

From Projection to Perception: A Mathematical Exploration of Shadow-based Neural Reconstruction

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Abstract

Reconstructing geometry in \mathbb{R}^3 from single-view images in \mathbb{R}^2 is an ill-posed inverse problem due to depth and occlusion ambiguities. This paper will explore ShadowNeuS, a published solution that uses neural Signed Distance Functions (SDFs) and ray tracing with shadow cues from multiple lightings to recover 3D shapes from a single view. We also explore how neural networks reconstruct higher-dimensional objects from their projections in lower-dimensions. By generalizing these ideas, we propose a framework for

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1 Introduction

References

- [LWX23] Jingwang Ling, Zhibo Wang, Feng Xu. *ShadowNeuS: Neural SDF Reconstruction by Shadow Ray Supervision*. arXiv: [2211.14086](#), 2023.