Real-time registration of noisy, incomplete and partially-occluded 3D pointclouds

This topic is about the registration of 3D pointclouds belonging to certain objects in the scene, rather than about registering different pointclouds of the scene itself.

State-of-the-art (SOTA) pointcloud registration models/algorithms should be first reviewed, and promising candidates should be selected for evaluation based on the criteria listed below.

- The method must work in real-time (at least 25 frames per second) for at least 5 different objects at the same time.
- The method must be robust to noise in the pointclouds. They come from an Intel RealSense D435 RGB+Depth camera.
- The method must be able to robustly track the objects of interest even if they are occluded partially by other objects.

The best-suited method must then be extended or improved in a novel way or a completely novel method should be developed.

Both classical as well as Deep Learning based methods must be considered.

Related work:

- DeepGMR: https://github.com/wentaoyuan/deepgmr
- 3D Object Tracking with Transformer: https://github.com/3bobo/lttr

Prerequisites

- First experiences with 3D data processing / Computer Vision
- Python programming, ideally also familiarity with C++
- Familiarity with Linux and the command line

Advisors

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