1.概述

当前开源的2D激光雷达slam的ROS package主要有 **gmapping** ros-perception/slam_gmapping ros-perception/openslam_gmapping

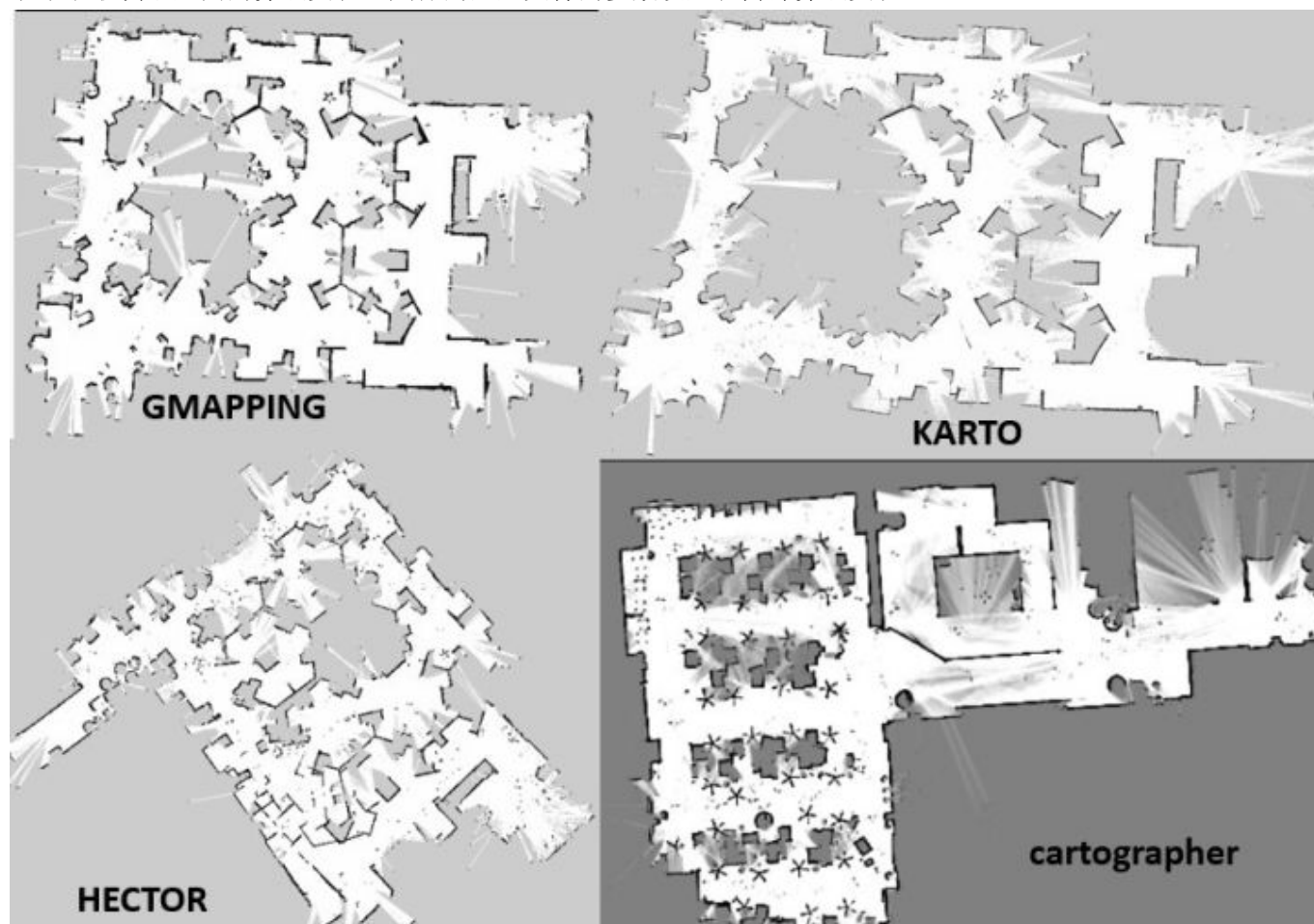**Hector** tu-darmstadt-ros-pkg/hector_slam

karto ros-perception/slam_karto ros-perception/open_karto skasperski/navigation_2d

cartographer googlecartographer/cartographer googlecartographer/cartographer_ros

2.建图效果

效果就取决于里面的算法实现，具体的配置文件的参数设置和内部算法实现

3.gmapping

gmapping包包含OpenSlam的Gmapping的一个ROS封装, 提供基于激光的SLAM(同时定位和创建地图)。依靠移动机器人收集的激光和位姿数据，可以创建2维栅格地图。

输入

激光雷达和位姿

4.1.1 Subscribed Topics

`tf` (tf/tfMessage)
> Transforms necessary to relate frames for laser, base, and odometry (see below)

`scan` (sensor_msgs/LaserScan)
> Laser scans to create the map from

输出

4.1.2 Published Topics

`map_metadata` (nav_msgs/MapMetaData)
> Get the map data from this topic, which is latched, and updated periodically.

`map` (nav_msgs/OccupancyGrid)
> Get the map data from this topic, which is latched, and updated periodically

`~entropy` (std_msgs/Float64)
> Estimate of the entropy of the distribution over the robot's pose (a higher value indicates greater uncertainty). New in 1.1.0.

参数

~inverted_laser (string, default: "false")
> **(REMOVED in 1.1.1; transform data is used instead)** Is the laser right side up (scans are ordered CCW), or upside down (scans are ordered CW)?

~throttle_scans (int, default: 1)
> Process 1 out of every this many scans (set it to a higher number to skip more scans)

~base_frame (string, default: "base_link")
> The frame attached to the mobile base.

~map_frame (string, default: "map")
> The frame attached to the map.

~odom_frame (string, default: "odom")
> The frame attached to the odometry system.

~map_update_interval (float, default: 5.0)
> How long (in seconds) between updates to the map. Lowering this number updates the occupancy grid more often, at the expense of greater computational load.

~maxUrange (float, default: 80.0)
> The maximum usable range of the laser. A beam is cropped to this value.

~sigma (float, default: 0.05)
> The sigma used by the greedy endpoint matching

~kernelSize (int, default: 1)
> The kernel in which to look for a correspondence

~lstep (float, default: 0.05)
> The optimization step in translation

~astep (float, default: 0.05)
> The optimization step in rotation

~iterations (int, default: 5)
> The number of iterations of the scanmatcher

~lsigma (float, default: 0.075)
> The sigma of a beam used for likelihood computation

~ogain (float, default: 3.0)
> Gain to be used while evaluating the likelihood, for smoothing the resampling effects

~lskip (int, default: 0)
> Number of beams to skip in each scan. Take only every (n+1)th laser ray for computing a match (0 = take all rays)

~minimumScore (float, default: 0.0)
> Minimum score for considering the outcome of the scan matching good. Can avoid jumping pose estimates in large open spaces when using laser scanners with limited range (e.g. 5m). Scores go up to 600+, try 50 for example when experiencing jumping estimate issues.

~srr (float, default: 0.1)
> Odometry error in translation as a function of translation (rho/rho)

~srt (float, default: 0.2)
> Odometry error in translation as a function of rotation (rho/theta)

~str (float, default: 0.1)
> Odometry error in rotation as a function of translation (theta/rho)

~stt (float, default: 0.2)
> Odometry error in rotation as a function of rotation (theta/theta)

~linearUpdate (float, default: 1.0)
> Process a scan each time the robot translates this far

~angularUpdate (float, default: 0.5)
> Process a scan each time the robot rotates this far

~temporalUpdate (float, default: -1.0)
> Process a scan if the last scan processed is older than the update time in seconds. A value less than zero will turn time based updates off.

~

~resampleThreshold (float, default: 0.5)
    The Neff based resampling threshold

~particles (int, default: 30)
    Number of particles in the filter

~xmin (float, default: -100.0)
    Initial map size (in metres)

~ymin (float, default: -100.0)
    Initial map size (in metres)

~xmax (float, default: 100.0)
    Initial map size (in metres)

~ymax (float, default: 100.0)
    Initial map size (in metres)

~delta (float, default: 0.05)
    Resolution of the map (in metres per occupancy grid block)

~llsamplerange (float, default: 0.01)
    Translational sampling range for the likelihood

~llsamplestep (float, default: 0.01)

~lasamplerange (float, default: 0.005)
    Angular sampling range for the likelihood

~lasamplestep (float, default: 0.005)
    Angular sampling step for the likelihood

~transform_publish_period (float, default: 0.05)
    How long (in seconds) between transform publications.

~occ_thresh (float, default: 0.25)
    Threshold on gmapping's occupancy values. Cells with greater occupancy are considered occupied (i.e., set to 100 in the resulting sensor_msgs/LaserScan). New in 1.1.0.

~maxRange (float)
    The maximum range of the sensor. If regions with no obstacles within the range of the sensor should appear as free space in the map, set maxUrange < maximum range of the real sensor <= maxRange.

这里参数较多

maxUrange < 激光雷达最大测距 <= maxRange