### **Camera Based 2D Feature Tracking**

**Aim:**

Execute feature detection and extraction algorithms on the set of images, Analyse and compare the methods based on its performance like robustness, time efficiency.

**Methodology:**

The feature tracking method involves two steps

1. Key point detection: Key point is a point in the image which is unique in the local area of the image, and can be matched with the corresponding point in other image

Various key point detection algorithms are SHI-TOMASI, HARRIS, FAST, BRISK, ORB, AKAZE, SIFT

1. Descriptor extraction :

Examples of Feature descriptor algorithms are BRISK, BRIEF, ORB, FREAK, AKAZE, SIFT.

Descriptor extraction can be further categorized into

1. Gradient based descriptor : Basic idea behind the gradient descriptor is based on distribution of intensity gradient in the local neighbourhood.

EX: SIFT, SURF

1. Binary descriptor : Binary descriptor is based solely on the intensity of the image. It encodes the information around the key points in the string of binary numbers.

EX: BRISK, FAST, BRIEF, AKAZE, ORB

**Bugs in OPENCV:**

While working on the OPEN CV 4.1.1 version, I came across some bugs in opencv lib

1. AKAZE Library does not work with any other key points detector other than AKAZE itself
2. SIFT key point detection algorithm does not work with ORB descriptor lib.

**Performance Analysis:**

**TASK 7** : BRISK has detected the highest number of key points, followed by AKAZE, FAST, SHIFT and SHI-TOMASI

**TASK 8 and TASK 9**: comparing the number of matched and time taken by the algorithm, my top three combination would be

1. FAST- ORB
2. FAST - BRIEF
3. AKAZE - ORB

This recommendation is because, from the result I observed that it generated a good number of key points in considerably less time.