

Project Proposal

'Reconstruction based 3D Mesh retrieval from single view RGB images'

1 Abstract

Recently there have been many advancements in modeling and digitizing information. That resulted in a surge in the quantity of 3D information available on the internet and domain-specific databases. For that reason, different researchers have developed 3D shape retrieval systems that can recover similar meshes given some input queries [3, 1, 2]. For such systems, the input queries could differ from having a different representation of a 3D mesh, a partial mesh, or even a 2D image. We propose a solution to the 2D image-based 3D object retrieval problem. Our approach is two-fold. First, we generate a 3D mesh representation from an input 2D image. Then we use the generated 3D information to compare and retrieve the closest mesh from an already existent database.

The problem of converting 2D images to 3D meshes has been addressed and solved in the Large-Scale 3D Shape Reconstruction and Segmentation from Shapenet Core55 [4]. In that research, researchers attempted to solve the problem with different techniques. One such approach would be to use the same approach for the construction part of the pipeline.

2 Requirements

2.1 Overview

We would like to try to implement a system that is able to fetch the best matching 3D mesh from a database from a single RGB image. For that we want to train two neural networks.

2.2 Methodology

Our first step is to train a neural network that reconstructs a voxel representation of an object from a single RGB image. In the second step we will search a database for the object that exhibits the highest similarity to our reconstruction. To calculate the similarity between object we will train an autoencoder on our database, and compare the distances between the latent space vectors of our reconstruction and each object in the database.

2.3 Dataset

We plan to use the shapenet dataset of meshes and rendered images. For our purposes we will convert the meshes from the dataset into voxels.

3 Team

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References

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