

AI4Steel

Enhancing Production and Logistics Efficiency in the Steel Industry Through Human-AI Collaboration



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MOTIVATION & GOALS

The **steel industry** is undergoing increasing complexity, necessitating the integration of **advanced AI methods** to **enhance operational efficiency** and support **informed, data-driven decision-making**. The goal of the AI4Steel project is to **optimize production and logistics processes** by leveraging **human-AI collaboration frameworks**. Through the intelligent transformation of high-dimensional and heterogeneous data into actionable insights, the project aims to facilitate more **adaptive, data-driven workflows** across the steel value chain. The initiative specifically targets two critical business units: **BU BAND**, responsible for coil production, and **BU BRAMME**, focused on slab production.

Project FactBox

Project Name AI4Steel
Project ID MFP A.1
Duration 48 Months

Area 3
Area Analytics

Project Lead
DI Dr. Belgin Mutlu

APPROACH

BU BAND: To simplify interaction with complex industrial data, the project combines **Generative AI**, an **agent-based system**, and a domain-specific **knowledge graph**. This enables natural language querying, with the agent dynamically assuming roles such as data analyst, SQL query builder, and debugger to support seamless data access and analysis.

BU BRAMME: We combine **ML/DL techniques** with domain-specific steelmaking expertise to develop **predictive models** tailored for industrial applications. Through **expert-guided preprocessing, feature engineering, and ensemble methods**, we ensure high accuracy and reliability for industrial deployment.

CONTRIBUTION

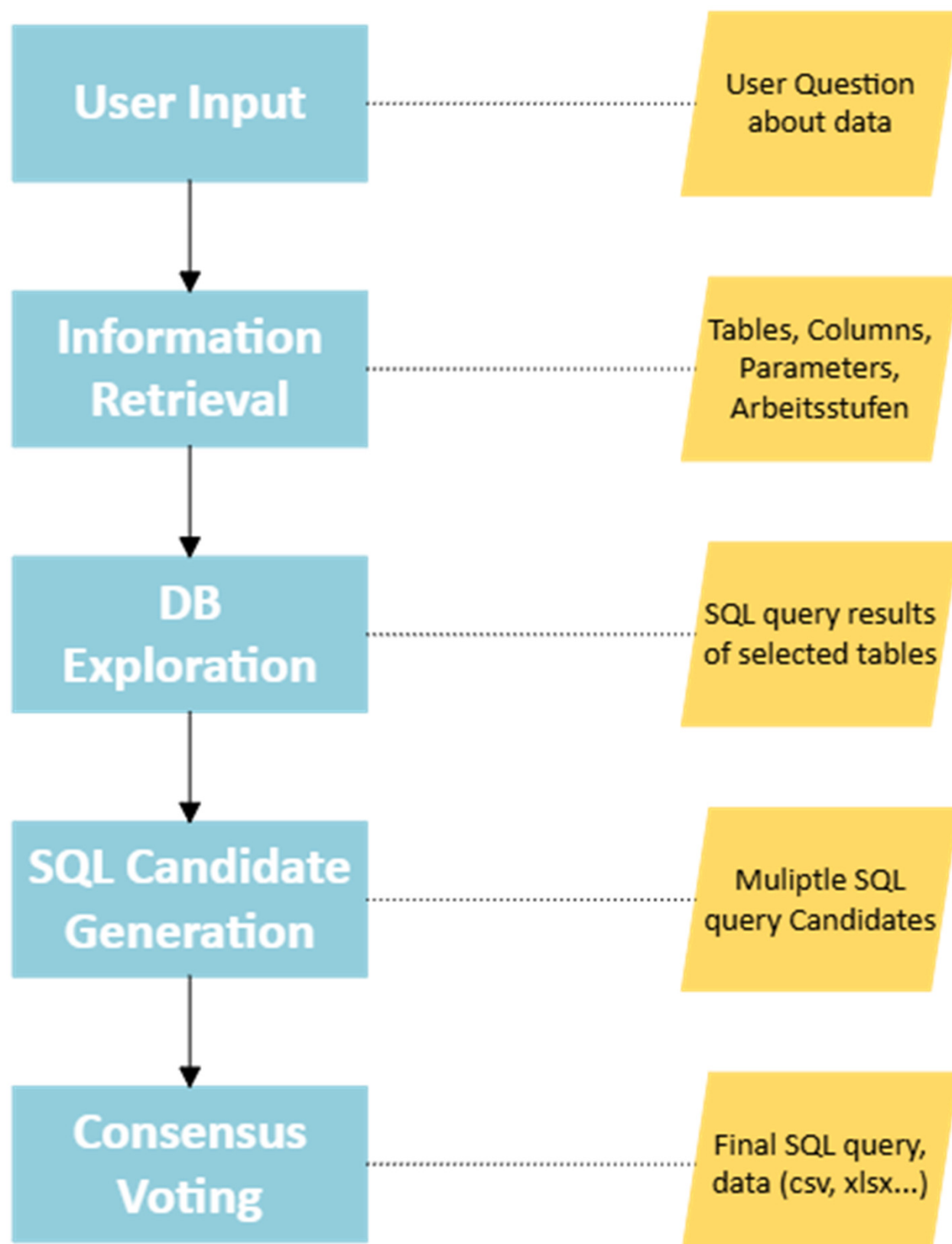
Scientific contribution

- Deployment of advanced AI and machine learning approaches for forecasting, optimization, and automation in complex industrial environments.
- Enabling data-driven decision-making in the steel industry through the integration of cutting-edge AI technologies and interactive visual components.

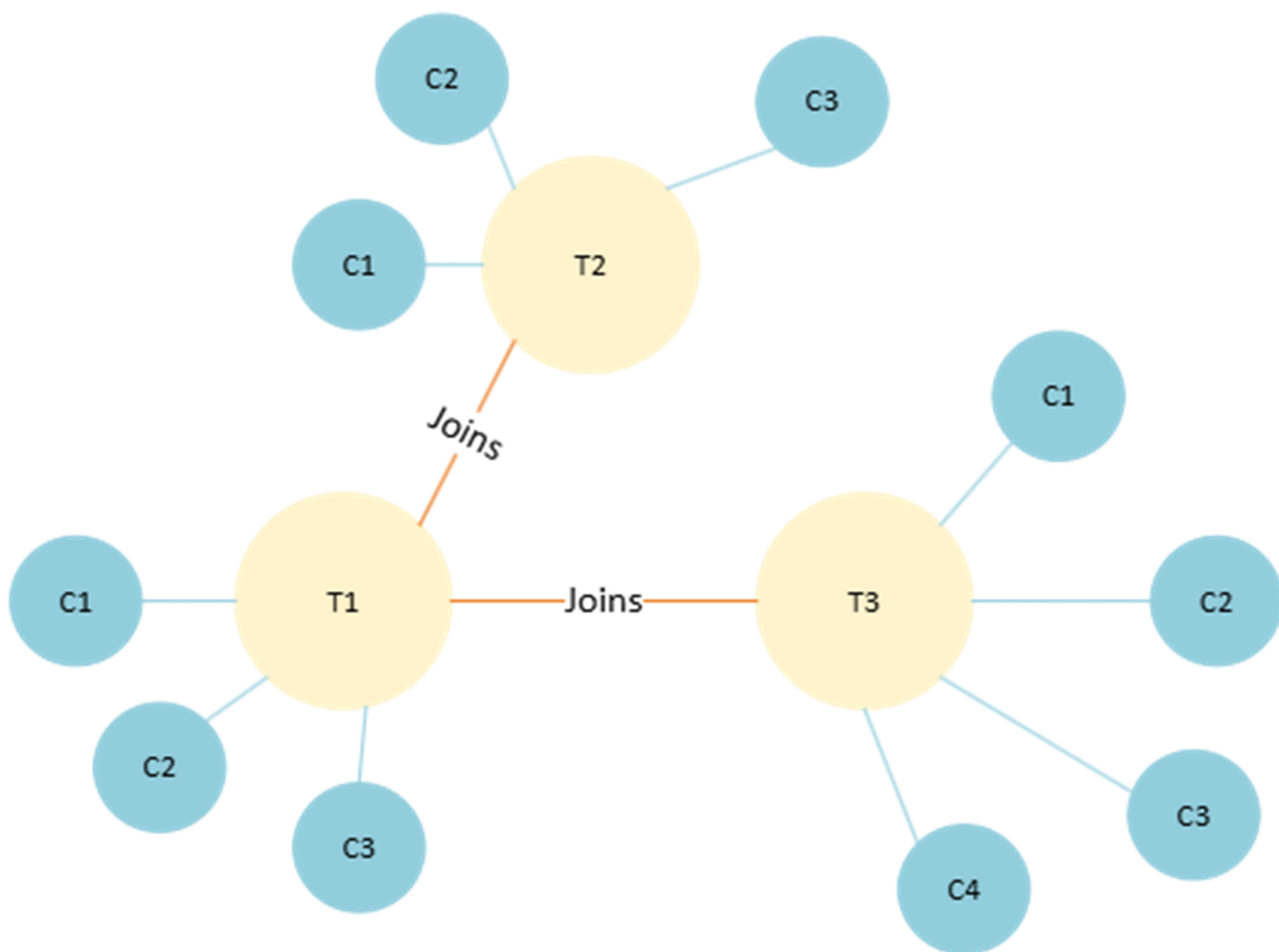
Economic contribution

- AI-driven process optimization reduces errors and enhances production reliability.
- Data-based optimization supports resource-efficient and sustainable manufacturing.
- Interactive AI assistance systems enable faster and more informed decision-making for employees.
- The project generates new insights into AI-supported visual process optimization and data-driven production control.

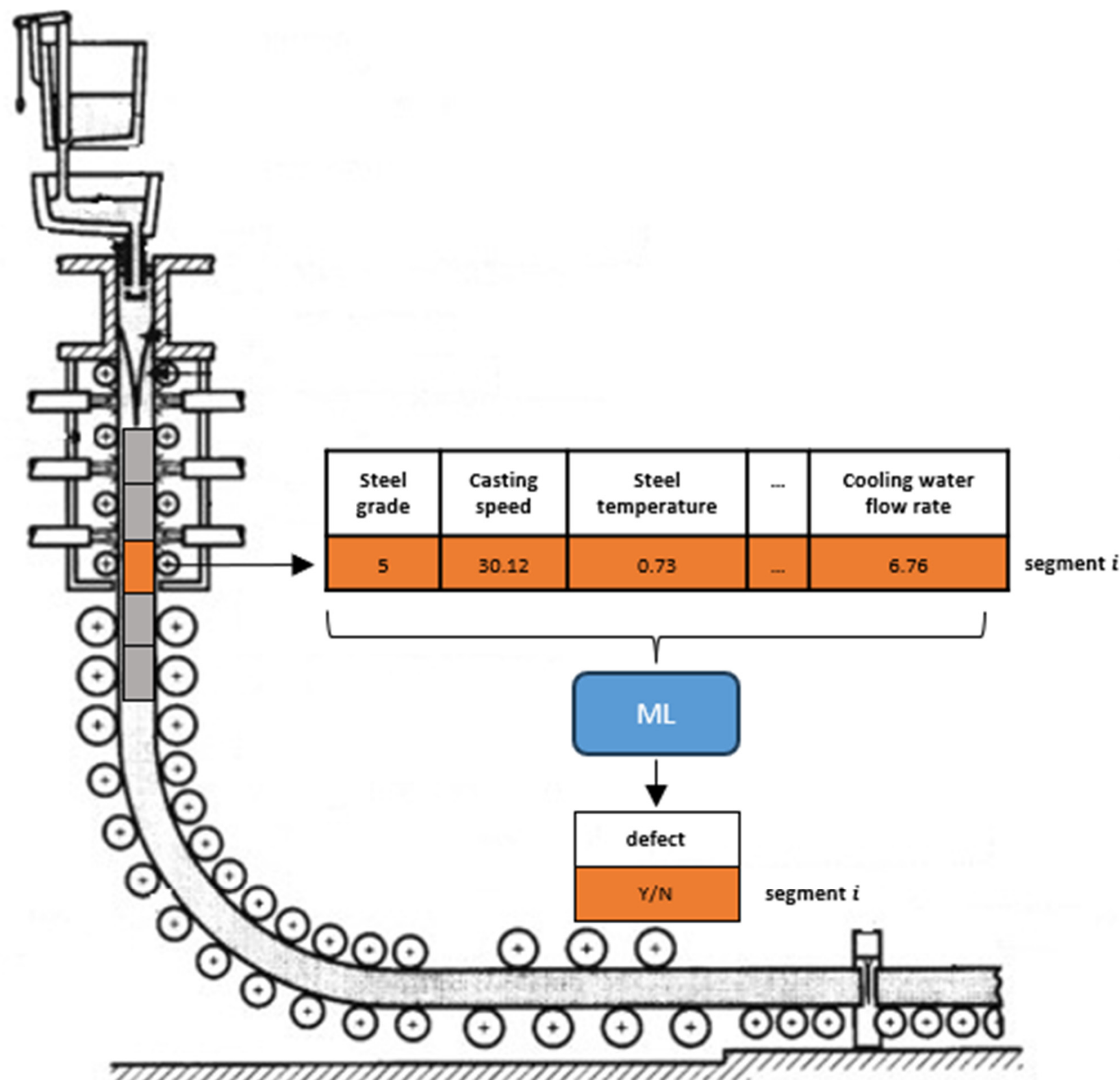
FRAMEWORK



Framework for SQL generation



Knowledge Graph Representation of Database Schema



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ONE STEP AHEAD.

