Exercise 1: Optical flow

Ilija Tavchioski

I. Introduction

Optical flow is an important information when it comes to tracking a moving objects in a video. In this assignment the goal is to implement two well known algorithms for calculating the optical flow of each pixel. The first one is Lucas-Kanade and the second one is Horn-Schunck method, and the research goal of this project is to compare their results on several examples, explain their hyper-parameters and experiment with possible improvements and research their anomalies.
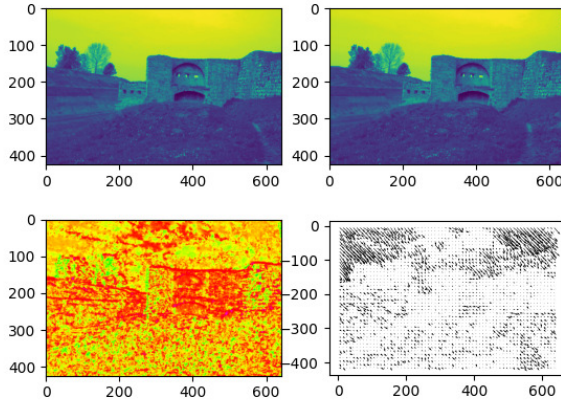
II. Experiments

A. Implementation

B. Results

Lucas−Kanade Optical Flow

Horn−Schunck Optical Flow

Lucas−Kanade Optical Flow
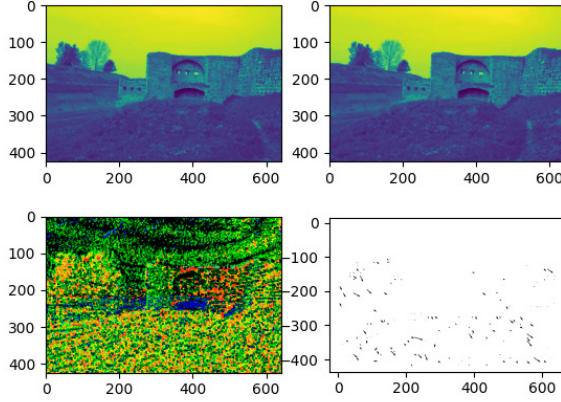
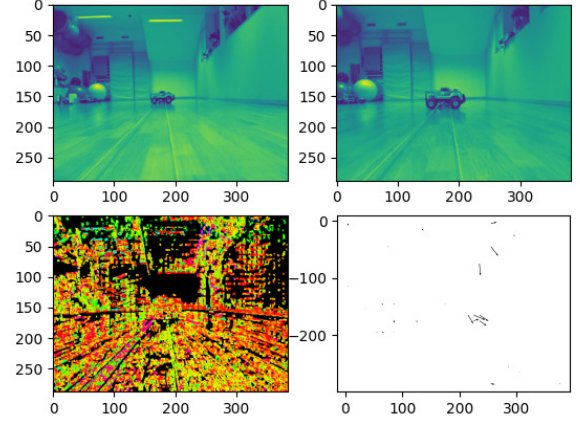
Horn−Schunck Optical Flow
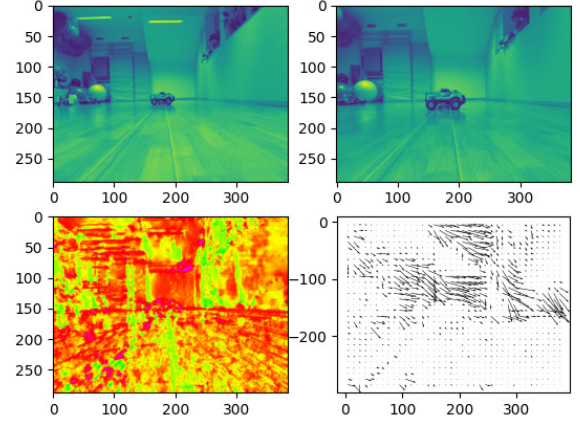
As we can see in our results (see Fig. II-B II-B II-B II-B II-B II-B), the Horn-Schunck algorithm is better in determing the flow in comparison to Lucas-Kanade which barely determine the flow due to several reasons such us when the determinant of
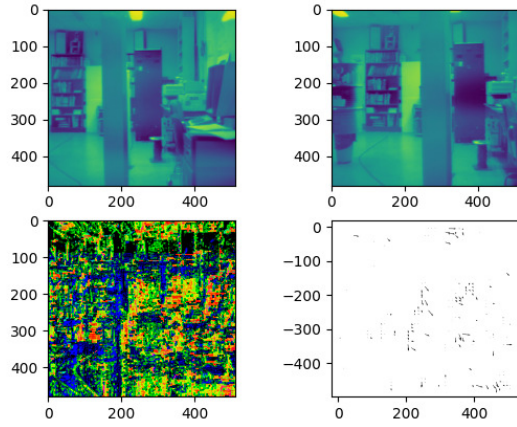
matrix is 0 and we have unreliable result of 0 vector in direction. This can be see especially in Fig. II-B when the position of the object in the two frames is drastic.

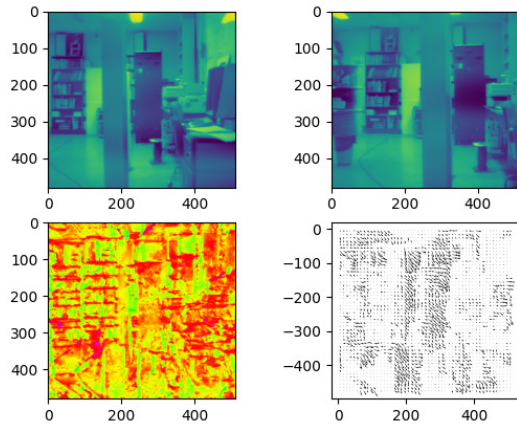### C. Rliability of Lucas-Kanade optical flow

D. Parameters of the methods

The methods have the following parameters, σ which is the standard deviation of the gaussian kernel this parameter does not makes much of a difference of course it still need be in the range of (1, 6) since if it is too high will disrupt the image and if it is too low won't have any implication, N which is the size of the neighbourhood. these two parameters are only for the Lucas-Kanade algorithm, this parameter especially if the frames are more moving needs to be higher II-D in order to catch moving of the pixel in wider neighbourhood, but if it is too high will give a wrong result.
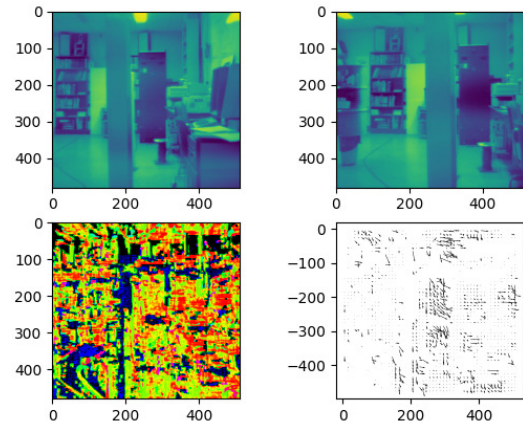
Lucas−Kanade Optical Flow

Horn−Schunck Optical Flow

Lucas−Kanade Optical Flow

III. CONCLUSION