

Thesis / Project

« Feature Engineering for Sensor Based Location Awareness using Decision Trees »

Background

Machine learning (ML) techniques can be used to imitate basic cognitive skills of animals. An example is the sense of location awareness. It enables all higher animals to remember a discrete number of locations, to recognize where it is, and to remember how to get from one location to another. The ability to recognize its own location in a set of known locations can be replicated using ML, e.g., with artificial neural networks, in a sensor module with multiple sensors. This can be used for transport boxes with integrated battery-powered sensor modules that are repeatedly transported through a factory along almost the same paths. Three student theses have already shown that this is possible with decision trees or feed-forward artificial neural networks.

A constantly growing dataset is being maintained by the institute. These include sensor data (e.g., accelerometer, gyroscope, magnetometer, temperature, pressure, etc.) collected at each location, while travelling along three paths in the TUHH premises.

Goals of the project

The goal of the proposed student project is to research, implement and evaluate how the data could be processed and engineered into features to be fed into Decision Trees.

These include visualization of raw data, identifying trends/event/anomalies and thereby formulating ways to process data accordingly, handling mixed sampling rates of different sensor data, feature construction and optimum feature selection. A good command in Python is expected by the student.

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