Karlsruhe Institute of Technology
Institute of Applied Informatics and
Formal Description Methods (AIFB)
Web Science Group
Zhan Qu
zhan.qu@kit.edu

Call for Bachelor/Master Thesis:
Explainable Graph-based 3D Point Cloud Analysis

Background

The utilization of Point Cloud data has emerged as a pivotal component in the field of 3D object representation, finding relevance in various domains such as autonomous driving, robotics, drones, and augmented/virtual reality. Within the domain of 3D Point Cloud analysis, fundamental tasks include classification and segmentation. Numerous models have been developed to address these challenges, with Graph-based methods, such as Dynamic Graph Convolutional Neural Network (DGCNN) [1] and its variations, have achieved state-of-the-art performance. However, the lack of explainability limits their practical applicability [2].
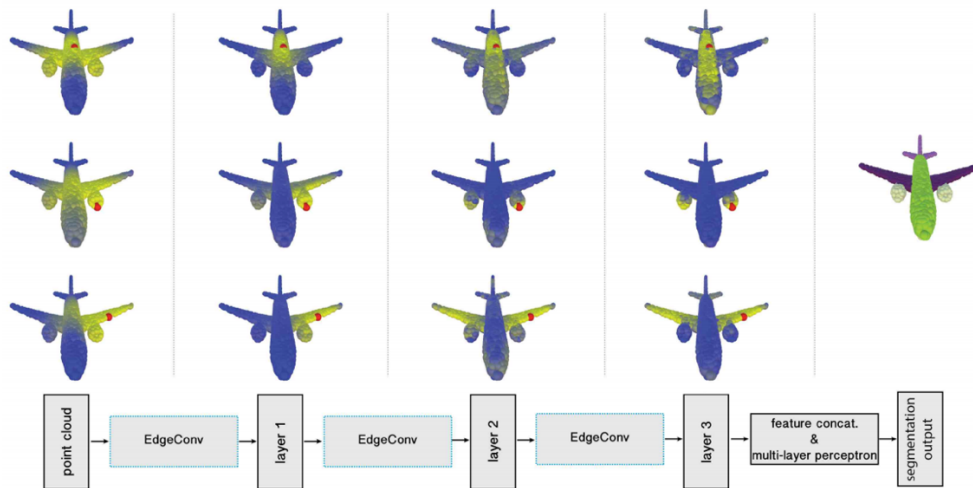

Figure 1: 3D Point Cloud Analysis and Dynamic Graph Convolutional Neural Network [1]

The principal aim of this thesis is to develop a novel method to enhance the explainability of Graph-based models for 3D Point Cloud Analysis. By undertaking this thesis, you will not only contribute to bridging the gap between cutting-edge 3D Point Cloud analysis techniques and Graph-based models, but also develop a deep understanding of how to use explainable AI to improve the trustworthiness and interpretability of Deep Neural Networks in real-world applications.

Prerequisites

- Good programming skills in Python.
- Excellent communication and academic writing skills in English.
- Knowledge in Machine Learning, Deep Learning and Artificial Intelligence.
- Experience with Graph Neural Networks and Explainable AI is a plus.

Please send your questions and application (with a transcript of records and a CV) to:
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[1] DGCNN
[2] Point Cloud Saliency Maps