Camera Based 2D Feature Tracking
Mid -Term Report

Data Buffer

MP.1 Data Buffer Optimization

Satisfied by using the RingBuffer class (RingBuffer.h) instead of a vector of DataFrame. The RingBuffer class fills a vector up to the limit of 'dataBufferSize'. Then each new addition is added at the end of the vector after existing members have been shuffled down by 1. The class could be made more efficient by the use of an 'inptr' and its own iterator (so the existing member shuffle is not required when a new image is added).

KeyPoints

MP.2 Keypoint Detection

Implemented the 'detKeypointsHarris' fn for the Harris keypoint detector and the 'detKeypointsModern' for the FAST, BRISK, ORB, AKAZE, FREAK and SIFT detectors, selectable using the relevant detectorType string from the parent fn. Note: Although the code builds with the FREAK detector implementation, running this detector results in a 'Feature Not Implemented' exception from opencv and a core dump.

MP.3 Keypoint Removal

Implemented a keypoint removal filter based upon the rectangle supplied. (line 115-128 in MidTermProject_Camera_Student.cpp. Note: Tried a narrower rectangle (550, 180, 150, 150) to remove more points just outside the vehicle boundary.

Descriptors

MP.4 Keypoint Descriptors

Implemented the student part of the 'descKeypoints' function. Added descriptor extractors for BRIEF, ORB, FREAK, AKAZE and SIFT, selectable by the appropriate descriptorType string.

MP.5 Descriptor Matching

Implemented the FLANN matcher (lines 21 to 29 in matchDescriptors) and the knn selection (lines 38 to 53 in matchDescriptors), both selectable by the appropriate selection strings.

MP.6 Descriptor Distance Ratio

Added the knn descriptor matching ratio filter as implemented in the preceding lesson segment.

Performance

MP.7 Performance Evaluation 1

No Of KeyPoints found

Image #	1	2	3	4	5	6	7	8	9	10
HARRIS	34	29	40	37	50	151	26	67	59	87
FAST	141	143	140	149	139	139	153	142	131	135
BRISK	254	274	276	275	293	275	289	268	258	249
ORB	87	101	105	110	106	121	128	120	117	117
AKAZE	162	157	159	154	162	163	173	175	175	175
SIFT	137	131	121	135	134	139	136	147	156	135