

Fall 2022 CSCI 1430 Capstone Project: NeRF This

Andrew Ding, Tony Zhu, Mingxuan Ji
Brown University

December, 2022

1 Abstract

This report ¹ explores the use of Neural Radiance Fields (NeRF) for 3D scene reconstruction from synthetic data. NeRF is a neural network-based model that learns an implicit representation of 3D scenes from 2D images. The model takes in the position and orientation of a virtual camera and returns the corresponding pixel color for that viewpoint.

The researchers trained the NeRF model using a synthetic dataset of 3D scenes and evaluated its accuracy and quality using various metrics such as mean squared error (MSE) and peak signal-to-noise ratio (PSNR). They also analyzed the performance of the model on different synthetic scenes to identify its strengths and limitations.

The results showed that the NeRF model can generate high-quality 3D reconstructions that are visually appealing and accurate. An example is included below.



However, the researchers also identified some limitations of the model, such as its sensitivity to occlusions and the need for long training time.

The report concludes with a discussion of potential future research directions for improving the NeRF model, such as incorporating temporal information into the model and using hybrid representations that combine explicit and implicit methods. The findings suggest that NeRF has the potential for various applications in computer vision, virtual reality, and augmented reality.

¹Link to the full report can be found here.