

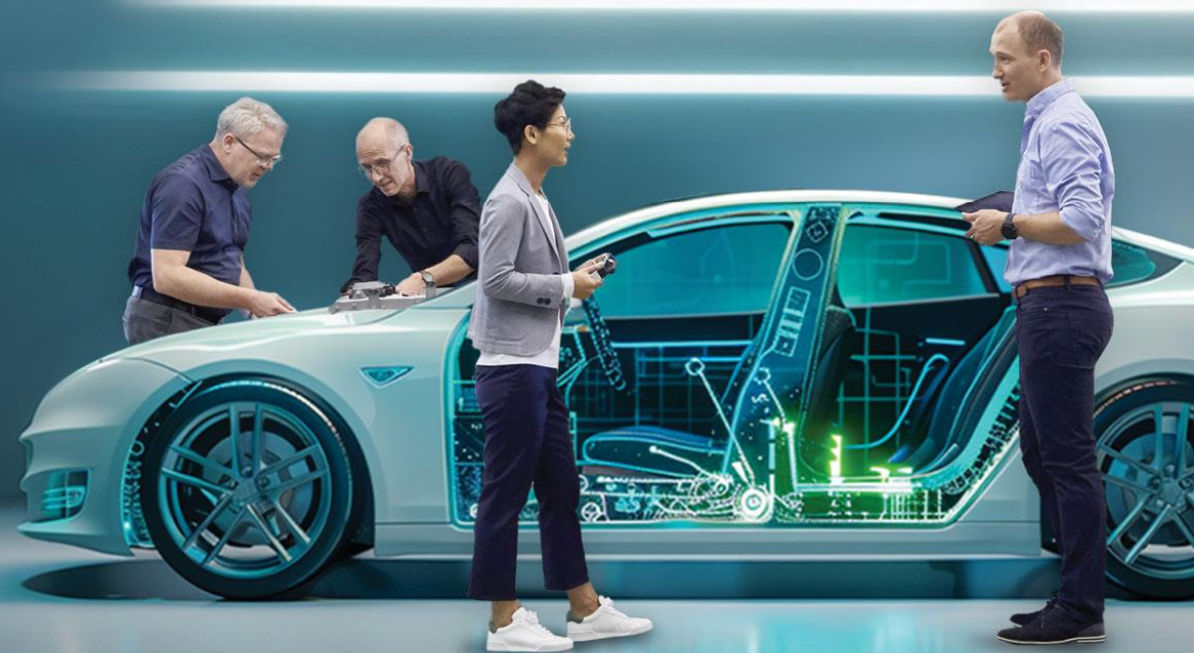
ASAM INTERNATIONAL CONFERENCE

Dec 04 - 05, 2024
Munich, GERMANY
aic.asam.net



"ASAM ODS enabling AI/ML-solutions"

Stefan Romainczyk, Peak Solution GmbH



ASAM ODS enabling AI/ML-solutions

CONTENT

Machine Learning Requirements

ASAM ODS for Data Management

Connect Machine Learning Tools

Conclusion

Machine Learning Requirements

ASAM ODS enabling AI/ML-solutions

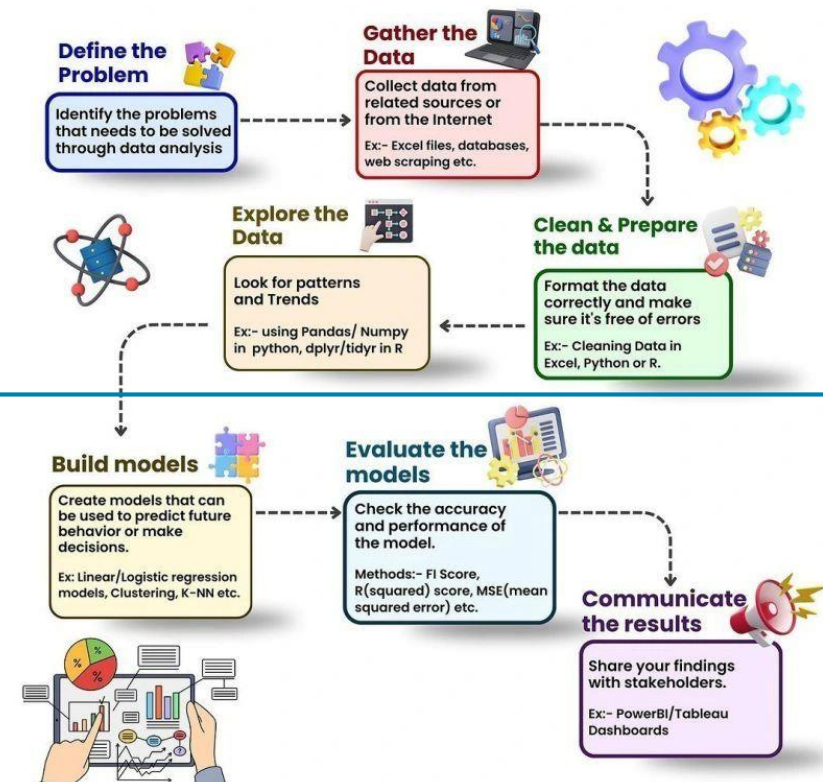
Data Flow in the Machine Learning Process

Machine Learning Requirements



Save for later

Process of Data Analysis



Curated by tutort^{ai}academy

Data Management

- Collect Data from different Data Sources
- Format Data correctly
- Provide Data access

Machine Learning

- Use AI Tools
- Generate AI Models
- Predict Results, Improve Workflows, ...

Personas in the Machine Learning Process

Machine Learning Requirements



Job

- Exploratory Data Analysis (EDA)
- Processing, Cleaning and Verifying the Integrity of data.
- Identify trends in data and make unique predictions.
- Develop an understanding of using Machine Learning Techniques.

Skills

- Understanding of Python or R and Expert in SQL.
- Understanding of Machine Learning Algorithm and Techniques.
- Hands-on Data Visualization tools like Tableau and Power BI.
- Experience in Big data tools like Spark and Hadoop.

Personas in the Machine Learning Process

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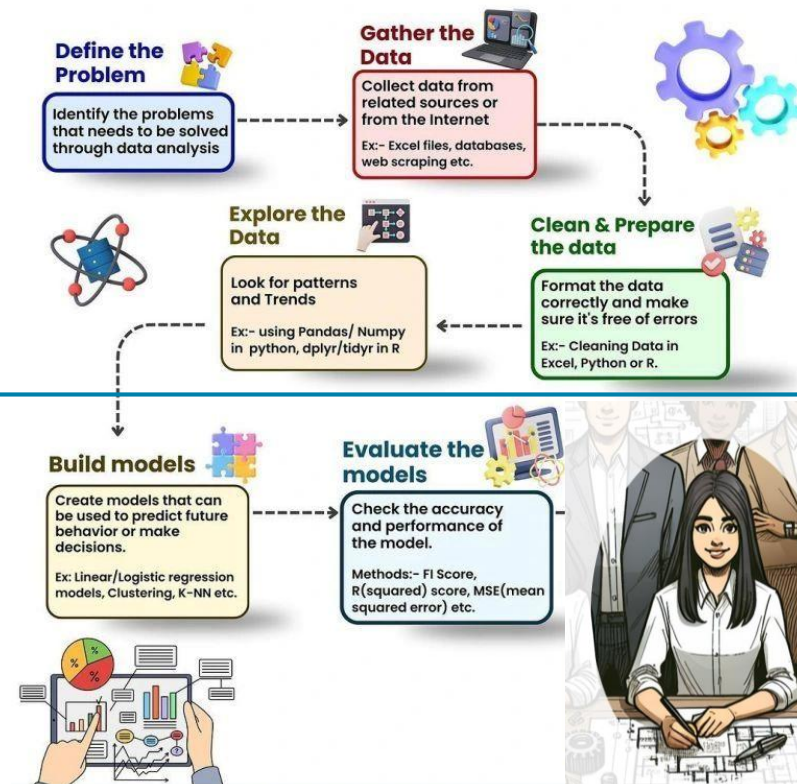
Data Flow and Personas/Tools in the Machine Learning Process

Machine Learning Requirements



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Process of Data Analysis



Curated by tutort^uacademy

Data Management

- Collect Data from different Data Sources
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1

ASAM ODS

Machine Learning Tools

- Python or R and SQL
- Machine Learning Algorithms
- Tableau and Power BI
- Spark and Hadoop

2

TBD

ASAM ODS for Data Management

ASAM ODS enabling AI/ML-solutions

1

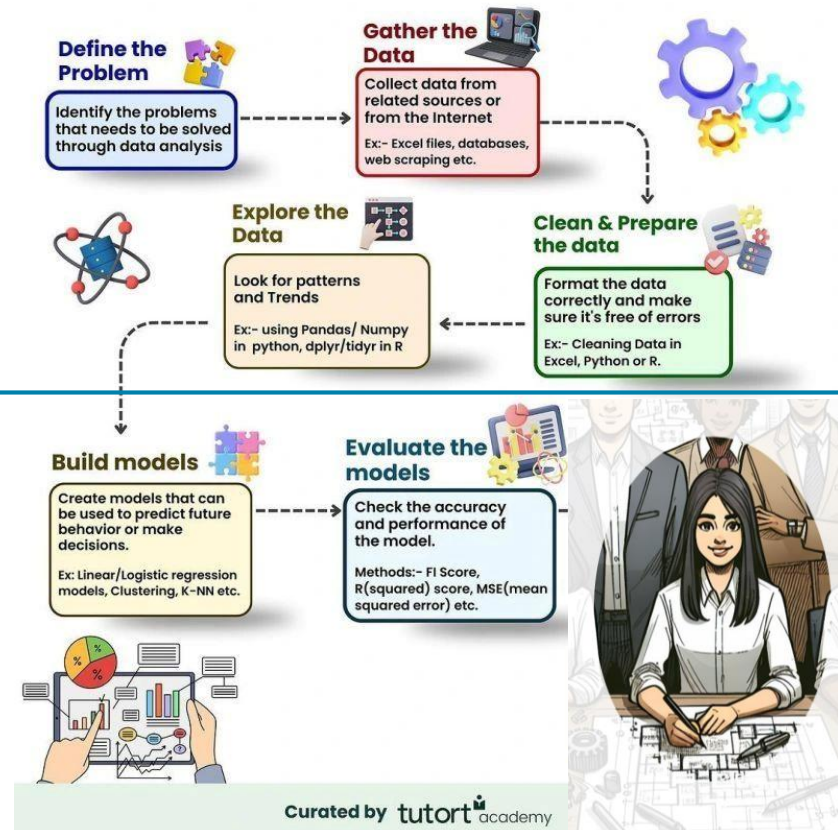
ASAM ODS for Data Management

ASAM ODS for Data Management



Save for later

Process of Data Analysis



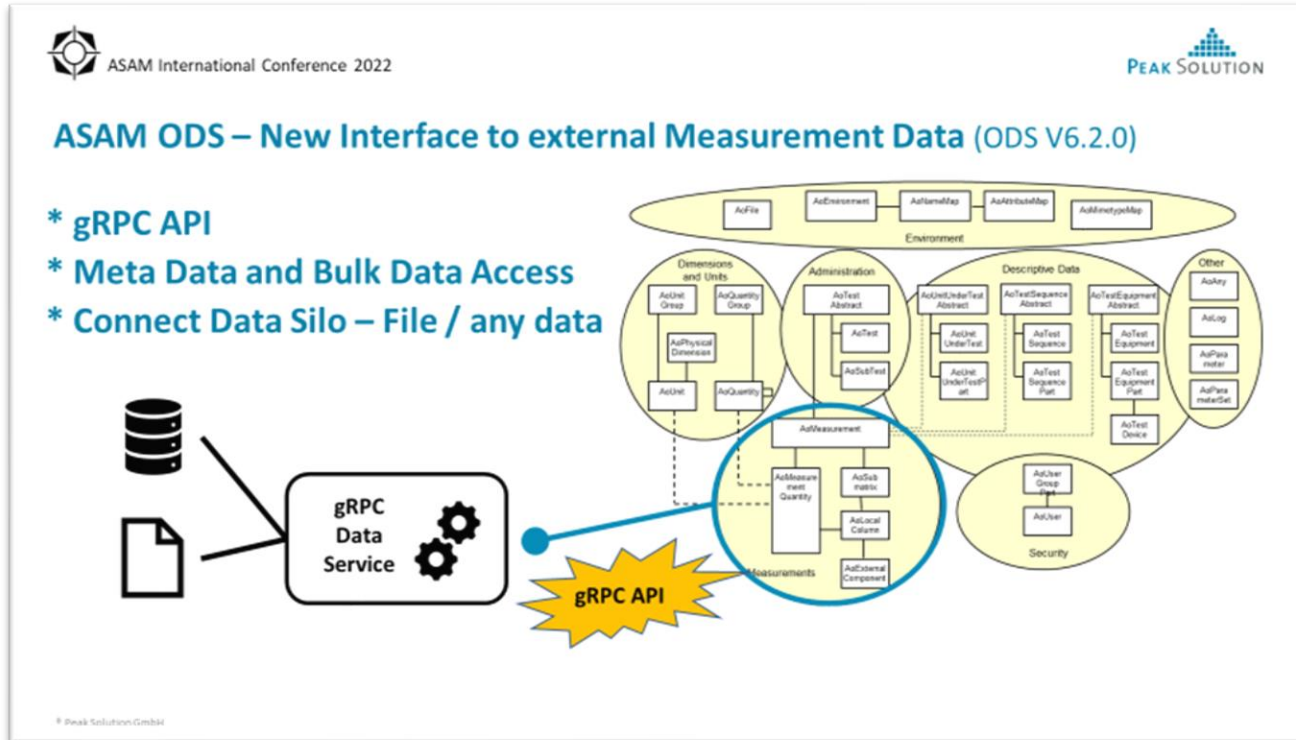
Data Management

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ASAM ODS

○ Collect Data from different Data Sources

ASAM ODS for Data Management



ASAM ODS External Data API

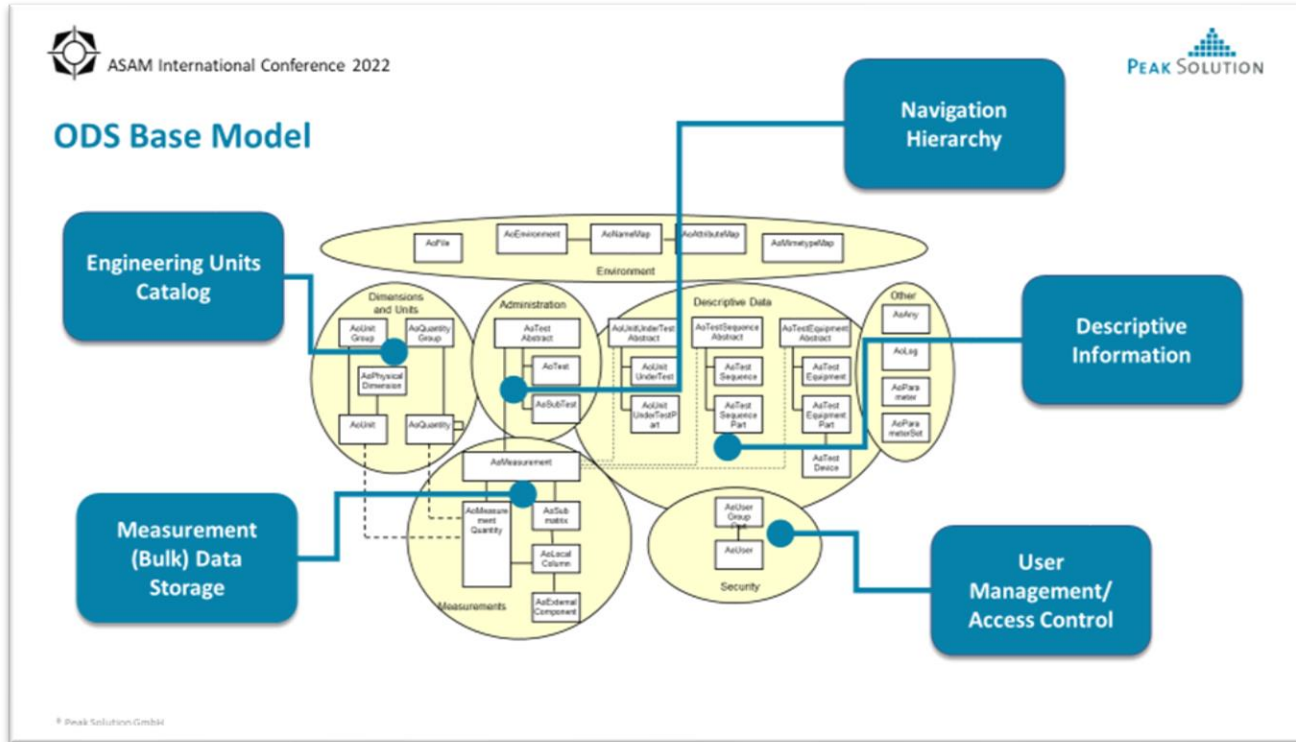
- Access “any” kind of data
- Avoid data conversion and data duplication
- Don’t break existing tool chains
- Support “any” programming language
- Small R&D investment
- Keep or share IP and ownership

2022: “Standardization facilitates the validation and homologation process for autonomous vehicles”

More Information: https://peak-solution.github.io/data_management_learning_path/exd_api/overview.html

○ Format Data correctly

ASAM ODS for Data Management



ASAM ODS Data Management

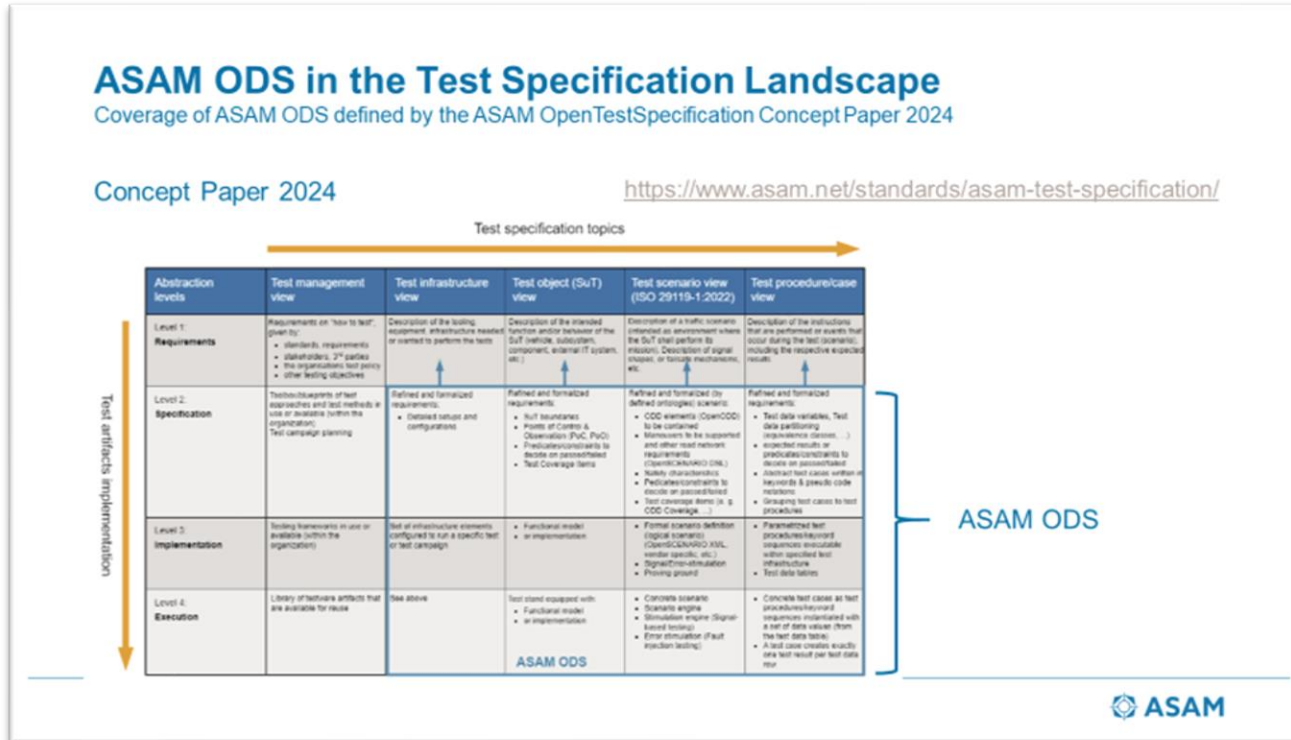
- Base Model for **Semantic**
- Base Entities and Relations define a Measurement Data **Ontology**

➔ ... Ideal for Machine Learning!

2022: “Standardization facilitates the validation and homologation process for autonomous vehicles”

Format Data correctly

ASAM ODS for Data Management



ASAM TestSpecification - Concept Paper 2024

ASAM ODS Data Management

- Pre-defined data models for:
 - BusData
 - Calibration
 - Geometry
 - Instrumentation
 - Measurement Data (openMDM)
 - NVH
 - WorkFlow
- ASAM ODS in the center of ASAM TestSpecification
- Not limited to Test Data Management

More Information: <https://www.asam.net/standards/asam-test-specification/>

○ Provide Data access

ASAM ODS for Data Management

ASAM ODS standard APIs

Corba, Http

and file formats

ATFX, MDF4

are supported by many different companies
and tools.

About ASAM Standards Active Projects Conferences & Events Application Stories **Members**

Member Directory Product Directory Expert Directory

Members > Product Directory

Product Directory

The content of the product directory is entered and maintained by the member companies. ASAM does not take any responsibility for the truthfulness and correctness of the information.

BUT...

Product	Tool or Service	Company	Standards
AMS-ATF Importer/ Konverter →	Tool	Kistler Chemnitz GmbH → Profile	ASAM ODS
ANSA/META suite →	Tool	BETA CAE Systems International AG → Profile	ASAM ODS
ARCOS →	Tool	CAETEC GmbH → Profile	ASAM ODS, ASAM MDF
ASAM ODS Connectivity →	Tool	Hottinger Bruel & Kjaer UK Ltd HBK → Profile	ASAM ODS
ASAM ODS Consulting and Software Engineering →	Service	Karakun AG → Profile	ASAM ODS

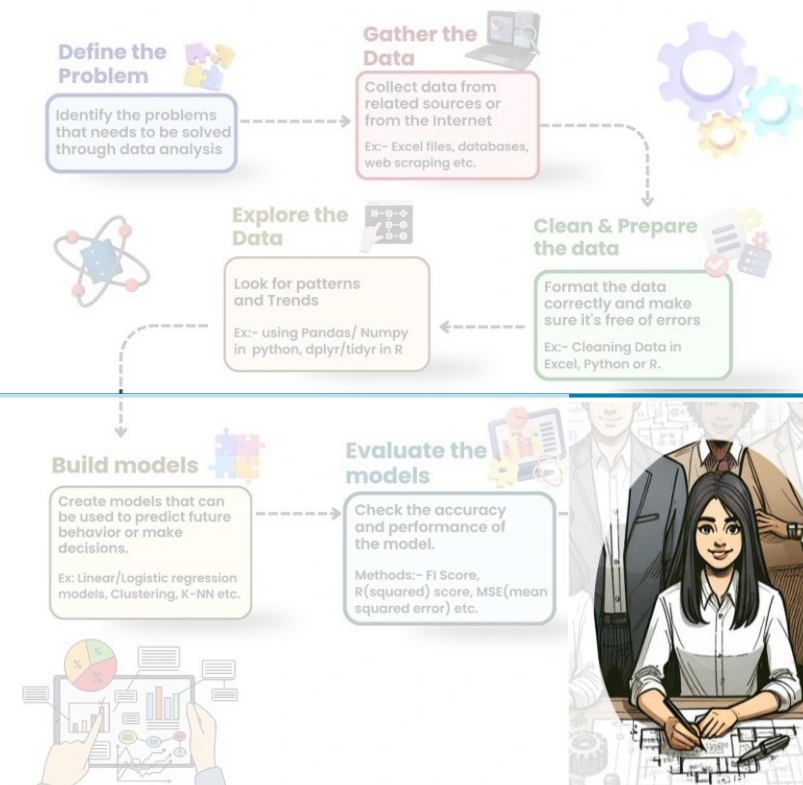
Data Flow and Personas/Tools in the Machine Learning Process

Machine Learning Prerequisites



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Process of Data Analysis



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Data Management

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ASAM ODS

Machine Learning Tools

- Python or R and Expert in SQL
- Machine Learning Algorithms
- Tableau and Power BI
- Spark and Hadoop

2

TBD

Connect Machine Learning Tools

ASAM ODS enabling AI/ML-solutions

2

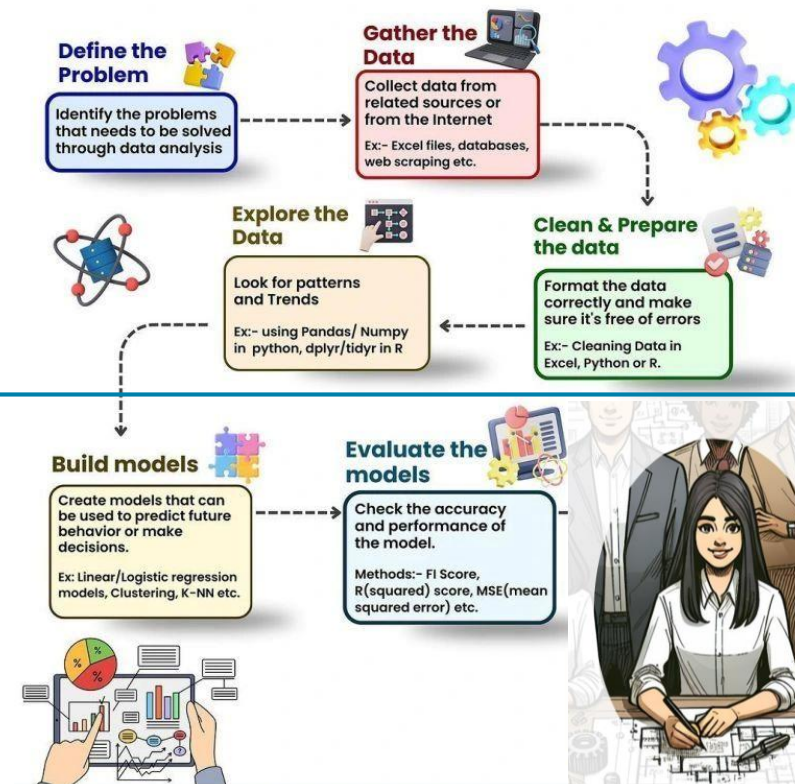
Data Flow and Personas/Tools in the Machine Learning Process

Connect Machine Learning Tools



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Process of Data Analysis



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Machine Learning Tools

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2

TBD

Python for ASAM ODS Data Access

Connect Machine Learning Tools

- **Light-weight**
- **pandas.DataFrames**
- **Simple API**

Python for ASAM ODS Data Access

Connect Machine Learning Tools

Welcome to ASAM ODSBox docs's documentation!

ASAM ODSBox

The **ODSBox** is a lightweight Python wrapper on the standardized **ASAM ODS REST API**. Using intuitive **JAQuel** queries and **pandas.DataFrames** the **ODSBox** makes dealing with ASAM ODS data in Python more fun.

```
from odsbox.con_i import ConI

with ConI(url="https://MY_SERVER/api", auth=("sa", "sa")) as con_i:
    measurements = con_i.query_data(
        {
            "AOMeasurement": {"name": {"$like": ""}},
            "Sattributes": {"name": 1, "id": 1},
            "Soptions": {"$rowlimit": 50},
        }
    )
    print(measurements)
```

Documentation

- [ODSBox documentation](#)
- [Work with ASAM ODS server](#)

Communication

The ASAM ODS server is called using HTTP calls defined by the **ASAM ODS standard**. The messages are encode/decoded using ASAM ODS **protobuf** message definitions provided at **ASAM-ODS-Interfaces**. As content type `application/x-asamods+protobuf` is used.

JAQuel Queries

JAQuel allows you to query your data in a simple and intuitive way inspired by **MongoDB Query Language (MQL)**. The definition of query expression as JSON easily integrates with the Python language – a win-win situation.

Installation

ODSBox is available on.

github	https://github.com/peak-solution/odsbox/
PyPI	https://pypi.org/project/odsbox/
github docs	https://peak-solution.github.io/odsbox

ASAM ODSBox

- Access ASAM ODS server using Python
- **Light-weight** wrapper on HTTP/Protobuf
- Provide data as **pandas.DataFrames**
- **Simple Query Language** (mongoDB - like)
- Pip-install
- Open Source

More Information: <https://peak-solution.github.io/odsbox>

Machine Learning Algorithms

Connect Machine Learning Tools



„Classic“ ML for Test Data Management:

- Classification
 - Support Vector Machines (SCM)
 - K-Nearest Neighbors (KNN),
 - Recurrent Neural Network (RNN)
- Outlier Detection
 - Autoencoder
 - Isolation Forest
 - Principal Component Analysis (PCA)



Tableau and Power BI

Connect Machine Learning Tools

ASAM ODS data for Microsoft Power BI Desktop

This notebook provides simple examples accessing ASAM ODS data with [Microsoft Power BI Desktop](#) using the [ASAM ODSBox](#) in combination with Python.

Prerequisites

To work with ASAM ODS data in Microsoft Power BI Desktop you have to install [Python](#) and the [ASAM ODSBox](#) on your local computer.

Look into this article Microsoft article for further requirements how to [Run Python scripts in Power BI Desktop](#).

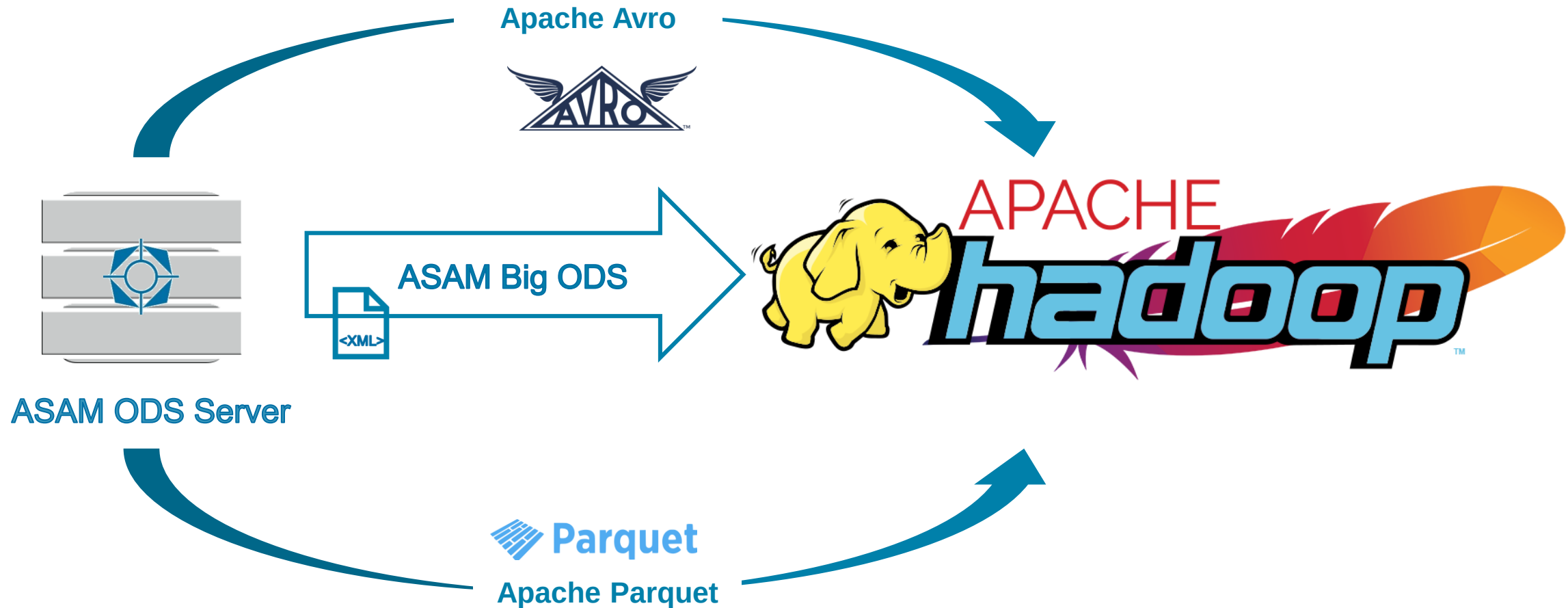
You can then copy these examples directly into Microsoft Power BI and [Run the script and import data](#)

The ODS HTTP API is a session based API. The session ID is called conl in the ODS documentation. The ASAM ODSBox uses con_i as API object representing the session.

Note: Use `con_i` in a `with` clause in your Python project to automatically close the session after importing the data.

Spark and Hadoop

Connect Machine Learning Tools



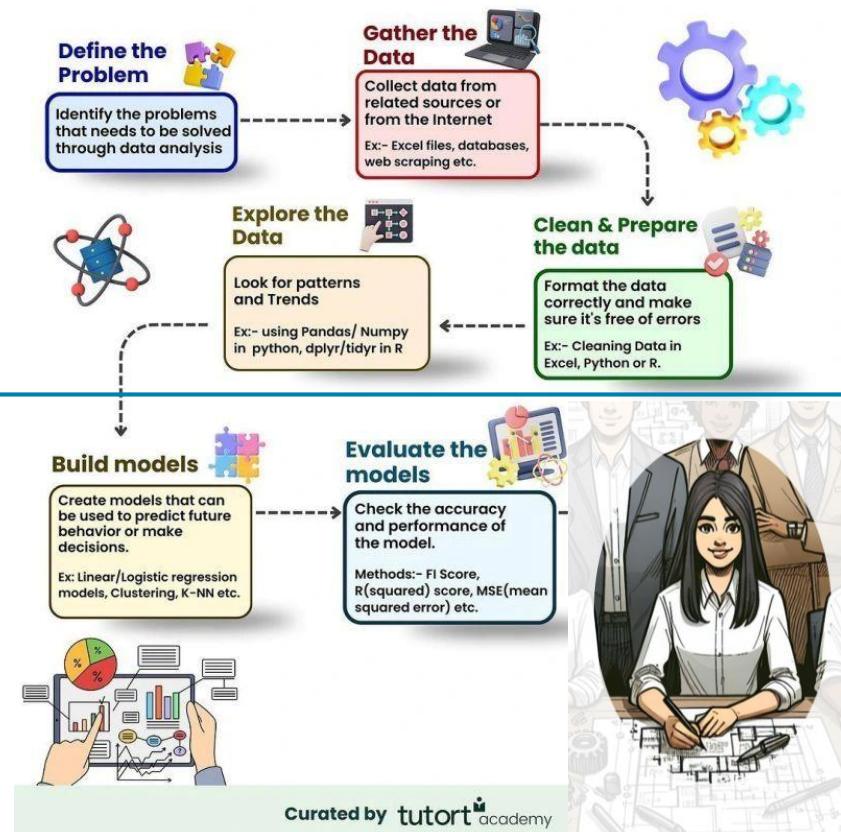
Data Flow and Personas/Tools in the Machine Learning Process

Connect Machine Learning Tools



Save for later

Process of Data Analysis



Machine Learning Tools

- ✓ Python or R and Expert in SQL
- ✓ Machine Learning Algorithms
- ✓ Tableau and Power BI
- ✓ Spark and Hadoop

2

ASAM ODSBox

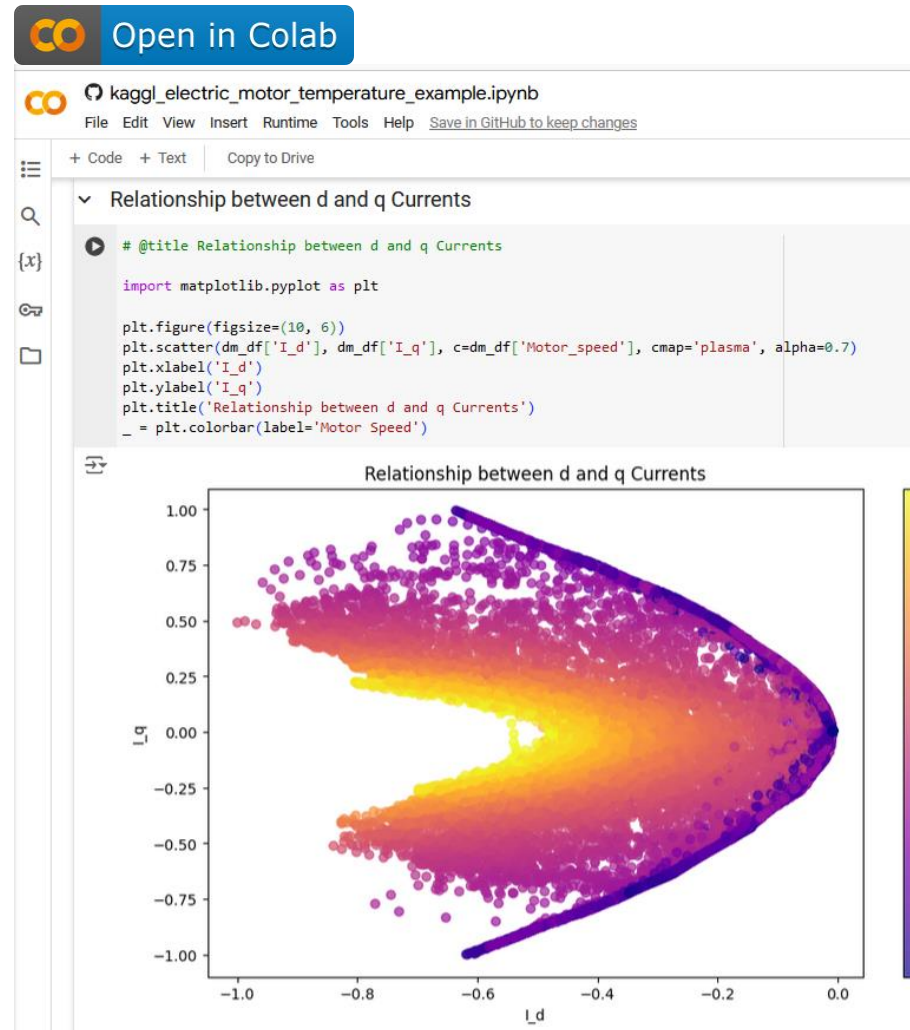
Bonus Material: AI Assistants

ASAM ODS enabling AI/ML-solutions

2+

AI Assistants for Data Exploration and Programming

Connect Machine Learning Tools



Copilot

Neuer Chat

Sie

How do I query an ASAM ODS server using Python?

Copilot

✓ Antworten für Sie werden generiert...

To query an ASAM ODS server using Python, you can use the **ODSBox** library. Here's a basic example to get you started:

1. Install ODSBox:

```
pip install odsbox
```

2. Connect to the ASAM ODS server:

Python

```
from odsbox.con_i import ConI

# Replace 'YOUR_SERVER_URL' with your actual server URL
con_i = ConI(url="YOUR_SERVER_URL/api", auth=("username", "password"))

# Example query to fetch measurement data
measurements = con_i.query_data({
    "AoMeasurement": {
        "name": {"$like": "*"}
```

- Getting started with (programming) ASAM ODS
- Recommendation for plotting data
- Generating code
 - Google Gemini
 - Microsoft Copilot
- Also for non-Data Scientists

Conclusion

ASAM ODS enabling AI/ML-solutions

ASAM ODS enabling AI/ML-solutions

Conclusion

Data Management

- ✓ Collect Data from different Data Sources
- ✓ Format Data correctly
- ✓ Provide Data access

ASAM ODS

Connect Machine Learning Tools

- ✓ Python or R and SQL
- ✓ Machine Learning Algorithms
- ✓ Tableau and Power BI
- ✓ Spark and Hadoop

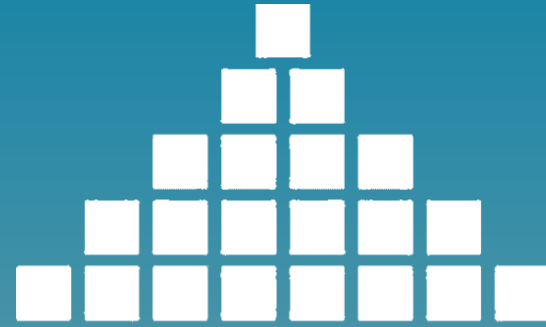
ASAM ODSBox

Conclusion

The **Data Management** technology components of **ASAM ODS** support the general requirements for **Machine Learning**.

In combination with Open Source software such as **ASAM ODSBox**, typical **Machine Learning Tools** can be used by **Data Scientists**.

Furthermore, ASAM ODSBox also bridges the gap to Microsoft **Copilot** or Google **Gemini** or other **AI Assistants** to create solutions faster and more efficient – even for **non-Data Scientists**.



PEAK SOLUTION

Test Processes - Test Data - Digital Identities

www.peak-solution.de

Thank you for your attention!