

Enterprise Platform and Integration Concepts: Research Group of Prof. Dr. Hasso Plattner

Orchestrating IoT Agents in Automotive Production via Deep Learning

Motivation

Deep Learning (DL) is the area of Machine Learning (ML) that applies artificial Neural Networks (NNs) to a broad family of tasks in different domains. The Internet of Things (IoT) in its essence is the inter-networking of physical entities (agents), each being a combination of sensors, intelligence and actuators. DL can be seen as a facilitator for IoT from multiple point of views, including both the injection of NNs into the agents and the use of NNs for orchestrating the cooperation and collaboration of the agents.

This project will look into the orchestration of things in car production processes. Sensors in production gather data. Actuators react intelligently in order to reach the production goals. Robots are agents that consists of sensors, actuators and intelligence. The more robots collaborate, the more sensors and actuators need to be taken into account. Production parameters like material thickness, densities and dimensions also play a role. Also, it is required that an intelligent orchestration works properly in all production states - i.e., smoothly, material delayed, on hold, et cetera.



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Goal

The goal of this project is to apply DL to orchestrating the cooperation and collaboration of IoT agents in automotive production processes. Deliverables are

- a software architecture that makes explicit how to apply DL to orchestration in IoT,
- an experimental setting or test scenario that is the practical motivator, and
- a running prototype implementation that is as expressive as possible, including trained Neural Network models and their respective execution environments.

During the project we will work on a realistic scenario with various data sources provided by the industry partner. We will develop and implement an application that allows to optimize the orchestration of agents based on information extracted from a large set of recorded events. Working on that objective includes collaborating with our industry partner and exploring state-of-the-art technology within the area of data management, data streaming, and machine learning – including SAP.

Setting

The project will be a joint effort of HPI and Porsche AG/MHP, represented by Porsche Digital Lab Berlin (PDLB). We expect a close collaboration. Both parties intent to visit each other regularly. The project members are allowed to work on site at PDLB in order to facilitate proper information exchange in both directions. The team will work on the newest hardware which will be provided by HPI. The project will consist of 4-6 students. The project will start in October.

Skills

We require that the team members have a huge motivation to

- work as a team,
- learn the current state of the art on both fields, that is DL and IoT, and
- generate and propagate knowledge relevant to the project and its adjacent fields.

Prior experiences in data analytics, machine learning or web front-end development are beneficial. A keen interest in expanding each one's background of the automotive sector is obligatory.

Contact

For questions and details visit us in the Villa, 2nd floor on Campus II or write us an email.

Christopher Schmidt (christopher.schmidt@hpi.de)

Guenter Hesse (guenter.hesse@hpi.de)

Dr. Matthias Uflacker (matthias.uflacker@hpi.de)