Trimbot Wageningen SLAM Dataset

1 Hardware Layout

The panoramic stereo camera has a pentagon shape and is consisted of 10 image sensors (Cam0 - Cam9). On each side of the pentagon housing, there are two image sensors which form a stereo vision camera. Cam0, Cam2, Cam4, Cam 6 and Cam8 are on the left in the stereo configuration while the rest image sensors are on the right in the stereo configuration.

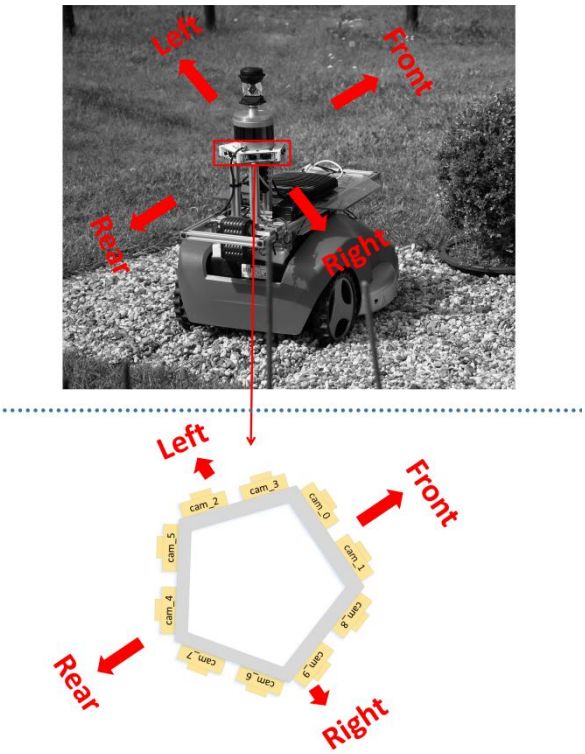

Figure 1. Hardware Layout

Cam0 and Cam1 are pointing to the front. Cam2 and Cam3 are pointing to the left front. Cam4 and Cam5 are pointing to the left rear. Cam6 and Cam7 are pointing to the right rear. Cam8 and Cam9 are pointing to the right front. Figure 1 gives an overview of the image sensors' layout on the real robot.

2 Data Structure and Format

In 'Trimbot Wageningen SLAM Dataset' folder, there are two subfolders ('Test', 'Train') and four files ('Calibration.yaml', 'StereoConfig.yaml',

'lablist.yaml', 'Garden.ply'). Figure 2. gives the data structure in the Trimbot Wageningen SLAM Dataset.

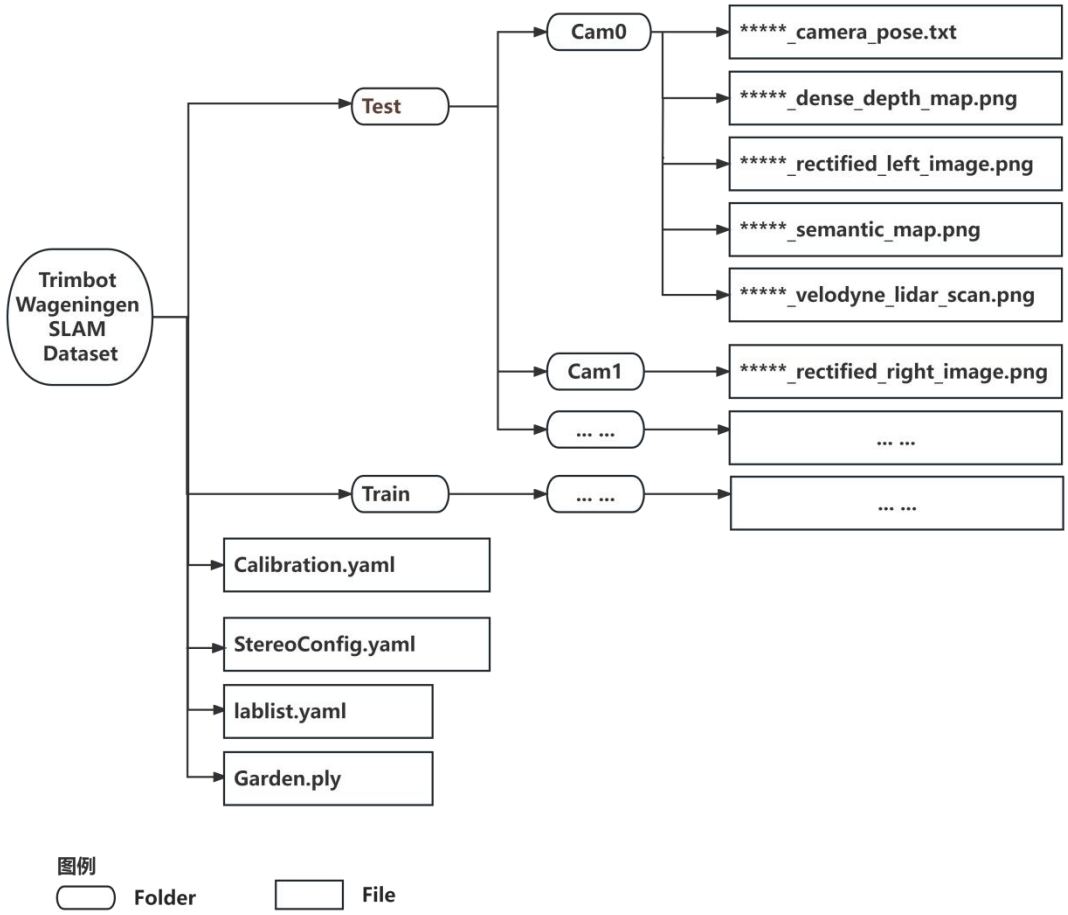

Figure 2. Data Structure

(1) 'Test' & 'Train' Folder

The data structure in 'Test' and 'Train' folder is same. There are 10 sub-folders (ranging from 'Cam0' to 'Cam9') in 'Test' and 'Train' folder. 10 sub-folders are classified into 5 groups according to the stereo configuration: Cam0 & Cam1, Cam2 & Cam3, Cam4 & Cam5, Cam6 & Cam7, Cam8 & Cam9. Each group has the same data structure. Take the group (Cam0 & Cam1) as an example. In the left image sensor folder 'Cam0', there are 5 classes of files and '*****' is the timestamp. In the

right image sensor folder ‘Cam1’, there is 1 class of files.

- ‘*****_camera_pose.txt’ in folder CamN (N=0,2, ..., 8)

This file has recorded the global pose of the image sensor CamN (N=0,2,4,6,8). The format in each file is ‘qw qx qy qz tx ty tz’. ‘qw qx qy qz’ is the quaternion. ‘tx ty tz’ is the translation and the unit is meter.

- ‘*****_dense_depth_map.png’ in folder CamN (N=0,2, ..., 8)

The value in each depth map should be divided by 256. Then you will get the real depth value (the unit is meter).

- ‘*****_rectified_left_image.png’ in folder CamN (N=0,2, ..., 8)

The rectified left image is a RGB image. It has 3 channels and the data type is uint8.

- ‘*****_semantic_map.png’ in folder CamN (N=0,2, ..., 8)

The values in the semantic map represent different objects. The values and their corresponding semantic meanings are shown in the file ‘lablist.yaml’. There are 20 classes in all.

- ‘*****_velodyne_lidar_scan.png’ in folder CamN (N=0,2, ..., 8)

The value in each file should be divided by 256. Then you will get the real depth value (the unit is meter).

- ‘*****_rectified_right_image.png’ in folder CamM (M=1,3, ..., 9)

The rectified right image is a gray image. It has one channel and the data type is uint8.

(2) Calibration.yaml

Symbol	Meaning
camN	the N^{th} camera, N=0,1,2, ... , 9
camera_model: pinhole	The type of the camera model is pinhole.
intrinsics: [fx, fy, cx, cy]	The intrinsic parameters of the image sensor. The unit is pixel.
resolution: [width, height]	The image resolution. The unit is pixel.
T_cn_cnm1	The transformation matrix between the camera coordinate systems: the current image sensor CamN and its former image sensor Cam(N-1)

(3) **StereoConfig.yaml**

The file recorded the product of the focal length and the baseline in the stereo cameras.

Symbol	Meaning
CamNM	The stereo camera consisted of image sensor CamN and CamM. e.g. the front stereo vision camera Cam01 whose is consisted of image sensor Cam0 and Cam1
fb	The product of the focal length and baseline in the corresponding stereo setting. The unit is (pixel * meter).

(4) **lablist.yaml**

Symbol	Meaning
LN	The label whose value is equal to N (N is a positive integer)
name	Semantic meaning

(5) **garden.ply**

The semantic 3D point cloud of the whole garden.

3 Tips

(1) Compare your pose trajectory with the ground truth pose trajectory or compare your reconstructed garden model with the ground truth garden model

Reply: When you compare your pose trajectory with the ground truth pose trajectory, please remember that transform your basic coordinate system into the ground truth basic coordinate system first. When you compare your reconstructed garden model with the ground truth model, please remember that transform your basic coordinate system into the ground truth basic coordinate system as well.

(2) About the depth information of the human in '*****_dense_depth_map.png'

Reply: The areas containing human in '*****_dense_depth_map.png' have not the human depth information but have the depth information of the objects behind the human. If you don't want the depth information of the objects behind the human, you may as well mask the depth information of the areas containing human. If you want your network to remove the human depth information and complete the depth information of the objects behind the human, you could use all the values in '*****_dense_depth_map.png' directly.