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README.md

Sensor Fusion: Sliding Window for Real-Time Lidar Localization -- 多传感器融合定位: 基于滑动窗口的实时定位

This is the solution of Assignment 07 of Sensor Fusion from 深蓝学院.

Problem Statement

1. 推导使用LOAM构建残差时, 与之相关联的两个位姿的Jacobian

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完整的推导过程参见here. 此处仅将结论摘录如下, 详细的符号定义参考推导文档.

∴ Jacobian for tightly-coupled LOAM are

a. point-line:

$$\text{pose } k\,(i)\begin{cases}\dfrac{\partial d_{pl}}{\partial R_k} = \alpha^T \bar{X}^L_{(k+1,i)}{}^{\wedge} \\ \dfrac{\partial d_{pl}}{\partial t_k} = -\alpha^T R_k^T\end{cases}$$

$$\text{pose } k+1\,(j)\begin{cases}\dfrac{\partial d_{pl}}{\partial R_{k+1}} = -\alpha^T R_k^T R_{k+1} X^L_{(k+1,i)}{}^{\wedge} \\ \dfrac{\partial d_{pl}}{\partial t_{k+1}} = \alpha^T R_k^T\end{cases}$$

b. point-plane

$$\text{pose } k\,(i)\begin{cases}\dfrac{\partial d_{pp}}{\partial R_k} = \beta^T \bar{X}^L_{(k+1,i)}{}^{\wedge} \\ \dfrac{\partial d_{pp}}{\partial t_k} = -\beta^T R_k^T\end{cases}$$

$$\text{pose } k+1\,(j)\begin{cases}\dfrac{\partial d_{pp}}{\partial R_{k+1}} = -\beta^T R_k^T R_{k+1} X^L_{(k+1,i)}{}^{\wedge} \\ \dfrac{\partial d_{pp}}{\partial t_{k+1}} = \beta^T R_k^T\end{cases}$$

2. 实现基于Sliding-Window的实时定位(Will be Available on 03/01/2021)

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算法中的关键计算参考here