AI-based network operation center space optimization

DT Technik leverages a data-driven approach for efficient utilization of its facilities

> **"The cooperation with T-Systems regarding the integration and usage of different approaches including ML technology as well as rule-based algorithms advanced the project to the next level."**

Leonhard Jugenheimer, Squad Lead at DT Technik

Deutsche Telekom Technik (DT Technik) is responsible for the planning, construction, and operation of critical technical infrastructure facilities and systems, and technology rollout within Germany for Telekom Deutschland GmbH. In 2022, DT Technik approached T-Systems to create a solution that would enable them to effectively utilize space in their network operation centers (NOCs).

A key priority was to automate the interpretation of the NOC layouts that were available as graphical data in Microsoft Visio and thereby reduce manual research time.

At a glance

- The NOC plans data was only available in a graphical format (MS Visio) and interpreting these plans manually was a time-consuming and error-prone task.
- T-Systems leveraged an algorithms-based approach to automate the interpretation of the NOC plans.
- Technologies used: Kubernetes, Python, VS Code, Label Studio, FiftyOne, PyTorch, Aspose, Kotlin, Java, MS Visio, C#, REST API, PostgreSQL.
- Outcomes: standardized data management, process automation, optimized space utilization, elimination of manual activities, end-to-end digitalization of the process.

T **· · Systems**

Let's power
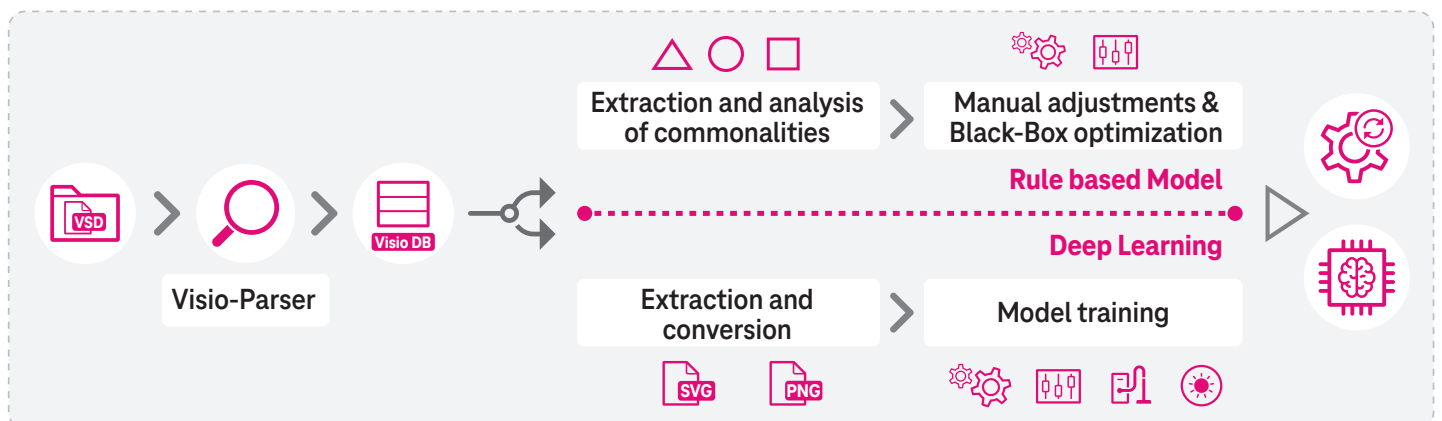higher performance
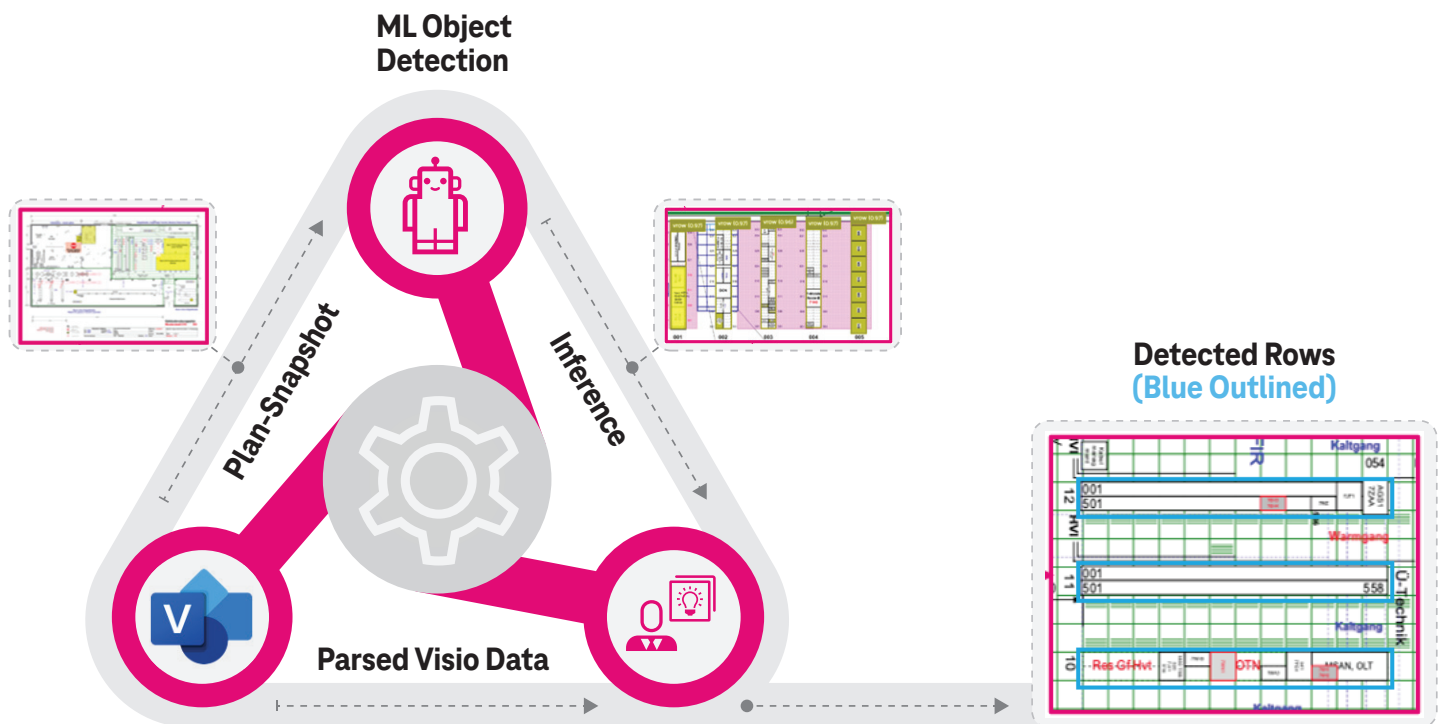
Reference in detail

The challenge

Network operation centers are very crucial for business organizations that require high availability at all times. Employees managing NOCs need to monitor one or multiple networks for any conditions that may require special attention to ensure uninterrupted services. In this instance, the customer was struggling to optimize their NOC spaces because the plans were originally in manually prepared MS Visio drawings. DT Technik employees would consult these drawings for manual research activities, for example, to plan for racks and optimize the available space. This was a very time-consuming task, and it also made computer-aided optimization processes impossible. The customer needed a solution that would help recognize the objects in the Visio drawings and relate the objects to the texts in the drawings.

The solution

T-Systems have been pioneers in the data space technology for over five years now. With their deep knowhow in the AI/ML space, they developed a Machine Learning-powered microservice called "Data Transformator", which combines domain expert-driven rules with computer vision deep learning within an ensemble model. This model, called "deep object detection model", enabled automation of Visio object recognition and interpretation of Visio drawings. The Visio files were parsed and analyzed for domain objects. The detected domain objects were served via dedicated REST API and front-end application. Then, the results were saved in a relational database (PostgreSQL).

The implementation of automation scenarios for the specialist pages was made possible through automated assignment of operating points. The detection system was thoroughly monitored and tested against the label data validated by domain experts to ensure quality.

ML Object Detection

Plan-Snapshot

Inference

Parsed Visio Data

Detected Rows (Blue Outlined)

Visio-Parser

Extraction and analysis of commonalities

Manual adjustments & Black-Box optimization

Rule based Model

Deep Learning

Extraction and conversion

Model training

Customer benefits

With the AI-based automation solution provided by T-Systems, the customer was able to save manual efforts and time and focus on their core tasks. The solution also helped them achieve process and system optimization, resulting in reduced operational costs. Data forms the backbone of any AI-based initiative. The solution provided by T-Systems helped the customer to achieve effective data management and cleansing, which, in turn, provided a valuable data feed for a holistic digital twin of network center. The customer's future migration needs are also addressed with this solution as T-Systems, with its forward thinking approach, has established a future-proof platform architecture comprising a modular structure.