INVENSITY Halbzeitpräsentation

INVENSITY HZP Summary

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Kapitel 1

Machine Learning Data Acquisition Process

Acquiring high quality datasets for Machine Learning processes can be broken down into a five-step process.

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At the beginning of most ML projects stands the data acquisition process. Quality and quantity of the acquired data is one of the most important factors for the later quality of the trained AI model.The acquisition process itself can be summarized into five steps, which are applicable to various data-centric processes. As ML is famously data-centric, this generalized process can be used for most if not all data acquisitions in ML processes.

1. Define ML-Model Output
2. Determine Influence Factors
3. Classify Influence Factors
4. Define Data Acquisition
5. Define KPIs

- What do we want to predict?
  - What do we want the model/algorithm to express or estimate
- What influences the predicted values?
  - Which factors influence the final result of the model
- Which are the most important influence factors (IFs)?
  - IFs are not all the same. Determine their level of influence.
- How to deal with influence factors?
  - Can the factors be controlled or even properly measured in the first place?
- How can we test our model's quality?
  - Smart KPIs can test the model's usability in different scenarios.

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Kapitel 2

Interface Documentation

INVENSITY documented the interfaces between the different data sources, AI models, applications and demonstration cars.

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- **To ensure communication and exchange between the involved partners within the AI-enhanced vehicle project, INVENSITY coordinated the interfaces between the different in- and outputs used for the AI-models and their application. An interface overview was created.**
- **This was used to**
  - **Visualize the interfaces between the different data sources, AI models and test vehicles**
  - **Show possible synergies between partners in data acquisition/sensor data**
  - **Ensure System Integration**
- **The interface diagram shows the highly complex inner workings of the different applications and the source data which is used in their development.**
- **As highlighted by the dense network shown in the visualization, the application development is far more complex than a simple data <-> application, 1 to 1 situation.**

INVENSITY documented the interfaces between the different data sources, AI models, applications and demonstration cars.

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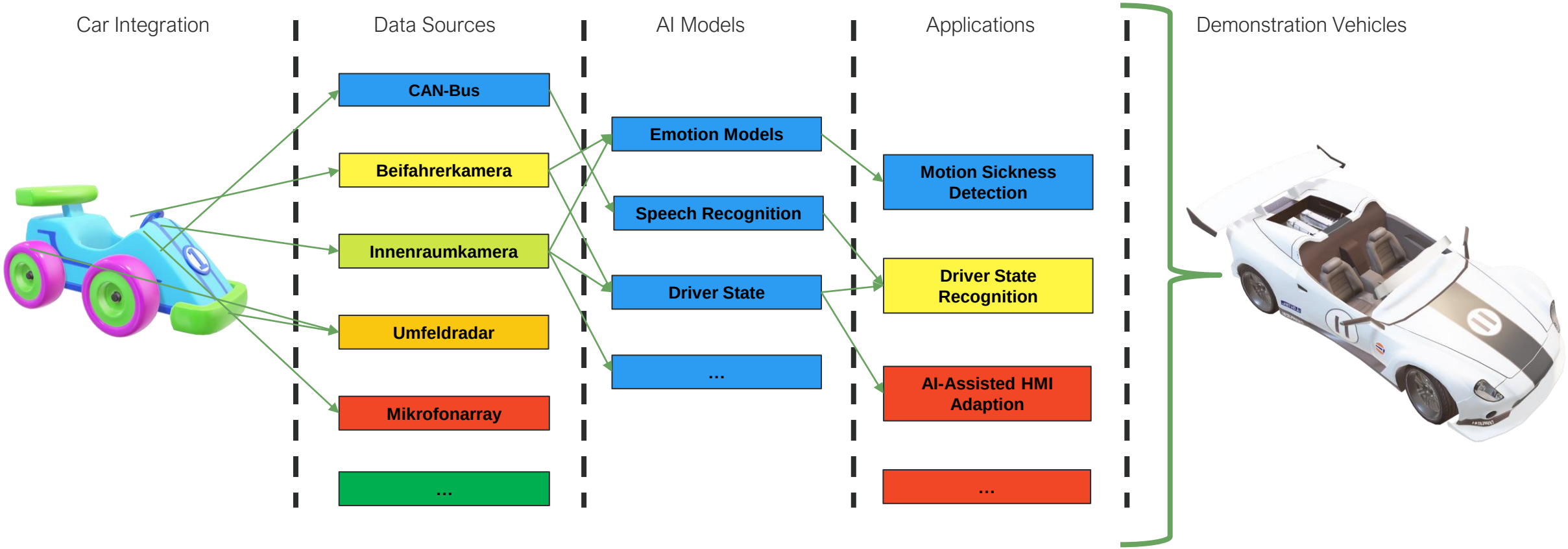

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Kapitel 3

AWS Cloud Infrastructure

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Data Collection

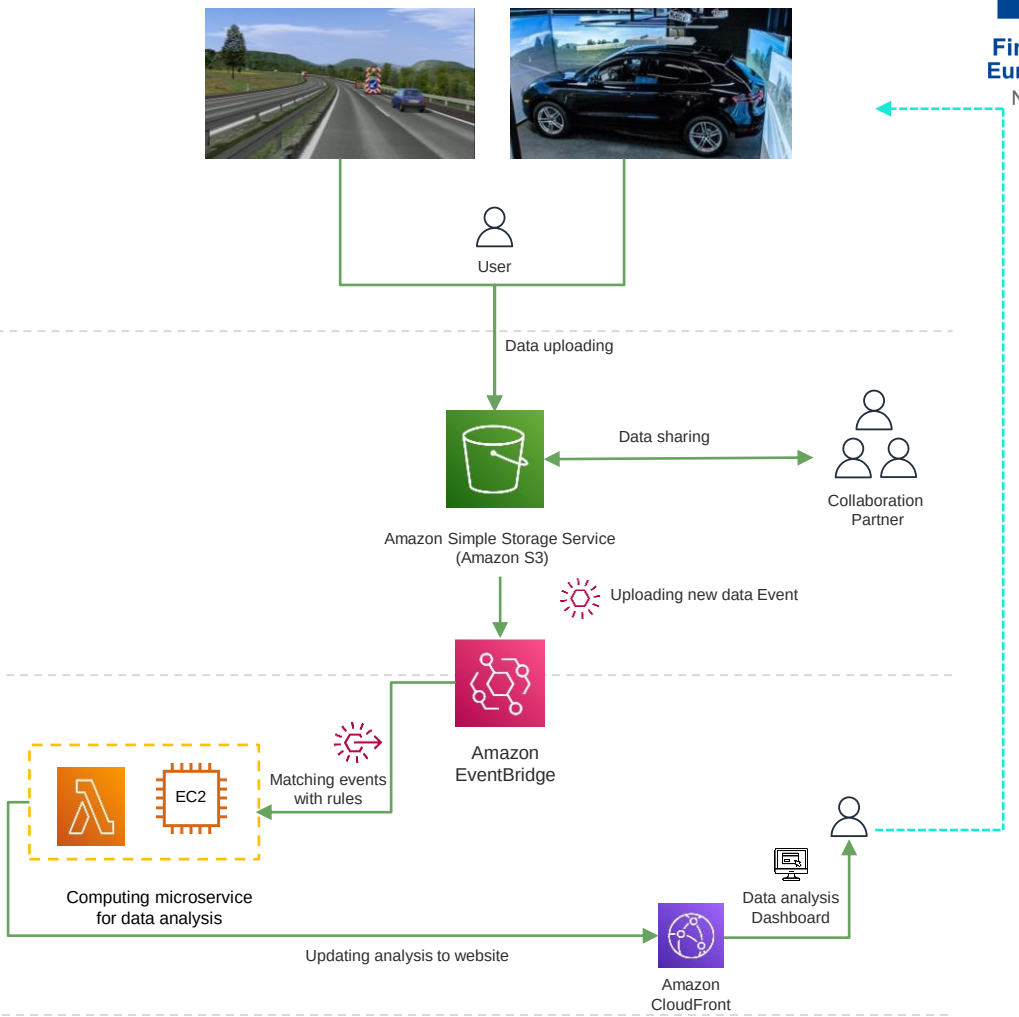
Data collection entails gathering relevant data from diverse sensors.

Cloud-based Data Sharing

After data collection, sharing the data through cloud-based platforms allows for remote access and seamless collaboration among stakeholders regardless of their physical location.

Data Quality Analysis

Data quality analysis involves assessing data accuracy, completeness, consistency, and reliability to identify anomalies, errors, or biases in the data. It encompasses data profiling, and outlier detection.



This system supports RQ I –MONITORING: Actionable data monitoring which allows a controlled data in terms of quality by identifying and correcting errors or inconsistencies in the data acquisition

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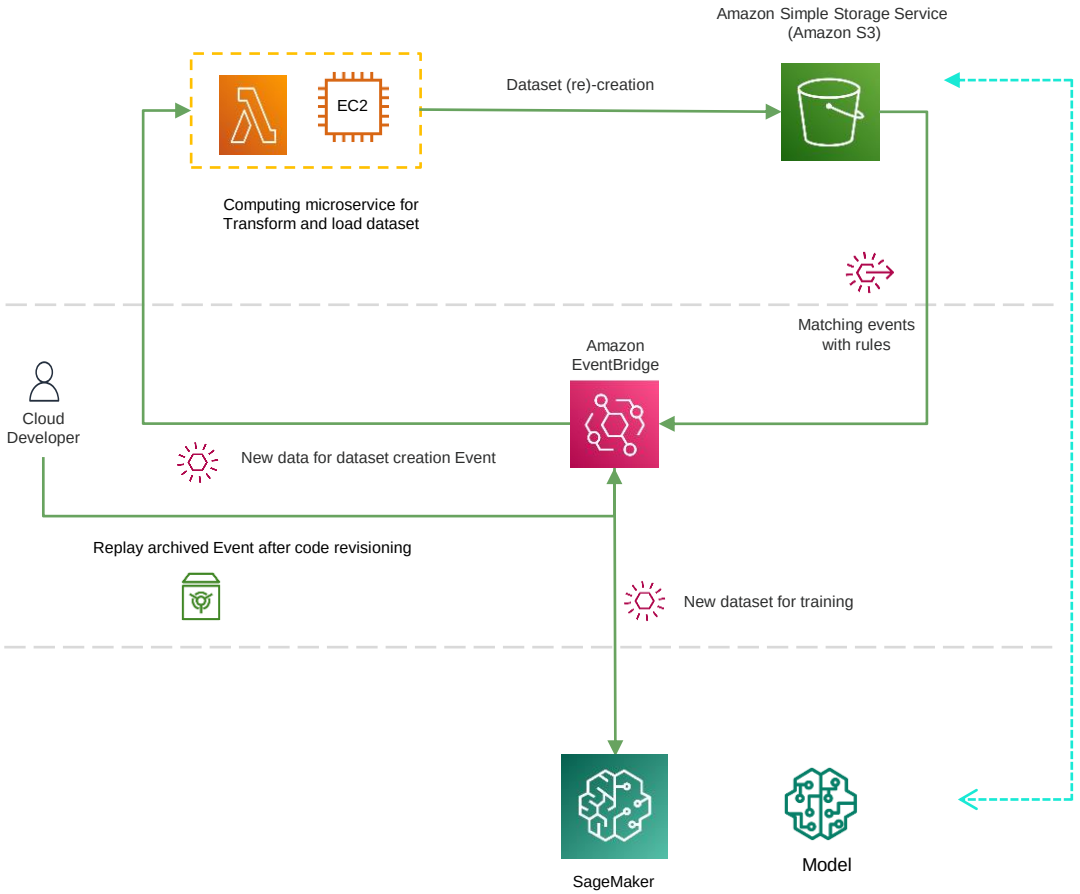
Dataset creation
Continuous dataset creation in the cloud enables data acquisition, integration, and analysis, and up-to-date insights into dataset.

Dataset (re)versioning
It allows for agile updates, both in response to changes in code for dataset creation, as well as accommodating new versions of data resulting from problem revisions, ensuring an adaptable and evolving data pipeline.

Model (re)training with latest model
Continual automatic re-training of the model with newly available datasets enables ongoing learning and improvement, ensuring that the model remains up-to-date and capable of capturing the latest patterns and insights.



This system supports
RQ II –SCALABILITY: it is possible to update the dataset, the transfer algorithm and the AI models continuously, and individually
RQ III –CONSISTANCY: Dataset consistency is assured during continuous creation of the dataset.

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KARLI

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