Lowe’s ratio test

Acts as a filter that sifts out keypoint matches based on distance. Between 2 frames, each keypoint would have travelled a certain distance. Out of all the potential matches observed by the image, only the 2 best matches will be kept. Lowe’s test sets a threshold for these 2 distances. If the distances are too similar, then the keypoint will be discarded and no longer used for further calculations.

Feature comparison between 2 frames

Let’s say there are N1 number of keypoints in frame 1 and N2 number of keypoints for frame 2. Each of the N1 and N2 number of keypoints will have their own descriptors calculated and assigned to them. This means that each of the keypoints will have certain information tied to them based on the type of descriptor algorithm used. There are several ways to compare features between 2 frames. One of the ways is to use Euclidean distance, like in Lowe’s paper. Lowe’s ratio test will compare the 2 points

Nearest neighbor search algorithm

To find a point in a set that resembles a given point the closest.

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T\_cam\_0 refers to the pose of camera.

Extrinsic camera parameters refer to the position of the camera in the 3D world. It is a 6-dimensional matrix (“6 degrees of freedom”). 3 components for the x, y, and z coordinates while the rest for 3D orientation (roll, pitch, and yaw). Defined by the pinhole camera model.

Note:

Roll – rotation about y-axis

Yaw – rotation about z-axis

Pitch – rotation about x-axis

Intrinsic parameters describe how to map 3D world in a 2D image plane (assuming camera sitting on the origin has zero orientation). Typically, there are 4 or 5 parameters, camera constant, scale difference, focal length, principal point, shear parameter.

Direct Linear Transform (11 DOF transformation) assumes perfect lens (no distortion). DLT can be computed with at least 6 control points (points with known coordinates in the environment).

Intrinsic and extrinsic parameters will be enclosed within an entity called the projection matrix.

Camera calibration to get intrinsic parameters.

Camera localization to get extrinsic parameters.

How exactly to run camera calibration?

Take images of checkerboard with camera that we want to calibrate.

Run those images through calibration software.

Get the parameters.

Building C++ programs that contains opencv, if you get undefined reference problems:

g++ -o <output\_name> <source\_code\_name> `pkg-config --cflags --libs opencv`