SS23 3D ML Project Proposal

Team Members:

1. Biray Sutcuoglu – 03766405
2. Youssef Youssef - 03766163

Project 1 (Our top priority): Reconstruction from single 2D Images

Summary: Creates a 3D shape from a single 2D image

Paper:

- 3D-R2N2: A Unified Approach for Single and Multi-view 3D Object Reconstruction
- Link: https://arxiv.org/abs/1604.00449

Dataset: Shapenet

Modifications:

- Change encoder to use a transformer with attention
- Change decoder to use a transformer with attention
- If there is enough time, try to reverse the process.
    - Given a 3D shape, output its corresponding 2D Image

Project 2: Text2Scene Synthesis

Summary: Creates a 3D scene from a given text input query using a diffusion model.

Paper:

- DiffuScene: Scene Graph Denoising Diffusion Probabilistic Model for Generative Indoor Scene Synthesis
- Link: https://arxiv.org/abs/2303.14207

Dataset: 3D-FRONT dining and living rooms

Modifications:

- Change the diffusion model to an autoregressive **random** transformer with attention. The random transformer is to preserve the main idea behind the paper of order-invariance of the furniture in the scene.

Notes:

- Not very sure the transformer architecture will yield better results

Project 3: Instance Segmentation

Summary: Given a 3D scene in the form of a point cloud, perform instance segmentation

Paper:

- PointGroup: Dual-Set Point Grouping for 3D Instance Segmentation
- Link: https://arxiv.org/abs/2004.01658

Dataset: Scannet

Modifications:

- Change backbone
- Use different clustering algorithm
- Change dataset to NYU Depth Dataset: (https://cs.nyu.edu/~silberman/datasets/nyu_depth_v2.html)