

Thesis title:**Intelligent Interior Design – Style Compatibility of 3D Furniture Models using Neural Networks****Author: Yuu Sakaguchi**

Abstract: Analysis of 3D shapes is a challenging task especially when it comes to measuring the styles. There are numerous possible real-world applications which benefit from machine understanding of 3D objects, so we explore analytical models to measure style-related features. 3D models can be represented in different formats such as polygon mesh, multi-view images, and point cloud, and each of them has different characteristics. In this work, we mainly focus on analyzing the ability of a point cloud to represent style information. In addition, we replicate an existing multi-view based method in order to fairly compare the performance of different representations. The goal of this thesis is to explore and evaluate point cloud based methods, and apply our method to develop applications which provides easy search in a furniture database based on style similarity. We trained and tested our model on two datasets which contain several different categories of 3D objects such as furniture in dining rooms, furniture in living rooms, buildings, and coffee sets. As the available datasets do not provide style class labels, we learn the embedding using triplet architecture and triplet loss. The replication and our point cloud methods perform relatively well compared to the random baseline, but were unable to achieve the reported accuracy in the original paper and related works.