

Multi-robot systems are an established research area with a growing number of applications. Efficient coordination in such systems usually requires knowledge of robot positions and the global map. This work presents a novel map-merging algorithm for merging 3D point cloud maps in multi-robot systems, which produces the global map and estimates robot positions. The algorithm is based on feature-matching transformation estimation with a novel descriptor matching scheme and works solely on point cloud maps without any additional auxiliary information. The algorithm can work with different SLAM approaches and sensor types and it is applicable in heterogeneous multi-robot systems. The map-merging algorithm has been evaluated on real-world datasets captured by both aerial and ground-based robots with a variety of stereo rig cameras and active RGB-D cameras. It has been evaluated in both indoor and outdoor environments. The proposed algorithm was implemented as a ROS package and it is currently distributed in the ROS distribution. To the best of my knowledge, it is the first ROS package for map-merging of 3D maps.