

E9 208 Digital Video: Perception and Algorithms

Assignment 1

(Due Oct 3, 2022)

Note: The assignment needs to be uploaded on Teams. Late submissions will be penalized.

Video Prediction using Optical Flow

In the given video sequences, you are required to predict a future video frame given the two past frames using optical flow. In particular, you are required to estimate the forward optical flow (flow from Frame n to Frame $n+1$) and assume linearity of motion to predict the future frame. Compare the performance of the following optical flow algorithms in terms of the quality of the estimated future frame (the reference future frame is already available for this comparison):

1. Lucas-Kanade optical flow
2. Discrete Horn-Schunck optical flow

You can use any library functions to estimate the optical flow. Please mention all the hyper-parameters of these functions and optimize them. For example, the modify the window of Lucas-Kanade, or modify the relative weights of the cost functions for Horn-Schunck. You do not need to implement any of these methods from scratch.

Answer the following questions in a report.

1. Show the predicted frames and comment on the visual performance.
2. Include the numerical performance comparisons for prediction according to the two methods.
3. Find where the estimated optical flow is different in the two methods and discuss why.
4. Determine the pixels for which you are not able to predict any intensities and discuss why.