g2o Summary 2020/05/26

Source code structure

Two **dual** parts:

Graph Construction

从图的角度理解：图中的顶点表示机器人的位姿或路标的位姿，边表示由运动模型引入的运动约束或由观测模型引入的观测约束。

- HyperGraph -> The graph to be constructed.
  - Nested classes
    - HyperGraphElementType -> 枚举类型。Data, Vertex, Edge 都继承自此类，因此可以用统一的方式对 Vertex, Edge 的实例进行操作。
      - Data -> Information related to a vertex. User-impl. -> Implemented as a node of a linked-list.
        - read -> Read data in file. User-impl.
        - write -> Write data to file. User-impl.
        - DataContainer -> As a data member in the Data class. -> Stores the interfaces user needs to manipulate the information stored in the corresponding Data object.
      - Vertex -> A vertex in the graph. User-impl.
        - VertexId -> The id associated to the vertex. -> Vertex is identified by its id.
        - EdgeSet -> The edges connected to the vertex.
      - Edge -> An (hyper) edge in the graph. User-impl.
        - EdgeId -> The id associated to the edge. -> Edge is identified by the pointer pointed to it.
        - VertexContainer -> The vertices connected by the (hyper) graph.
  - Constructors for the HyperGraph class and for the Vertex and Edge classes.
  - Member function:
    - addVertex() -> You should set the id of the vertex first.
    - addEdge()
    - etc.
  - Member variabls:
    - VertexIDMap -> id-vertex unordered_map.
    - EdgeSet -> Edges.
  - etc.

Graph Optimization

从优化的角度理解：图中的顶点表示需要优化的参数，边表示参数间的约束。

- OptimizableGraph -> The class specifies the optimization problem from the perspective of graph. -> Derived from HyperGraph. -> It can be seen as the dual of the hyper graph in the optimization field.
  - HyperGraphAction -> enum object. 统一对 Vertex, Edge 的操作接口。

- Hessian -> User-impl.
- b vector -> User-impl.
- read -> User-impl.
- write -> User-impl.
- oplusImpl -> User-impl. Update the params according to the delta params.
- setToOriginImpl -> User-impl.
- computeError -> User-impl. Compute the errors according to the current configuration of the vertices.
- linearizeOplus -> User-impl. linearize the constraints by applying jacobian on the delta params.
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Some notes

一些博客及教程

g2o学习笔记

gauge freedom