

Proposed topic for Master's thesis

Towards a Standardized Description Framework for AI Models and Training Data in Urban Digital Twins



Detected bicycle racks in Munich using Deep Learning (source: Erbe et al. 2022)

Urban Digital Twins (UDTs) are rapidly emerging as integral tools for urban planning, management, and decision-making processes. Cities are increasingly using AI models to support the data update processes for the numerous geospatial data that comprise UDTs. For example, the state capital Munich utilizes an AI-based approach developed in a master's thesis supervised jointly with TUM to detect citywide installed bicycle stands. Training such AI models is highly resource-intensive, thus facilitating the exchange of trained models and training data between cities makes sense to distribute the effort across multiple cities. To assess whether a model trained in city X with its data foundation is applicable in city Y, both the models and the training

data should be described in a standardized manner.

The aim of this thesis is to develop a framework for describing AI models and training data in the context of UDTs. Components of this framework include, for example, a metadata schema that describes the models and training data in an appropriate way, as well as a catalog system serving as a metadata catalog and exchange platform for models and training data. The framework should meet the requirements of cities establishing UDTs. Through collaboration in the joint project Connected Urban Twins, a requirements analysis will be conducted with the cities of Munich, Hamburg, and Leipzig. Existing open standards like the Training Data Markup Language for Artificial Intelligence. Existing open standards such as the OGC Training Data Markup Language for Artificial Intelligence, as well as existing metadata catalogs for UDTs, will be examined for their usability and potentially utilized for a prototype implementation.

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