Cs_423 Project Report

- ShiTomasi Corner Detection:

The Shi-Tomasi corner detector is a feature detection algorithm that can be used to detect corners in an image. It is based on the Harris corner detector, but it is more efficient and has better performance in practice.

The Shi-Tomasi corner detector works by computing the eigenvalues of the Hessian matrix of the image at each pixel. The eigenvalues are a measure of the curvature of the image at that pixel, and corners correspond to pixels with high curvature. The algorithm selects the N strongest corners (i.e. those with the highest eigenvalues) as the corner points. In this project I need have strongest corners to increase the accuracy. Therefor, Shi-Tomasi corner detection is the well-fitted algorithm for this project.

- Lucas-Kanade Optical Flow:

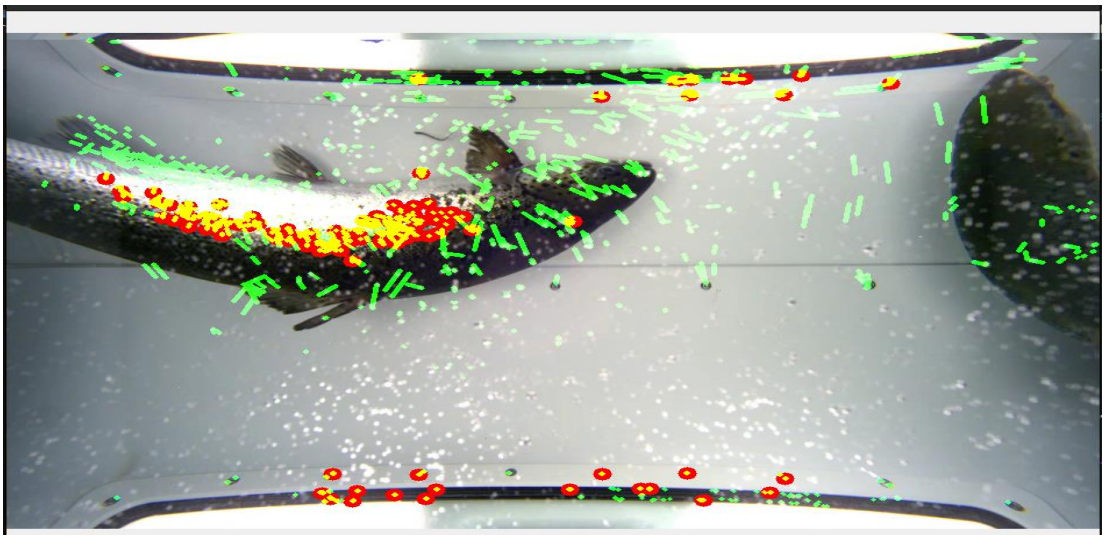
The Lucas-Kanade optical flow method is a widely used algorithm for computing the dense optical flow between two images. It is based on the assumption that the pixel intensities of an object do not change between consecutive frames, and uses this assumption to compute the flow vectors that describe the movement of the pixels between the frames.

- K-Mean Clustering

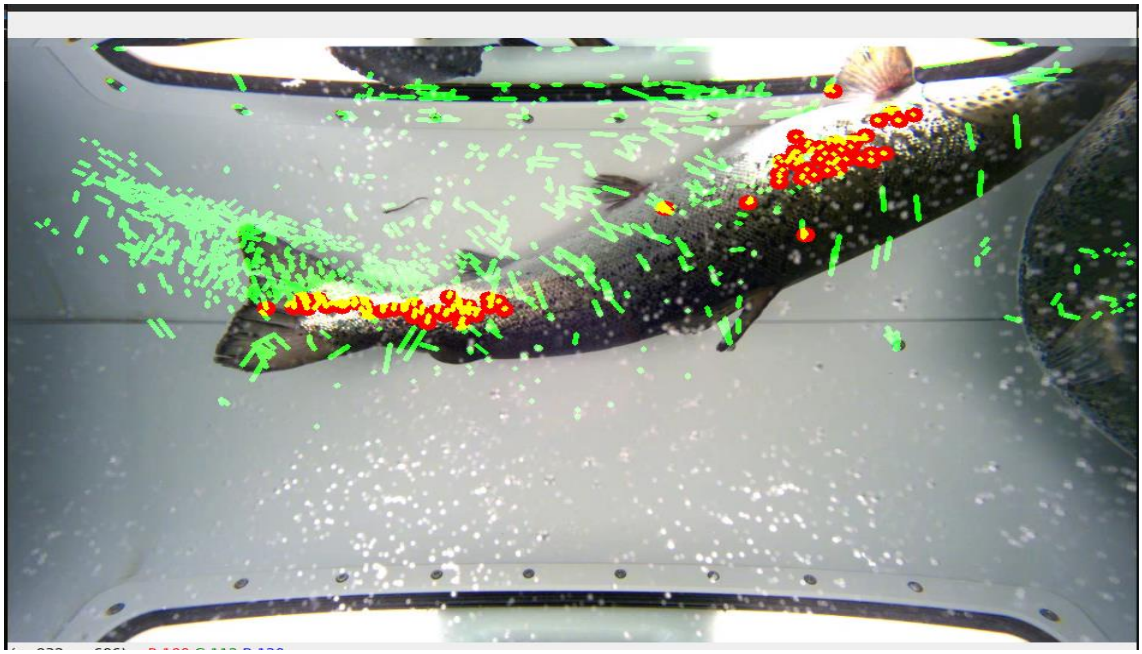
K-Mean clustering clusters the point according to the selected cluster number and after that take the mean of the points and this point is the cluster center.

In the corner elimination part of the project to distinct the background and fish, I prefer to eliminate motionless corners. As a result of that, background corners disappers and we can see only the fish’s corners. However, If a fish passes over a background corners, background corners are appear again for a frame.

Before I apply the algorithm:



After applying the algorithm:



When we want to decide which side the fish is going ,I prefer to use K-Mean clustering algorithm because I need to decide where is fish going according to the previous points mean of the fish and the next points mean of the fish. After the subtraction of the previous points of cluster center and next point of the cluster center algorithm can decide which side fish is going. However, because of the implementation mistakes this is not working very well.