

WRITE UP

Task MP1. DATA BUFFER OPTIMIZATION

Ring buffer was implemented with a databuffer size of 2. It is maintained by removing the first image from the buffer so that at any time only 2 images are present in the buffer.

Task MP2. KEYPOINT DETECTION

The detectors SHITOMASI, HARRIS, FAST, BRISK, ORB, AKAZE, SIFT are chosen by user's input in the form of string and setting it in the 'detectorType' variable.

The following functions "detKeypointsShitomasi", "detKeypointsHarris", "detKeypointsModern" (for detectors other than SHITOMASI and HARRIS) are defined in matching2D_Student.cpp for performing the detection operation.

Task MP3. KEYPOINT REMOVAL

The keypoints present on the preceding vehicle are collected in the vector list "PointsOnCar" by collecting the points within the given rectangle (cx = 535, cy = 180, w = 180, h = 150).

Task MP4. KEYPOINT DESCRIPTORS

The descriptors BRISK, BRIEF, ORB, FREAK, AKAZE and SIFT are chosen by user's input in the form of string and setting it in the 'descriptorType' variable.

The "descKeypoints" function has multiple 'if' condition statements such that the descriptor is chosen based on the string value of the 'descriptorType' variable. The 'extractor' variable is set to the descriptor type through OpenCV commands for e.g. cv::xfeatures2d::FREAK::create().

Task MP5. DESCRIPTOR MATCHING TYPE, SELECTOR TYPE

Matching type are of "MAT_BF" is a brute force based matcher type and "MAT_FLANN" is a Flann based matchers which are defined in the matching2D_student.cpp function and can be selected by user by giving a string based input. Similarly, selector type are chosen from the options "SEL_NN" and "SEL_KNN" which are defined in the matching2D_student.cpp.

Task MP6. DESCRIPTOR DISTANCE RATIO

The threshold is set to 0.8 in the SEL_KNN category.

Task MP7. Number of keypoints on preceding vehicle – performance evaluation 1

The "TASKMP7.xlsx" excel notebook contains the information about the number of keypoints on the preceding vehicle for each detector given in the project.

Task MP8 and MP9. Performance Evaluation 2, 3

The times taken for detection and descriptor extraction for the different possible detector descriptor combination for "MAT_BF" matcher with "SEL_KNN" selector type. The number of matched keypoints are also recorded. All these data are recorder in the "Task_MP8_MP9.xlsx" file. **The top 3 are : FAST_ORB, ORB_BRIEF, BRISK_BRIEF** as these take average times of detection and extraction of 1.1173 ms, 0.6153 ms, 1.1263 ms . Since we need to develop a TTC system based on this hence it is wise to chose a combination which takes very less time in 2D feature tracking.