

# Project Rawseeds

## Suggestions about map alignment

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*NOTE: WHAT FOLLOWS IS BASED ON THE CONCEPTS DEFINED BY THE DOCUMENT "GENERAL CONCEPTS AND DEFINITIONS FOR BPs", WHICH IS PART OF THE INFORMATION ASSOCIATED TO ALL BENCHMARK PROBLEM INSTANCES. PLEASE REFER TO THAT DOCUMENT FOR CLARIFICATION.*

## Introduction

The computation of some of the performance metrics proposed by Rawseeds requires that a reconstructed trajectory (i.e., the trajectory of the robot generated by the algorithm under test - or **AUT**) is expressed in the same reference frame used by the *poseGT* ground truth. As the reconstructed trajectory is referred to the map of the environment generated by the AUT, this operation is equivalent to the alignment of the reconstructed map with the *poseGT* reference system.

## Suggestions to perform the alignment

The correct expression of the reconstructed trajectory in the *poseGT* reference system depends on the availability of the roto-translation  $RT_{1st_{pose}}^{GTframe}$  of the first pose of the dataset used by the AUT to generate the reconstructed map, with respect to the *GTframe*, which is the frame which the *poseGT* is referred to. In the following, we will briefly hint to how such roto-translation could be determined.

- If the first pose of dataset belongs to an area of the environment where ground truth data are available, then an estimate of  $RT_{1st_{pose}}^{GTframe}$  is already included in the dataset (as part of the ground truth data). As the accuracy of  $RT_{1st_{pose}}^{GTframe}$  has a deep effect on the value of the performance measures that depend on it, we suggest to take this value as just a first estimate.
- If the first pose is not in an area where ground truth is available, and/or to refine the first estimate of  $RT_{1st_{pose}}^{GTframe}$ , the author of the AUT has to determine the roto-translation basing on her/his preferred method. A full description of such method (i.e., one that makes it possible to repeat its application) is required and must be provided along with the value of the performance measure that required the alignment. A possible way to execute the above task (i.e., determine  $RT_{1st_{pose}}^{GTframe}$ ) is to perform an ICP-like alignment between the mappingGT and the reconstructed map, basing on a suitable set of features, initial estimates, and human verification and tuning.

Please note that the whole map-alignment process might be substituted by the indication of a previously-published Benchmark Solution from which the value of  $RT_{1st_{pose}}^{GTframe}$  has been copied.