MP.0 Mid-Term Report: -

This report below addressing the whole rubric points

MP.1 Data Buffer Optimization

The ring buffer code is at MidTermProject_Camera_Student.cpp (Lines 68:71)

MP.2 Keypoint Detection

All detectors are implemented in matching2D_Student.cpp (Starting line 100)

MP.3 Keypoint Removal

The removal code is at MidTermProject_Camera_Student.cpp (Lines 94:106)

MP.4 Keypoint Descriptors

All descriptors are implemented in matching2D_Student.cpp (Lines 56:96)

MP.5 Descriptor Matching

Matching types are implemented in matching2D_Student.cpp (Lines 7:53)

MP.6 Descriptor Distance Ratio

Descriptor distance ratio is implemented in matching2D_Student.cpp (Lines 36:52)

MP.7 Performance Evaluation 1

The number of keypoints on the preceding vehicle for all 10 images is documented in https://github.com/afawzy88/SFND_2D_Feature_Tracking/documentation/Camera_Midterm_Project_Statistics.xlsx (Column C)

MP.8 Performance Evaluation 2

The number of matched keypoints for all 10 images using all possible combinations of detectors and descriptors is documented in https://github.com/afawzy88/SFND_2D_Feature_Tracking/documentation/Camera_Midterm_Project_Statistics.xlsx (Columns J:P)

MP.9 Performance Evaluation 3

The time it takes for keypoint detection and descriptor extraction is documented in https://github.com/afawzy88/SFND_2D_Feature_Tracking/documentation/Camera_Midterm_Project_Statistics.xlsx (Columns D and H)

Notes, selection and Justification: -

- Fastest three detectors:
  - FAST (Average 1.499 ms)
  - ORB (Average 5.747 ms)
  - SHITOMASI (Average 12.21 ms)

- Fastest three descriptors:
  - ORB (Average 1.17 ms)
  - BRIEF (Average 1.778 ms)
  - BRISK (Average 4.643 ms)

- Combinations:
  - Combination FAST, ORB : ~ 2.669 ms Total time, ~ 75.3% matching
  - Combination FAST, BRIEF: ~ 3.277 ms Total time, ~ 77% matching
  - Combination FAST, BRISK: ~ 6.092 ms Total time, ~ 59.5% matching
  - Combination ORB, ORB : ~ 6.917 ms Total time, ~ 71.37% matching
  - Combination ORB, BRIEF: ~ 7.525 ms Total time, ~ 50.98% matching
  - Combination ORB, BRISK: ~ 10.39 ms Total time, ~ 70.25% matching
  - Combination SHITOMASI, ORB: ~ 13.38 ms Total time, ~ 86.14% matching
  - Combination SHITOMASI, BRIEF : ~ 13.98 ms Total time, ~ 89.56% matching
  - Combination SHITOMASI, BRISK : ~ 16.85 ms Total time, ~ 72.77% matching

- Top 3 Selection:

  I would choose the best three as:

  1. Combination FAST, BRIEF
  2. Combination FAST, ORB
  3. Combination ORB, ORB

  Considering that matching matters the same as speed for collision avoidance system