Data Usage Flowchart

ROS

roscore

-roscore must be running for ROS functionalities to work.
-Run roscore and leave it in the background

Extract imu data

-Write imu data from bag file to text file so it can be processed in Matlab

Extract gps data

-write gps data from bag file to text file so it can be processed in Matlab

MATLAB

Matlab plot of orientation

-Project orientation based on imu data onto a plane to check if orientation and point cloud data is synchronized

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static transformation

-Reorients LiDAR with respect to the flight control unit (fcu)
-Takes user inputs to do rotation

fcu to world transformation

-Fixes the fcu frame onto the world frame
-Gets imu and gps data from topic: mavros/global_position/local

RViz

-Displays the transformed point clouds
-Gets position and orientation from fcu to world transformation node
-Gets point cloud from /velodyne_points node in bag file
-Can't process point cloud

.bag file

-File format in which all data accumulated from flight is stored

listener_tf

-Subscribes to the previous transformation and applies the transformations to the point cloud scans. The transformed scans are stored in new bag file

pointcloud2pcd

-Subscribes to a topic and writes each point cloud scan to a .pcd file

Rename .pcd file

-Renames the .pcd files generated from 1 to number of generated pcd files.

pcl viewer

-Displays some or all point clouds depending on needs

pcd2ply

-Converts the pcd file to a ply format

Meshlab

-A better program to view and process the point cloud data

Removing canopy

-Remove point clouds related to trees (not accomplished)

→ Position and Orientation data

→ Point Cloud data