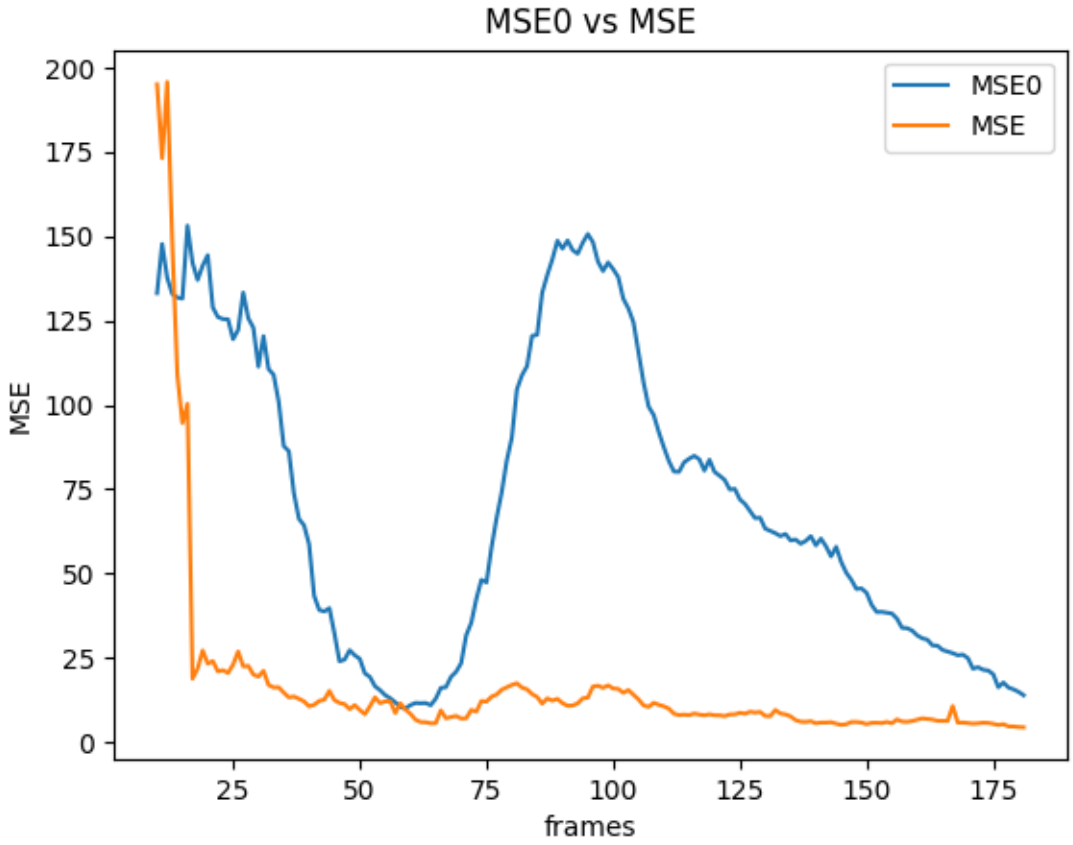
1 Mean Square Error

Figure 1: MSE for v_SkateBoarding_g25_c01.avi with 10 frames between each calculation



Here we can see that the Mean Square Error is way lower with the compensated frame. That is due to the difference between the previous frame and the compensated frame, computed using the previous frame and the flow between the previous and the current frame. Therefore, on the skateboard video, which is dynamic with a lot of motion, the compensated image is closer to the current image than the previous one is.

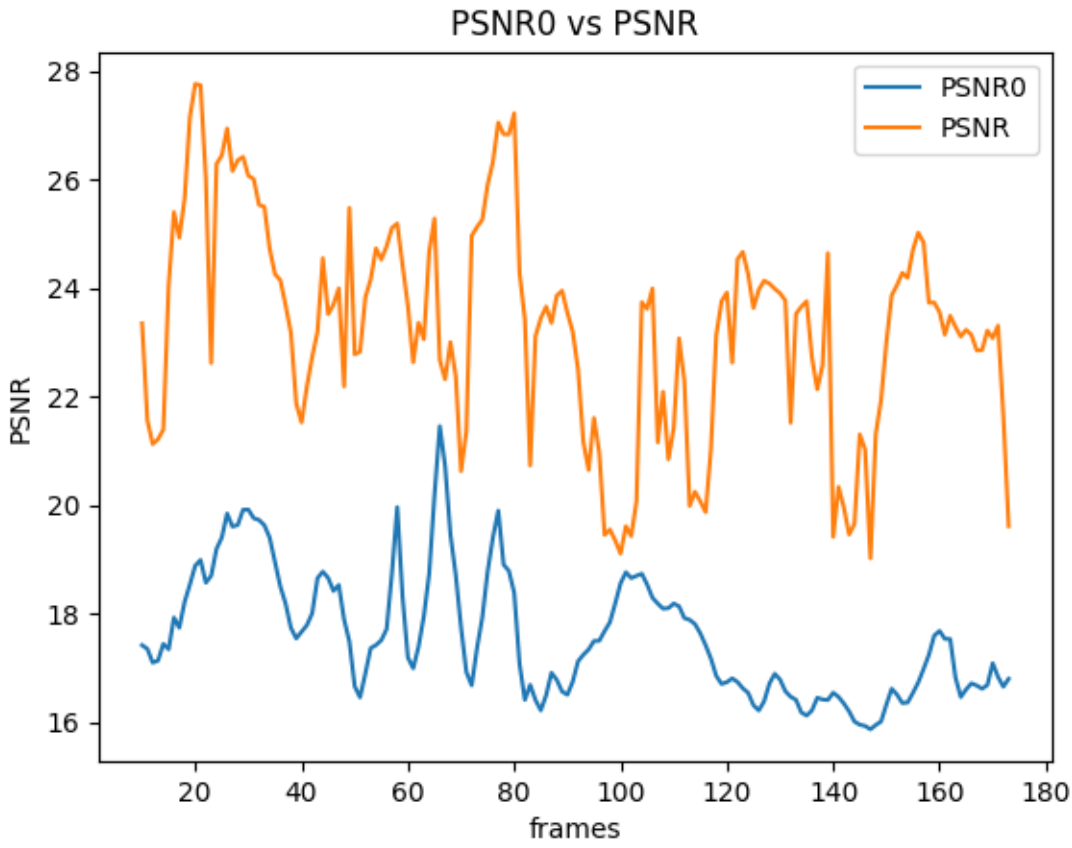
Figure 2: MSE for v_Taichi_g25_c01.avi with 10 frames between each calculation



Here it is approximately the same thing, but we can notice that both the MSE are rather low, and that the one of the compensated frame is higher at the beginning. The reason why could be the said low MSE, and that the video doesn't contain a lot of motion at the beginning, then the compensated frame is further from the current frame than the previous one.

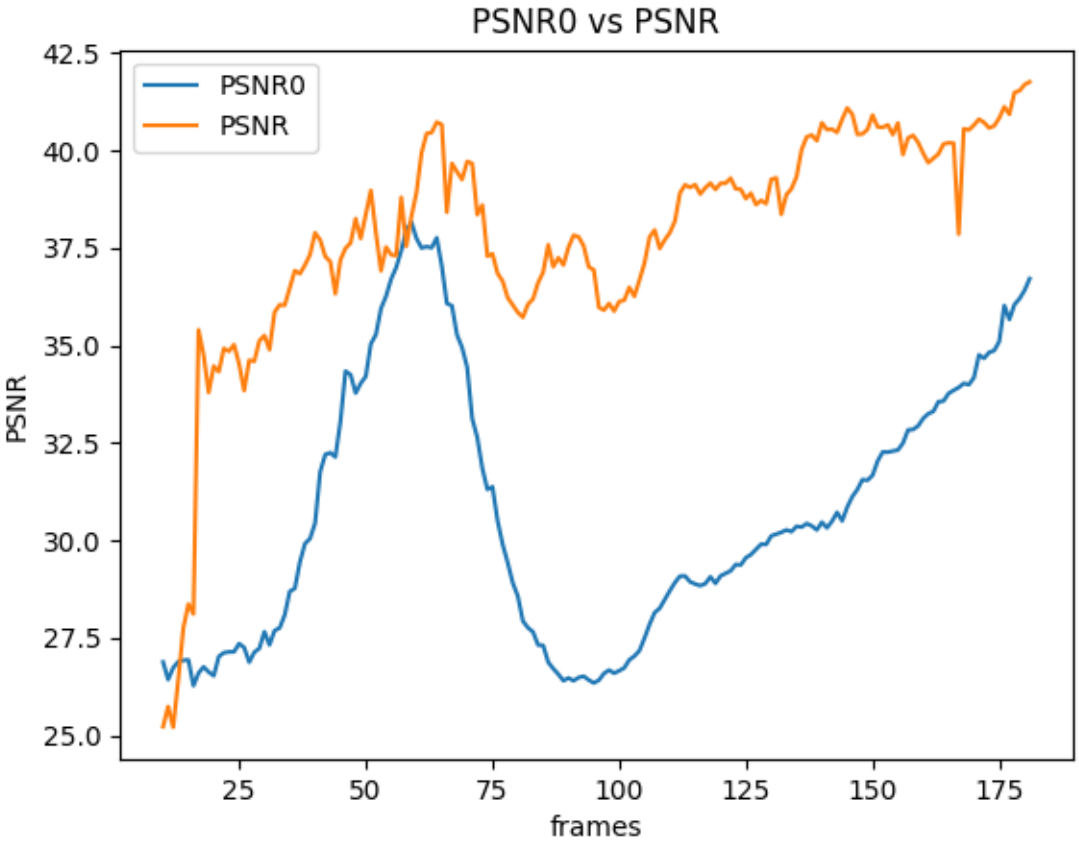
2 Peak Signal to Noise Ratio

Figure 3: PSNR for v_SkateBoarding_g25_c01.avi with 10 frames between each calculation



This result is what could be expected, knowing that the PNSR is computed with 1/MSE. The PSNR with the compensated frame is higher than the other, because its MSE was.

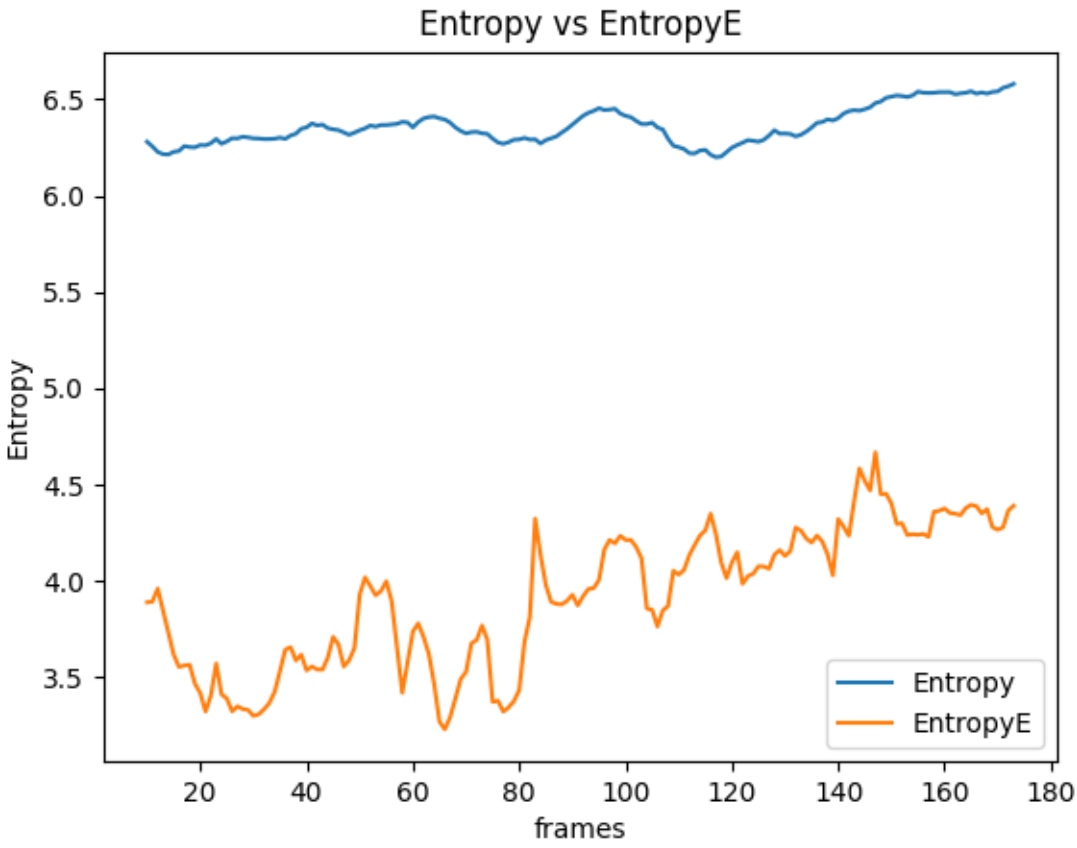
Figure 4: PSNR for v_Taichi_g25_c01.avi with 10 frames between each calculation



As for the skateboard video's PSNR, the corresponding MSE is followed.

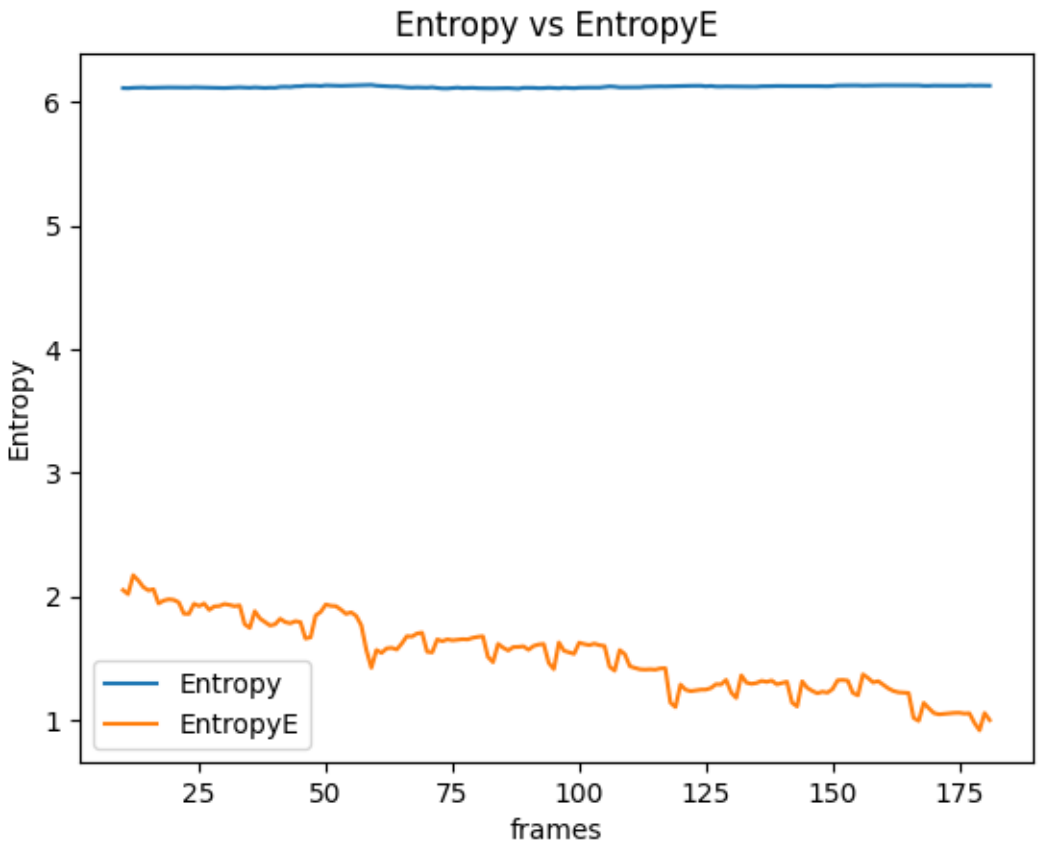
3 Entropy

Figure 5: Entropy for v_SkateBoarding_g25_c01.avi with 10 frames between each calculation



The entropy is the way to measure the disorder in a picture. The error image's entropy is low because it has a lower amount of different colours than the actual image.

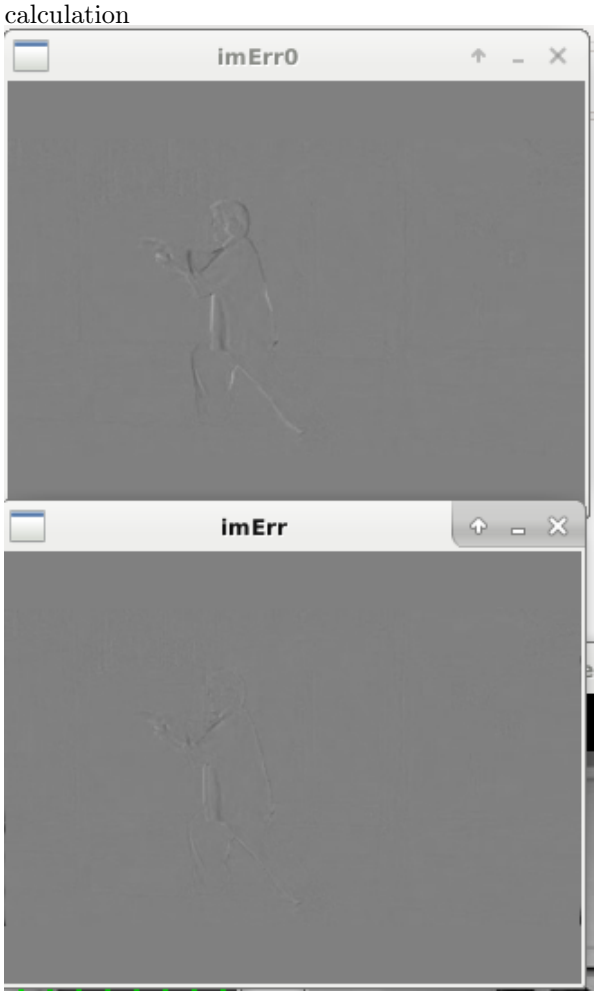
Figure 6: Entropy for v_Taichi_g25_c01.avi with 10 frames between each calculation



Because the Taichi video is pretty linear (background not moving, martial artist not making useless movements), the histogram, or distribution of pixels, and therefore the entropy stays close to constant for the entire video.

4 Error image

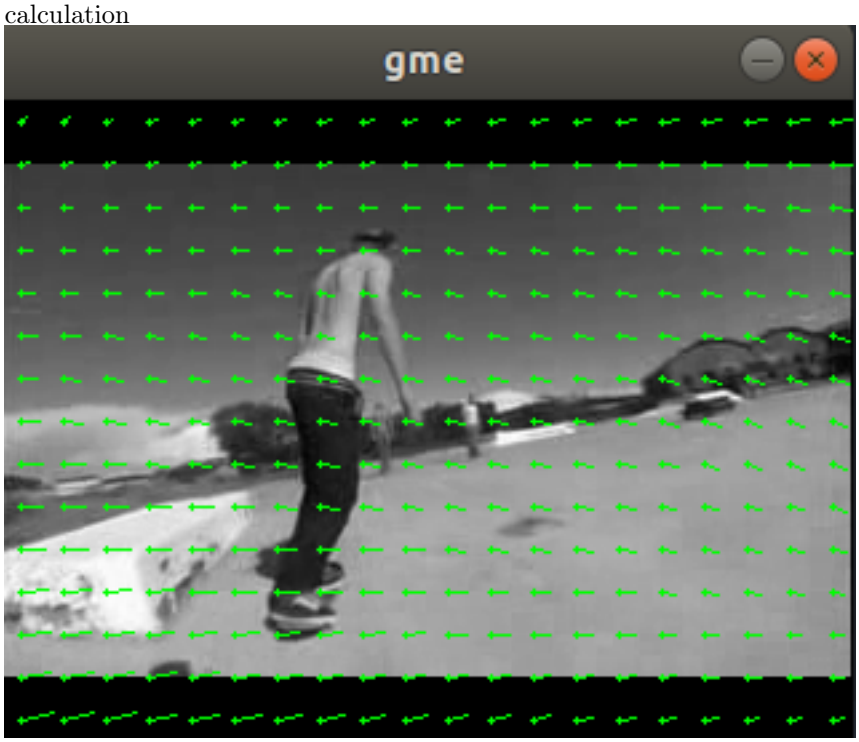
Figure 7: Error image for v_Taichi_g25_c01.avi with 10 frames between each calculation



The error image is computed with the difference between two frames (the current and the previous ones for imErr0, and the current and the compensated ones for imErr). The gray color means that they are about the same color, which is rather understandable, because the background of the video is not moving. There are some noticeable differences around the martial artist, because he is moving.

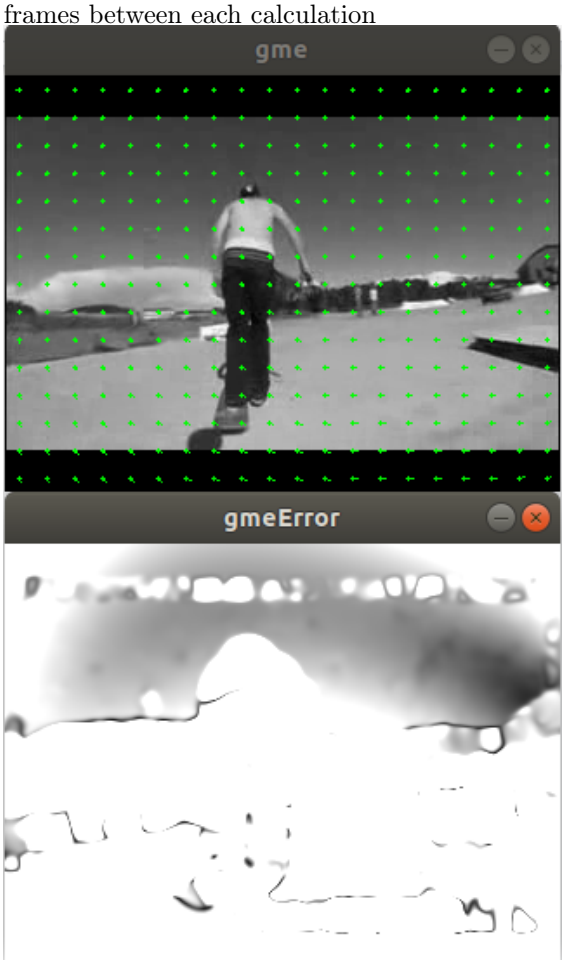
5 Global Motion Estimation

Figure 8: GME for v_SkateBoarding_g25_c01.avi with 10 frames between each calculation



Here the Global Motion Estimation is well shown by the vectors going left for the most part.
Indeed, the camera is going right to follow the skateboarder, so pixels are mostly moving to the left on the image, accordingly to the change of perspective.

Figure 9: GME and GME error for v_SkateBoarding_g25_c01.avi with 10 frames between each calculation



At the beginning of the skateboard video, the camera slightly rotate clockwise. The GME therefore displays motionless vectors close to the center of the screen, and rotating vectors close to the bottom corners (where the ground is located). But since the sky (upper part) almost doesn't change, the vectors located on it are not computing substantial movement.
Thus the GME error notices a problem with the sky movement and displays a gray track along it, while most if the rest is white and shows no problem.