



# 3D DEEP LEARNING

## Context

Deep Learning has made huge steps over the last years and is successfully applied in different application domains. Computer vision is probably the domain with the most successful deep learning applications so far. The state-of-the-art is still progressing at a high-pace.

## Assignment

In this internship we explore the state-of-the-art in deep learning for 3D image data. Machine learning techniques for this type of data have great potential as our world is inherently three-dimensional and even four-dimensional when considering the temporal domain.

3D data can be represented in different formats such as multi-view RGB(D) images, volumetric, polygonal mesh, point cloud or primitive-based CAD models. As a special case, we also want to look into so-called 2.5D data (also called “2D+Z”). A related question is also how one effectively analyzes 4D data (3D plus time dimension). The extra dimension introduces large computational and memory overhead that quickly is a bottleneck for applying deep learning successfully to these type of data.

## Internship overview

- Master Student
- Graduation Assignment
- Mathware
- Location: Eindhoven

## Technologies

- Deep Learning
- 3D data
- Computer Vision
- Segmentation
- Object detection
- Python
- Tensorflow



Specific tasks for 3D Deep Learning that we are interested in are classification, object detection and semantic segmentation. Recent literature suggests various deep learning based approaches: volumetric CNNs, multi-view CNNs, spectral CNNs, feature-based DNNs, point cloud DNNs

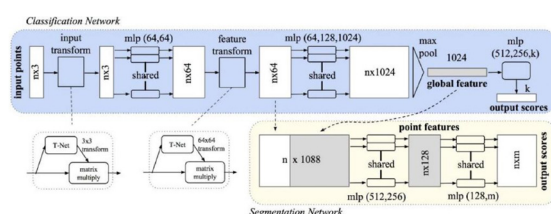
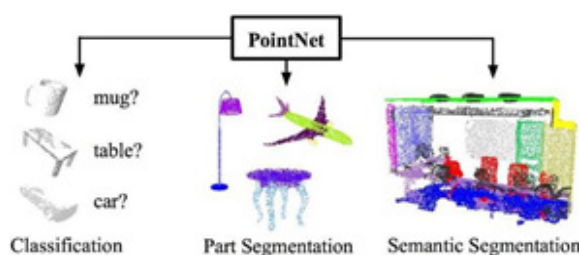
## Goals

After having familiarized yourself with deep learning, your goals for this internship are:

- Explore and understand the state-of-the-art models for 3D Deep Learning.
- Study the pros and cons of suggested approaches on a number of aspects.
- Apply state-of-the-art models to datasets (training and testing).
- Potentially: develop a new model or improve an existing model.

There are several open datasets at your disposal that you can work on. Technology-stack to be used:

Python, Jupyter Notebook, TensorFlow, Keras and PyTorch.



## Why choose Sioux?

- Working on innovative technology
- Challenging, dynamic and varied work
- A comfortable and personal work environment
- Plenty of opportunities for personal development
- Great career opportunities
- Contributing to a safe, healthy and sustainable society

## Get in touch!

Would you like to know more about this student assignment?

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