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THREE-DIMENSIONAL RECONSTRUCTION USING NERF ARTIFICIAL INTELLIGENCE TECHNIQUE

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DECLARATION

I declare that the work on this project/dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA (UiTM). This project/dissertation is original and it is the result of my work, unless otherwise indicated or acknowledged as referenced work.

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ABSTRACT

Photogrammetry has been a fundamental tool for three-dimensional (3D) reconstruction. However, the introduction of the Neural Radiance Field (NeRF) represents a significant advancement in this field. NeRF uses neural networks to create 3D representations from a series of two-dimensional (2D) images, utilizing Artificial Intelligence (AI). Traditional photogrammetry often encounters challenges when dealing with objects that have complex surfaces and textures, leading to incomplete or inaccurate 3D models. By employing NeRF's ability to predict the color and density of every point in a scene, this research aims to evaluate the effectiveness of NeRF techniques within photogrammetry pipelines, specifically for reconstructing non-cooperative objects. The primary goal is to generate 3D reconstructions using the NeRF technique and to conduct a thorough evaluation of the resulting accuracy. The study involves applying various methodologies to datasets captured from non-cooperative objects using a camera and configuring the NeRF algorithm to facilitate 3D model reconstruction using photogrammetry pipeline. The study concludes with a comparative analysis of the 3D reconstructions produced by both NeRF and traditional photogrammetry pipelines compared to Ground Truth, to validate the accuracy of the resulting 3D models. The outcomes demonstrate the effectiveness of NeRF in reconstructing non-cooperative objects compared to photogrammetry. Furthermore, the findings indicate that future research in this area has the potential to significantly enhance the quality and efficiency of NeRF techniques in photogrammetry for 3D modeling.

Keywords: 3D model, NeRF, Artificial Intelligence, Photogrammetry

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