

ABSTRACT

The reflective surface of vehicles makes the process of 3D model reconstruction prone to geometric and visual errors, requiring data acquisition and control point distribution strategies to ensure representative results. This study aims to analyze image acquisition strategies, shooting angle configurations, and control point distribution patterns in 3D car reconstruction using a photogrammetry approach and NeRF algorithms. The SfM-MVS method is used to construct feature-matching-based geometry, which is then compared with the NeRF approach that models continuous volumetric representations and light interactions in a more complex manner. The research variations include the distribution of control points on the ground and a combination of the ground and body, as well as differences in photo- and video-based acquisition methods in several shooting angle configurations. The evaluation was carried out through visual quality analysis, model completeness, noise level, and RMSE values based on GCP and ICP. The results of the study in the form of geometric model accuracy tests with an ICP RMSE value of no more than 2 cm show that the even distribution of control points in critical areas of the object, as well as acquisition with multiple angles and high overlap, improve the stability and consistency of the model geometry. The NeRF approach shows greater adaptability to reflective characteristics than conventional methods. The implementation of this 3D reconstruction result was modified into a Near Range Photogrammetry-based interactive media as a means of digital transformation for car repair shop marketing that enables interactive visualization for customers. Thus, this research not only contributes to improving the geometric accuracy of 3D models but also supports innovation in digital technology-based marketing strategies.

Keywords: *3D Reconstruction, Close Range Photogrammetry, Geometric Accuracy Test, NeRF, Vehicles*