GRA Name: Sushmita Sarker

Institution: University of Nevada, Reno

Mentor: Dr. Alireza Tavakkoli

Email: sushmitasarkers@unr.edu

Abstract:

Generating lifelike and diverse 3D point clouds is a crucial task in computer vision, with applications in remote sensing and digital representation of physical objects. However, existing generative models struggle with the unstructured and irregular nature of point cloud data. We propose a novel approach that leverages diffusion processes to generate 3D point clouds, integrating individual conditional variables for each point to enable precise generation of part-specific structures. Our method enhances the generation capabilities of diffusion models, allowing for structurally and segmentation-aware point clouds. Through a comparative analysis of guided and unguided diffusion processes, we demonstrate the significant impact of conditional variables on diffusion dynamics and generation quality. Extensive experiments validate the efficacy of our approach, producing detailed and accurate 3D point clouds tailored to specific parts and features.