Fusion of IMU and GPS data

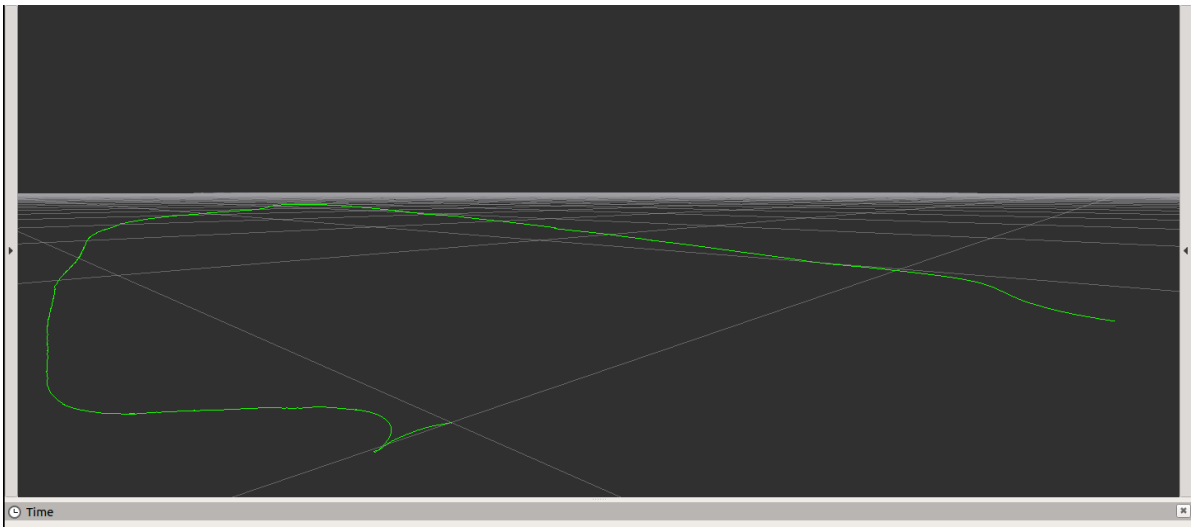
This function fuses IMU and GPS data and displays the fused data in Rviz.

1. Run

terminal input

```
roslaunch imu_gps_localization imu_gps_localization.launch
rosbag play gps.bag
```

After running, with the playback of data packets, in Rviz the green track is also continuously extended, representing the position after fusion,



In this case, we use the data package in the folder as a demonstration. In actual development, we need to use the rosbag tool to record the data of IMU and GPS.

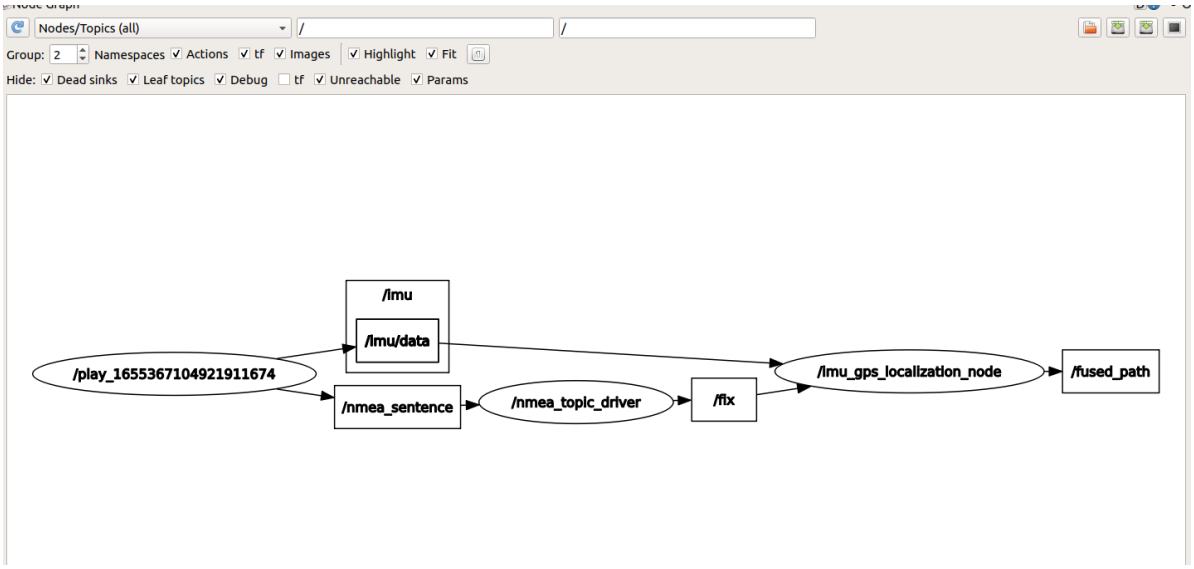
We can view the contents of this packet through **rosbag info gps.bag ,**

```
yahboom@Transbot:~$ rosbag info gps.bag
path:        gps.bag
version:     2.0
duration:    15:26s (926s)
start:       Jul 20 2018 00:15:57.84 (1532016957.84)
end:         Jul 20 2018 00:31:24.51 (1532017884.51)
size:        2.9 GB
messages:    472470
compression: bz2 [6106/6106 chunks; 60.27%]
uncompressed: 4.8 GB @ 5.3 MB/s
compressed:  2.9 GB @ 3.2 MB/s (60.27%)
types:       geometry_msgs/TwistStamped  [98d34b0043a2093cf9d9345ab6eef12e]
             nmea_msgs/Sentence          [9f221efc5f4b3bac7ce4af102b32308b]
             sensor_msgs/Imu             [6a62c6daae103f4ff57a132d6f95cec2]
             sensor_msgs/LaserScan       [90c7ef2dc6895d81024acba2ac42f369]
             sensor_msgs/MagneticField   [2f3b0b43eed0c9501de0fa3ff89a45aa]
             sensor_msgs/PointCloud2     [1158d486dd51d683ce2f1be655c3c181]
             sick_ldmrs_msgs/ObjectArray [09128101facd48306fd0cf85eaf2be8f]
             std_msgs/String             [992ce8a1687cec8c8bd883ec73ca41d1]
             velodyne_msgs/VelodyneScan  [50804fc9533a0e579e6322c04ae70566]
topics:      /cloud                           11582 msgs    : sensor_msgs/PointCloud2
             /hdl32e_left/velodyne_packets     9259 msgs    : velodyne_msgs/VelodyneScan
             /hdl32e_right/velodyne_packets    9259 msgs    : velodyne_msgs/VelodyneScan
             /imu/data                        92673 msgs    : sensor_msgs/Imu
             /imu/mag                         92673 msgs    : sensor_msgs/MagneticField
             /imu_data_str                    92673 msgs    : std_msgs/String
             /nmea_sentence                   13901 msgs    : nmea_msgs/Sentence
             /objects                         11579 msgs    : sick_ldmrs_msgs/ObjectArray
             /scan                            46197 msgs    : sensor_msgs/LaserScan
             /velocity                        92674 msgs    : geometry_msgs/TwistStamped
```

The content of the topic part is the topic recorded by this data packet. It can be seen that IMU (/imu/data and /imu/mag and GPS (/nmea_sentence) data are included.

During operation, we can also view the node graph to see the topic transmission between nodes, terminal input

```
rosrun rqt_graph rqt_graph
```



2、launch file

```
<launch>
    <param name="acc_noise"       type="double" value="1e-2" />
    <param name="gyro_noise"      type="double" value="1e-4" />
    <param name="acc_bias_noise"  type="double" value="1e-6" />
    <param name="gyro_bias_noise" type="double" value="1e-8" />

    <param name="I_p_Gps_x"       type="double" value="0.0" />
    <param name="I_p_Gps_y"       type="double" value="0.0" />
    <param name="I_p_Gps_z"       type="double" value="0.0" />

    <param name="log_folder"      type="string" value="$(find
imu_gps_localization)" />

    <node name="nmea_topic_driver" pkg="nmea_navsat_driver"
type="nmea_topic_driver" output="screen" />
    <node name="imu_gps_localization_node" pkg="imu_gps_localization"
type="imu_gps_localization_node" output="screen" />

    <node pkg="rviz" type="rviz" name="rviz" output="screen"
      args="-d $(find imu_gps_localization)/ros_wrapper/rviz/default.rviz"
required="true">
    </node>

</launch>
```

Among them, the node **imu_gps_localization_node** is used to fuse IMU and GPS data. Its source code is located in imu_gps_localization-master/ros_wrapper/src. The focus is on **localization_wrapper.cpp** , which includes subscription topics, fusion data and publishing topic data.