

The Developer Advocates present

SAP CodeJam

2024



Getting Started with
Machine Learning using SAP HANA



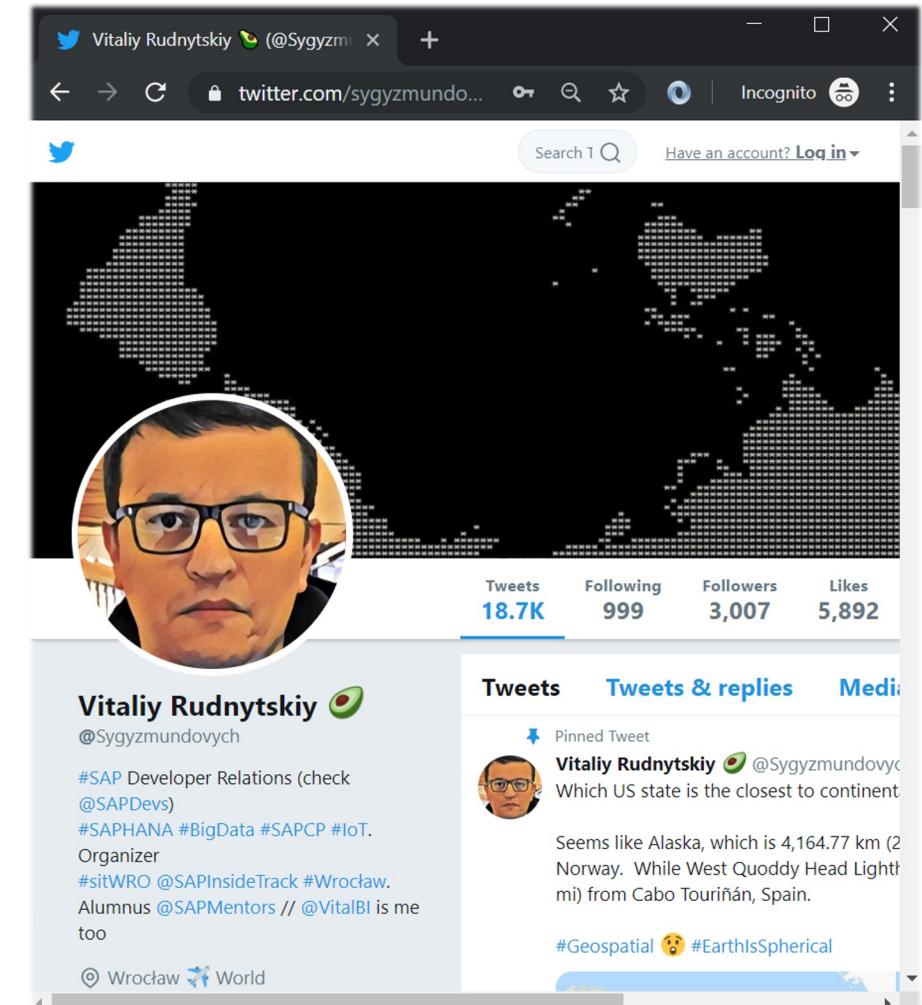
Berlin, Germany 
Jun 28, 2024



Witalij Rudnicki

aka @Sygymundovych
aka Vitaliy Rudnytskiy
aka Віталій Рудницький

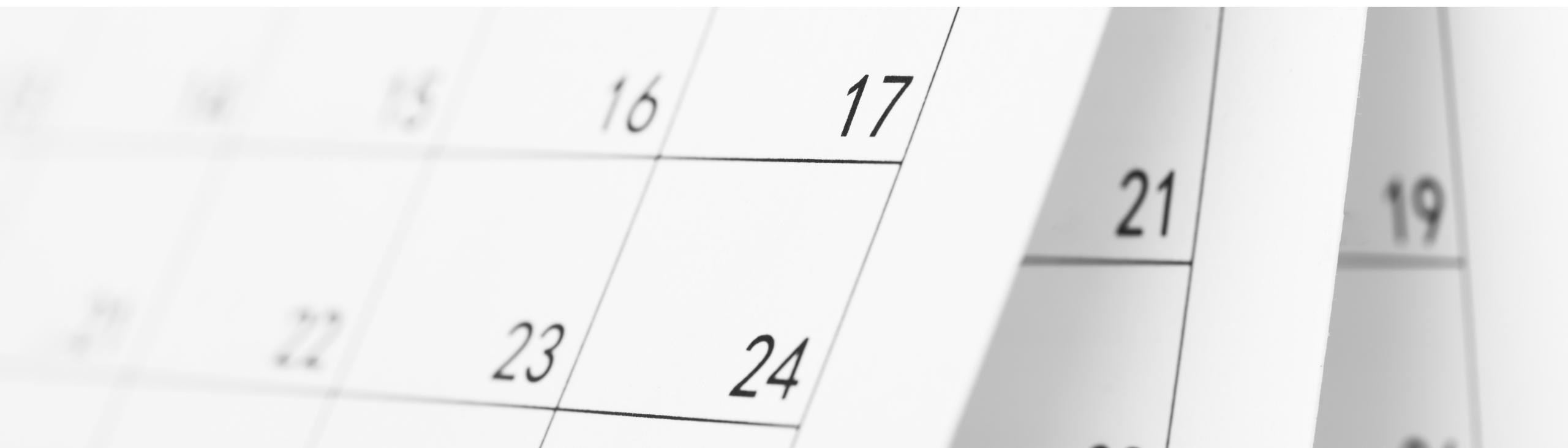
- 15 years **tech consultant** in SAP BI/BW
- SAP **Developer Advocate**
in **SAP Community & Developer Relations**
- All things Data
<http://bit.ly/SAPDevsData>
- Based in Wrocław, Poland
- Organizer of local SAP Community meetups and **SAP Inside Track**



SAP Stammtisch Berlin: <https://www.meetup.com/sapstammtischberlin/>



Events not be missed



Devtoberfest: <https://community.sap.com/t5/devtoberfest/gh-p/Devtoberfest>

1. ABAP & CAP
2. Low-code/No-code
3. Data, Analytics, & AI
4. User Interface
5. Integration Suite

SAP TechEd

Where ideas get real

The SAP TechEd event brings together developers, practitioners, enterprise architects, and global IT leaders. Joined by SAP experts and partners, they'll unite to explore innovations in app development tools, generative AI, clean core for cloud ERP, and much more.



<https://news.sap.com/2024/01/sap-teched-in-2024-expanded-global-program>:

SAP TechEd Virtual: October 8-9, 2024

SAP TechEd On Tour:

- North America,
- Europe, the Middle East and Africa (EMEA),
- Latin America and the Caribbean (LAC), and
- Asian-Pacific and Japan (APJ)

ASUG Tech Connect with SAP TechEd, West Palm Beach, Florida: November 12-14, 2024

June Developer Challenge: SAP HANA multi-model, incl. Vector Engine

The Timeline

Just check the challenges each Wednesday during the following four weeks to get the new one.

Mark your calendars! Here's the game plan:

June 5th	Start of the Challenge	Setup exercise	Submissions
June 12th	Week 2	Words as Vectors	Submissions
June 19th	Week 3		
June 26th	Week 4		
July 3rd	Final deadline		

Ready, Set, Code!

Have fun, experiment boldly, and good luck!

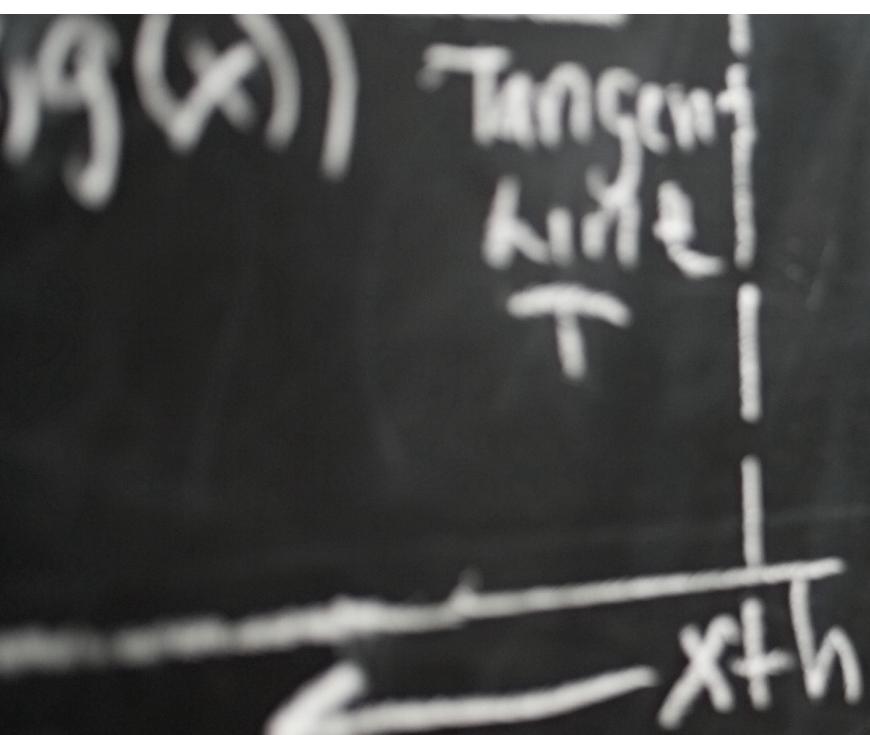


source: <https://community.sap.com/t5/application-development-blog-posts/developer-challenge-sap-hana-multi-model-using-python-in-sap-business/ba-p/13722560>

SAP Developers channel: <https://www.youtube.com/@sapdevs>

The screenshot shows a YouTube video player interface. At the top, the YouTube logo and search bar are visible. The main video frame displays two men in a video conference. On the left, Thomas Jung, a Developer Advocate, is shown with a blue radial background and the SAP logo. On the right, DJ Adams is shown in a room with wooden cabinets and blinds. The video player includes a progress bar at 0:45 / 1:01:20, control icons (play, pause, volume), and a SAP logo indicating it's powered by Zoom. Below the video, a caption reads "Let's test drive Joule's generative AI features in SAP Build Code together! 1 of 2 (EMEA / APJ)". The video has 34.4K subscribers and 49 likes. A banner at the bottom right promotes "GENERATIVE UI" with the text "Anyone can build GENERATIVE UI with AI SDK 3.0".

A bit of theory before we start

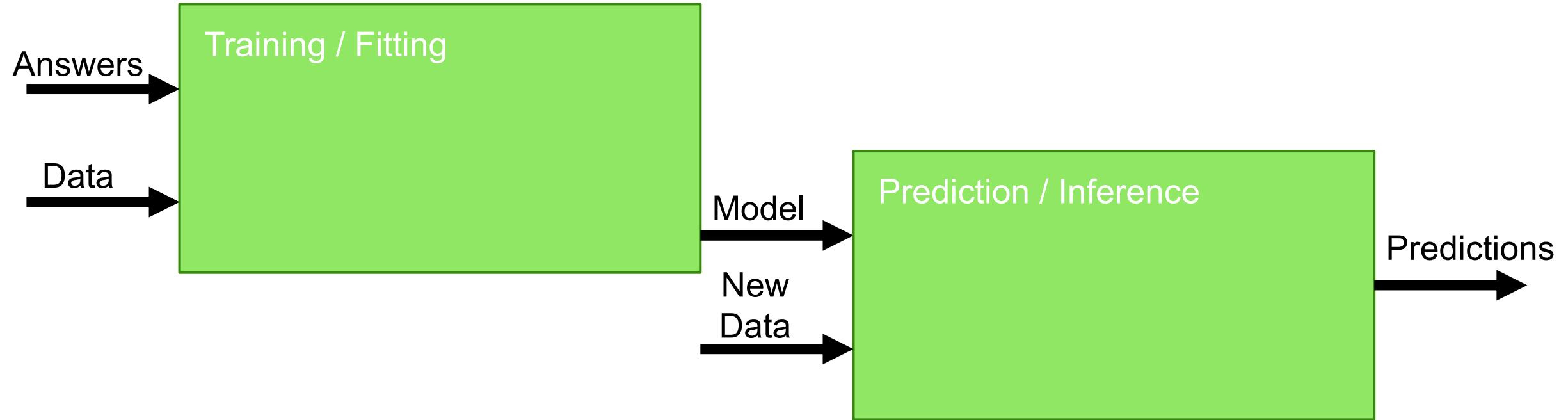


$$f'(x) = \lim_{h \rightarrow 0} \frac{(x+h)^2 - x^2}{h}$$

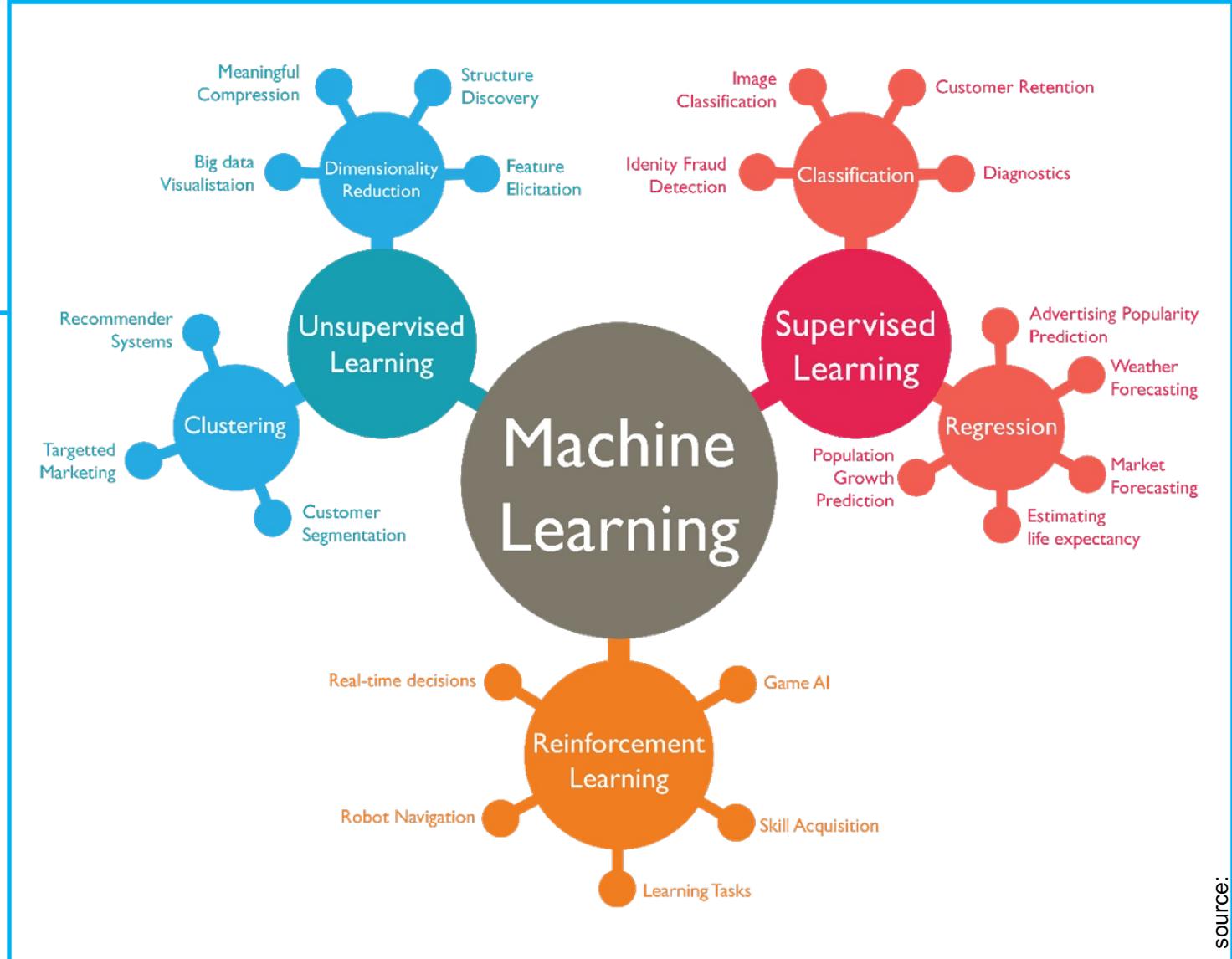
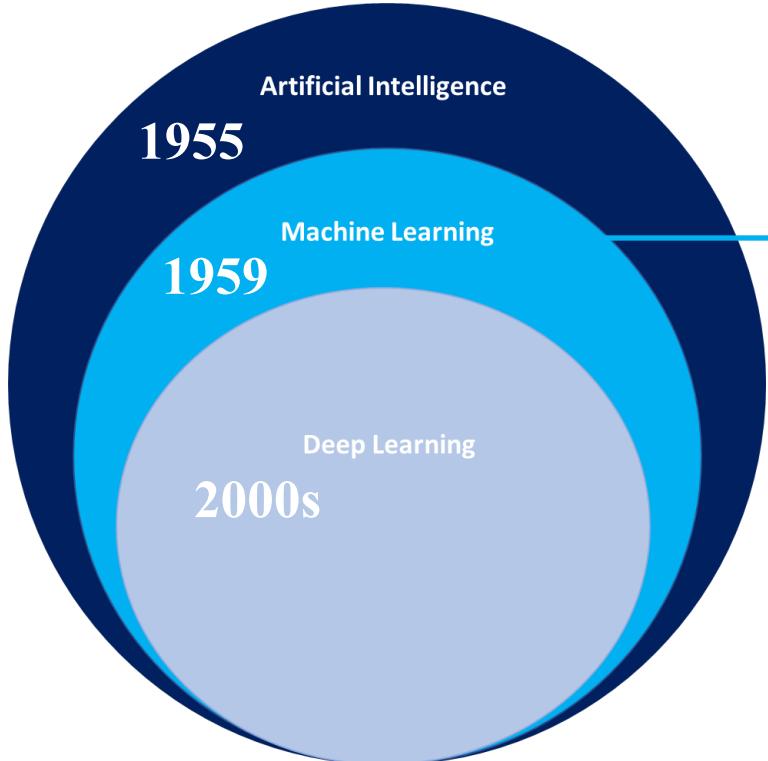
$$= \lim_{h \rightarrow 0} \frac{x^2 + 2xh + h^2 - x^2}{h}$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$$

Machine Learning



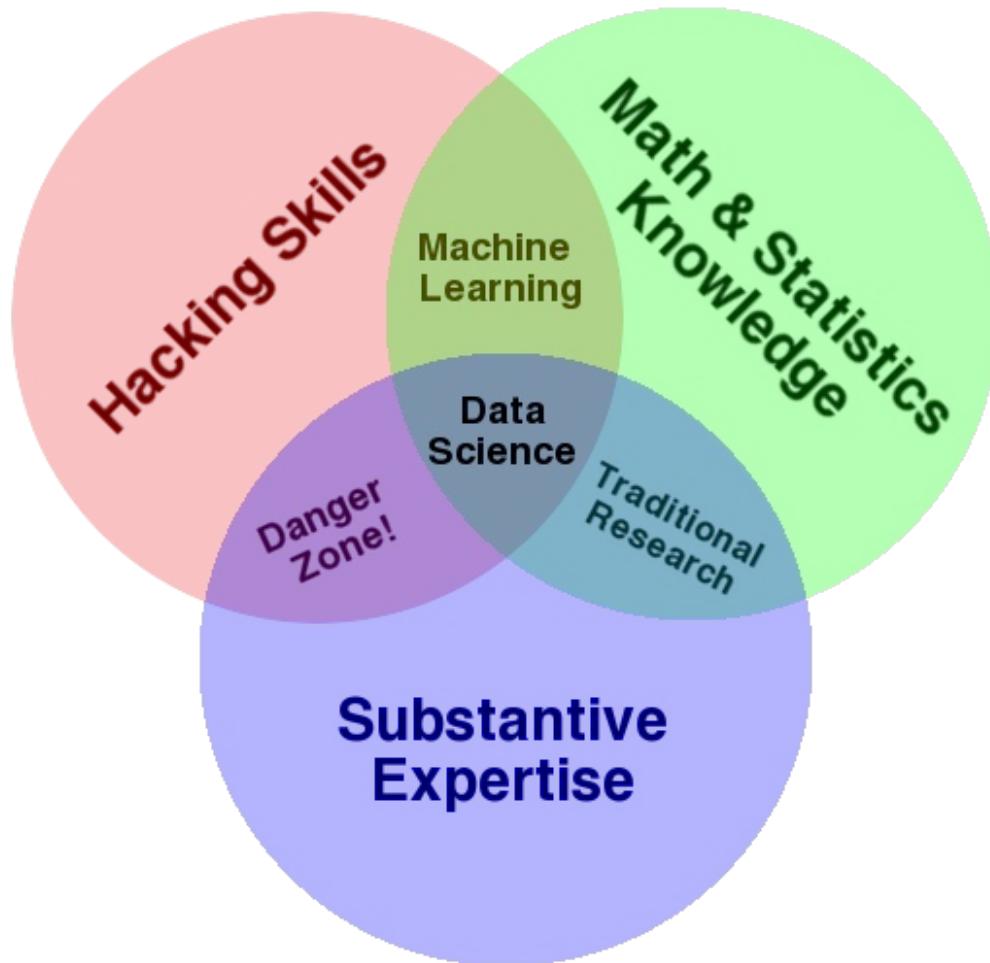
Machine Learning Terminology



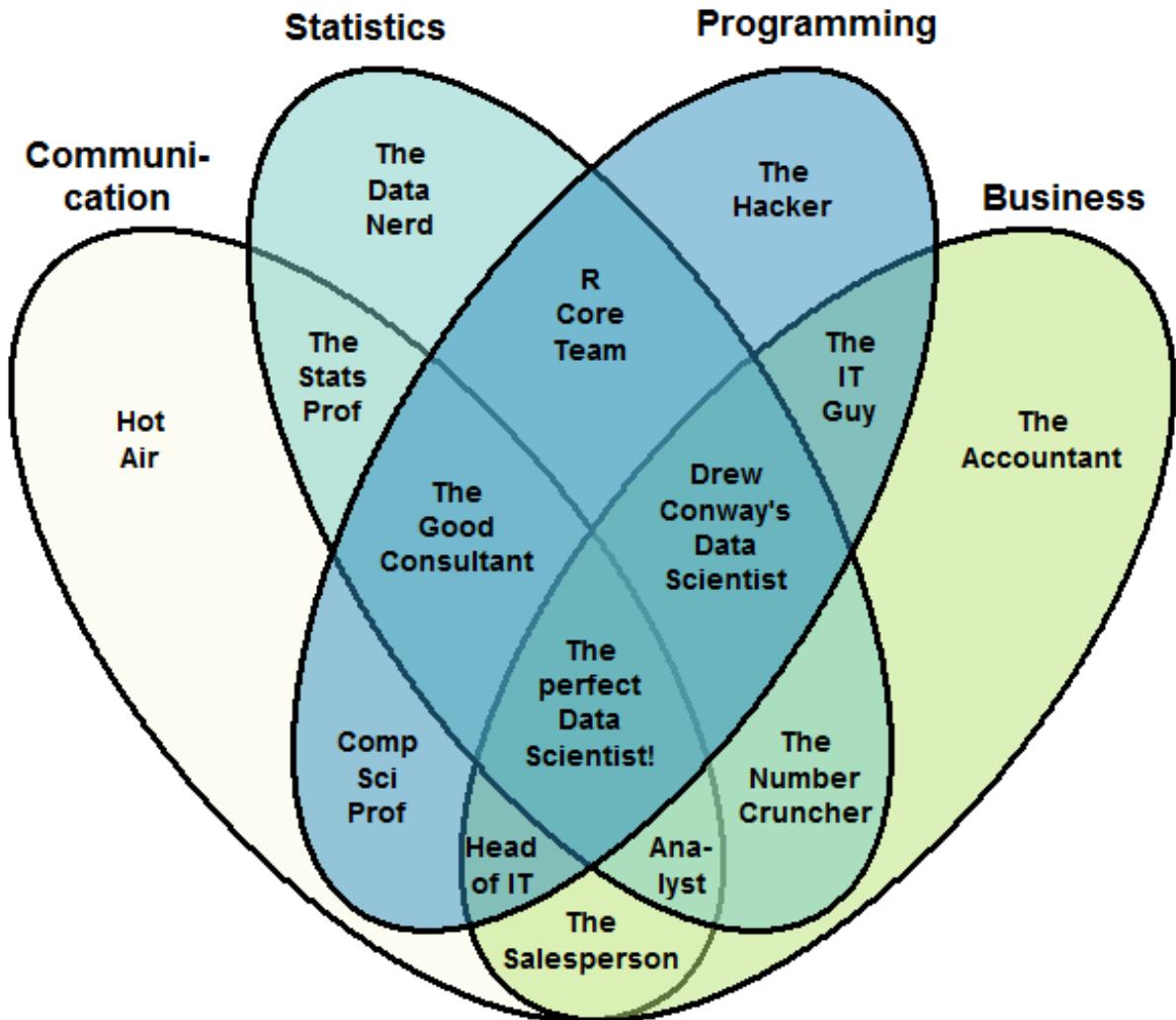
source:

<https://www.researchgate.net/publication/337958773> A Novel Approach for Improving Breast Cancer Risk Prediction using Machine Learning Algorithms A Survey

Who is the Data Scientist?

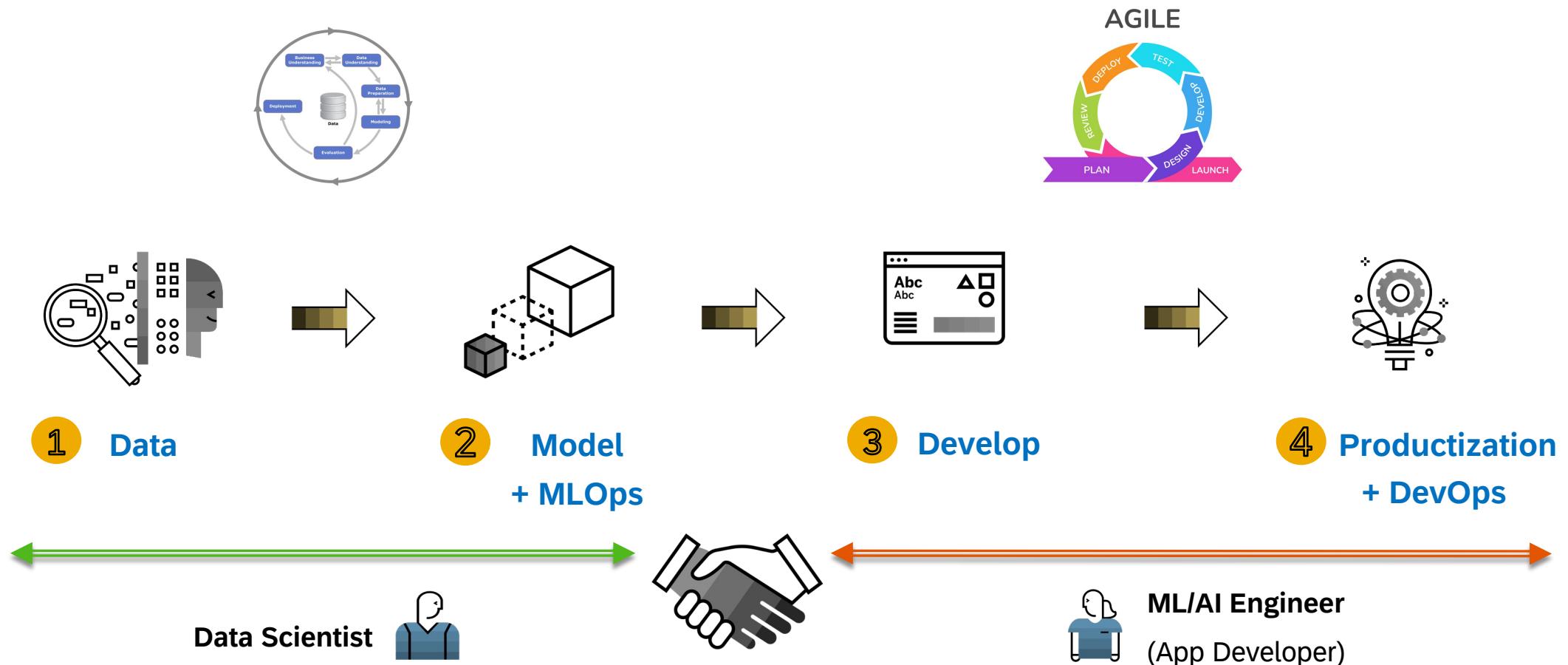


Drew Conway's Data Scientist Venn Diagram

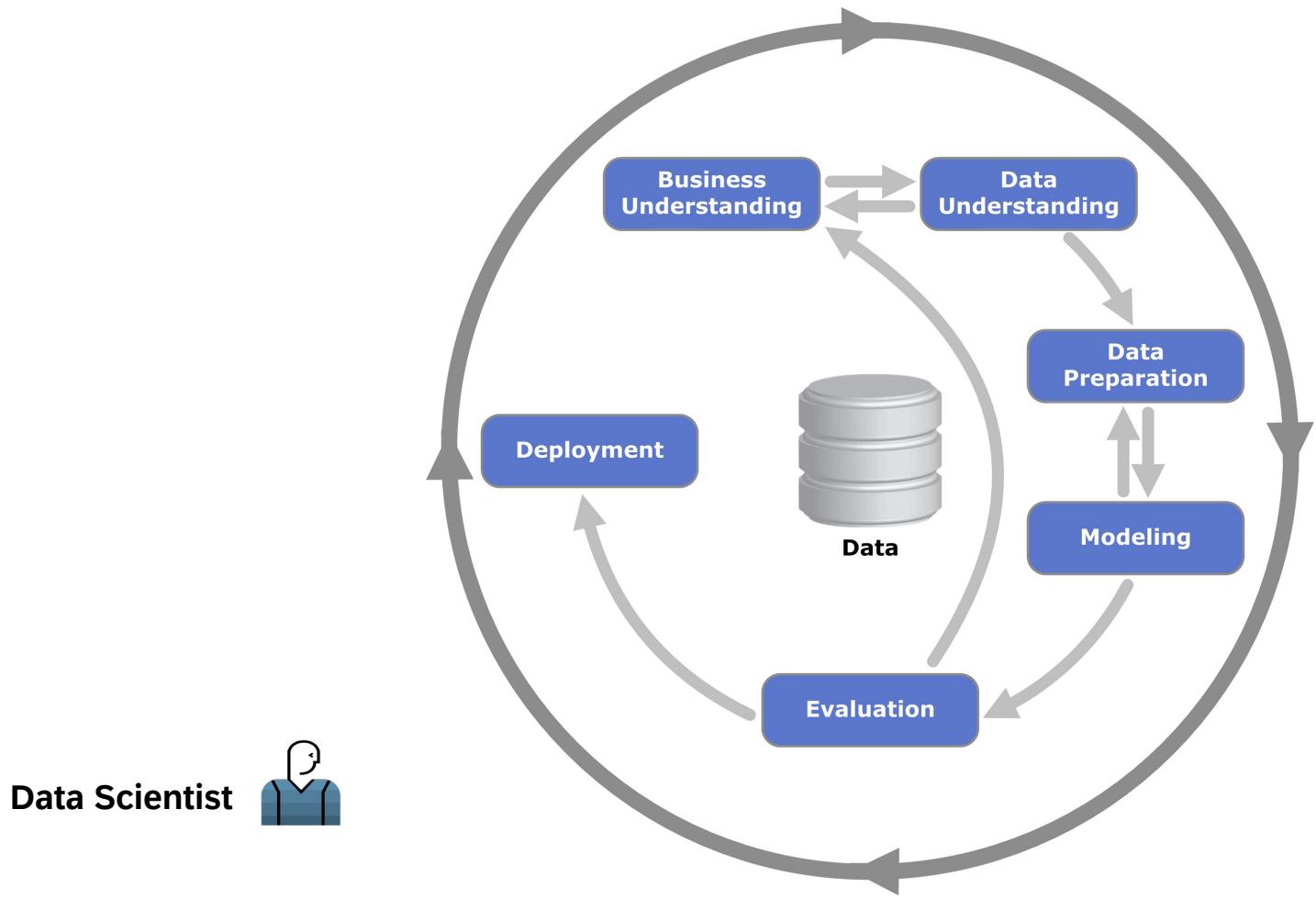


Stephan Kolassa's Data Scientist Venn Diagram

Development Approach | Building an Intelligent Data Application



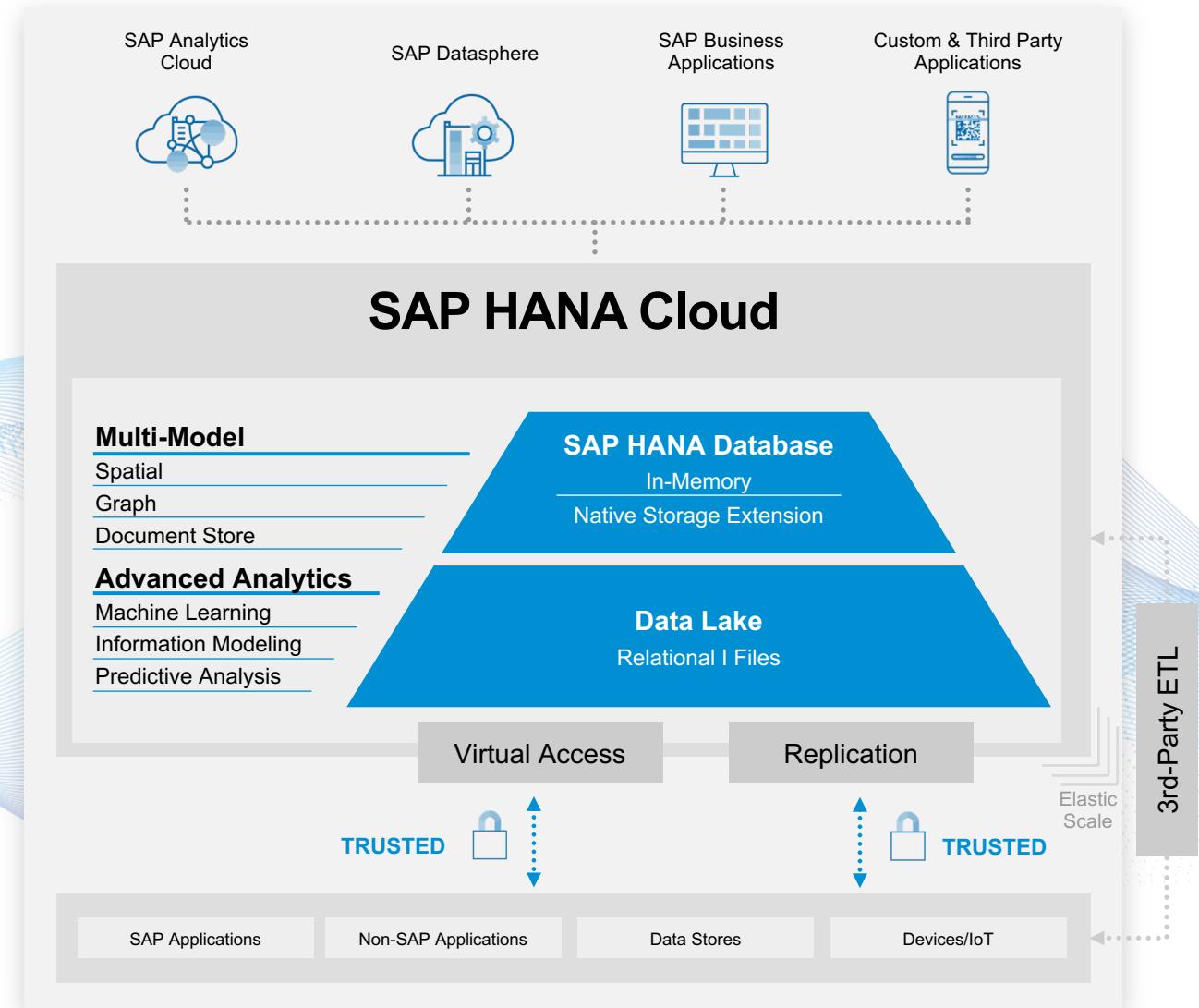
Development Approach | Training a Model



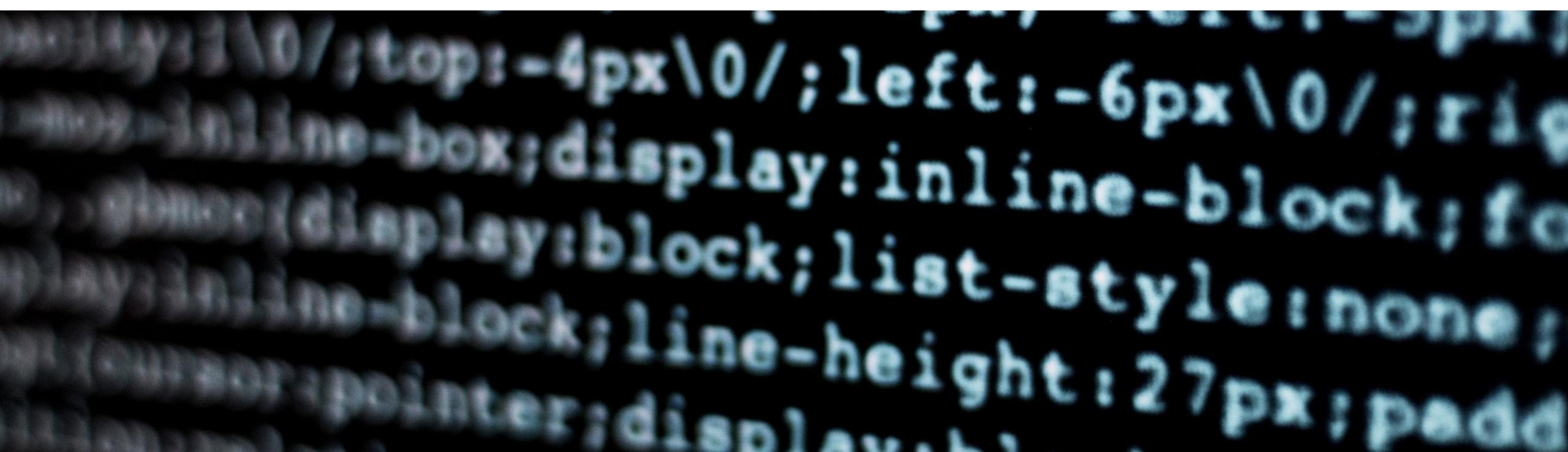
SAP HANA Cloud | Foundation for Intelligent Data Applications on SAP BTP

Power Intelligent Data Applications with SAP HANA Cloud

- Running mission-critical applications and analytics with **one solution**
- Seamlessly blend **multi-model data** to enhance business processes
- Federate data **across hybrid systems** and multiple clouds
- Provide **proven in-memory performance** for all data needs



Let's get busy 😎



Your ML Challenge today:

The screenshot shows the Kaggle Competitions page. On the left is a sidebar with navigation links: kaggle, Create, Home, Competitions (which is selected), Datasets, Models, Code, Discussions, Learn, and More. The main content area has a title "Competitions" and a sub-section "Get Started". It features a search bar, filters, and categories: All Competitions, Featured, Getting Started, Research, Community, and Playground. A section titled "New to Kaggle?" highlights the "Titanic - Machine Learning from Disaster" competition, which is circled in red. Other visible competitions include "House Prices - Advanced Regression Techniques" and "Spaceship Titanic".

Competitions

Grow your data science skills by competing in our exciting competitions. Find help in the [documentation](#) or learn about [Community Competitions](#).

[Host a Competition](#)

Search competitions

Filters

All Competitions Everything, past & present

Featured Premier challenges with prizes

Getting Started Approachable ML fundamentals

Research Scientific and scholarly challenges

Community Created by fellow Kagglers

Playground Fun practice problems

Get Started

New to Kaggle?

These competitions are perfect for newcomers.

Titanic - Machine Learning from Disaster

Start here! Predict survival on the Titanic ...
Getting Started
16184 Teams

Knowledge Ongoing

House Prices - Advanced Regression Techniques

Predict sales prices and practice feature ...
Getting Started
4328 Teams

Knowledge Ongoing

Spaceship Titanic

Predict which passengers are transported...
Getting Started
2506 Teams

Knowledge Ongoing

Exercises



Repo: <https://github.com/SAP-samples/hana-ml-py-codejam/>

(→ https://bit.ly/CJ_HANAML)

1. Pre-requisites:

<https://github.com/SAP-samples/hana-ml-py-codejam/blob/main/prerequisites.md>

2. Exercises:

<https://github.com/SAP-samples/hana-ml-py-codejam#the-exercises>

3. Worth watching:

<https://github.com/SAP-samples/hana-ml-py-codejam#additional-learning-material>

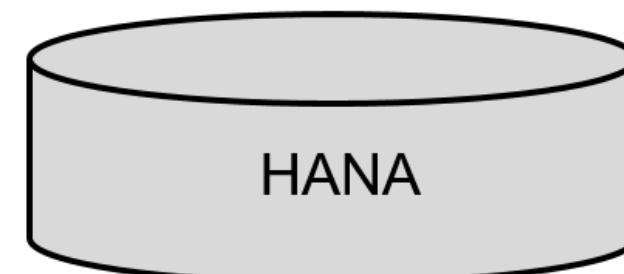
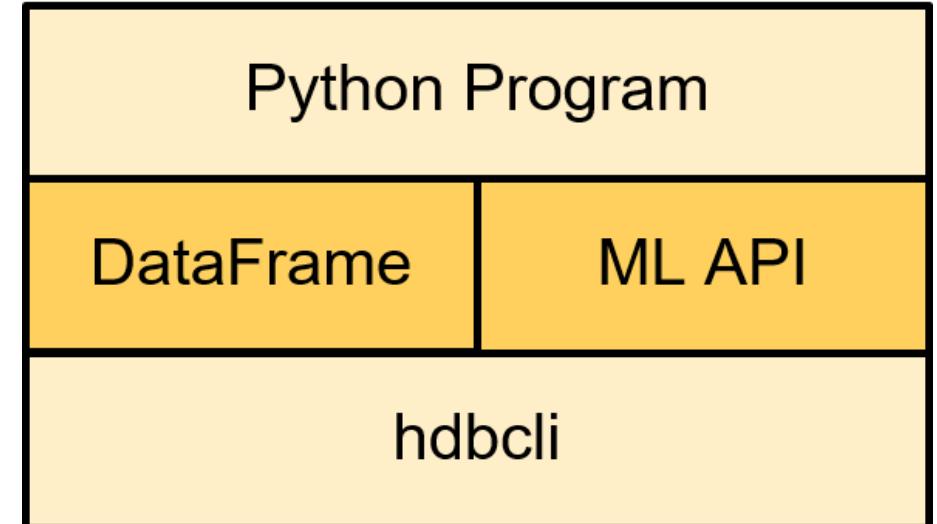
4. Try at home in your SAP BTP Trial:

<https://github.com/SAP-samples/sap-community-developer-challenge-eda-hana>

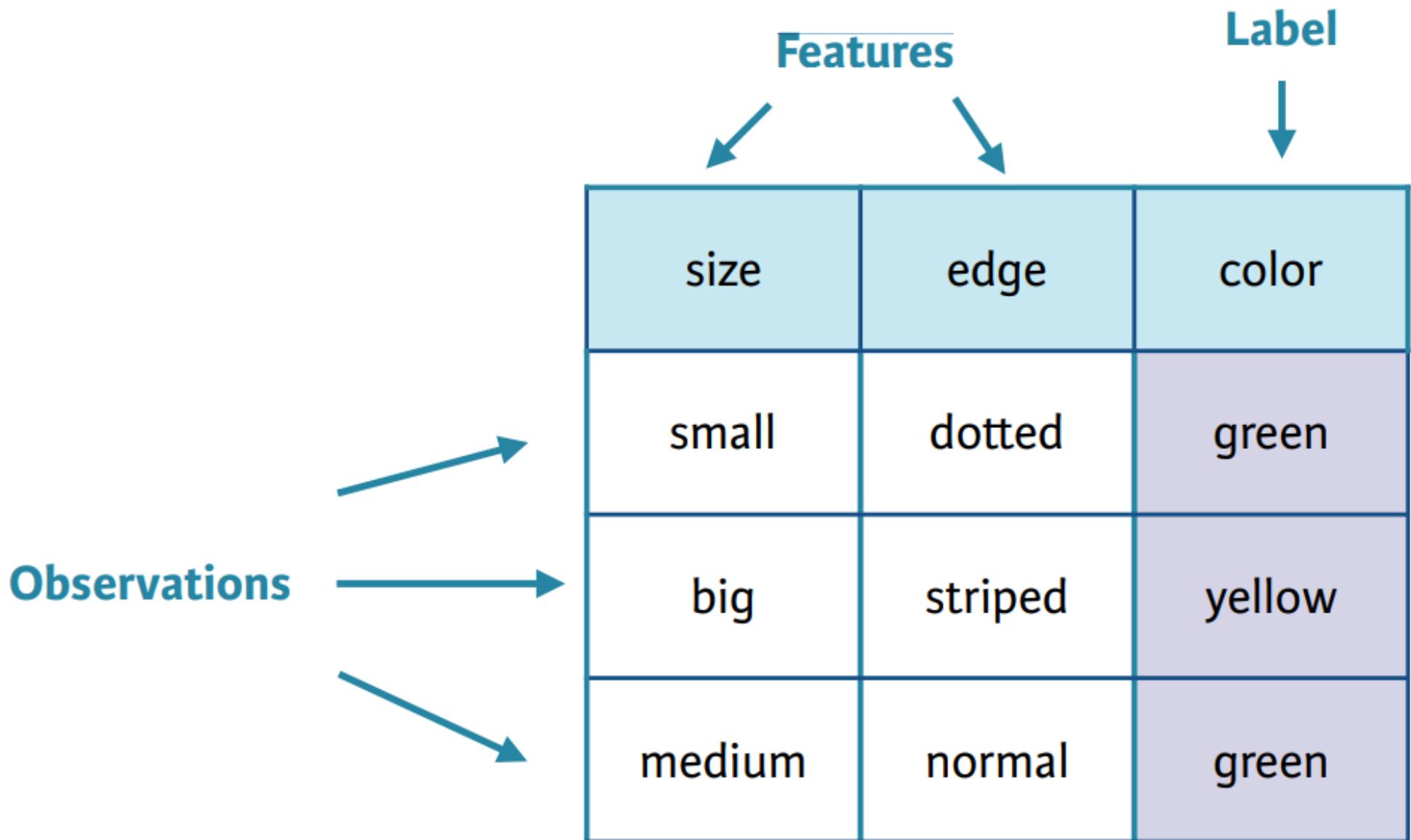
Understand DataFrame(s)

Data Scientist using Python

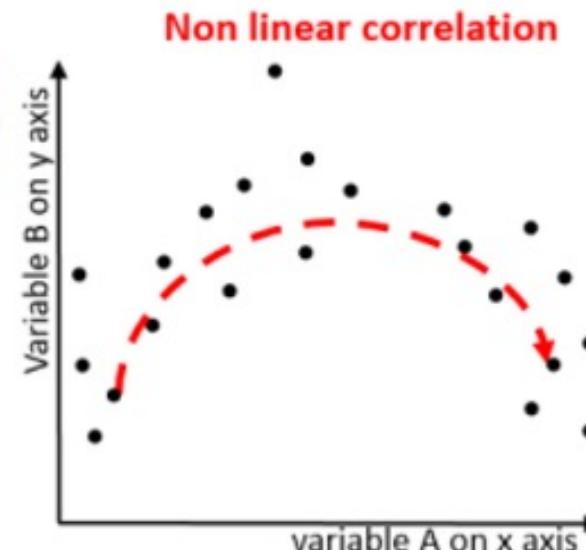
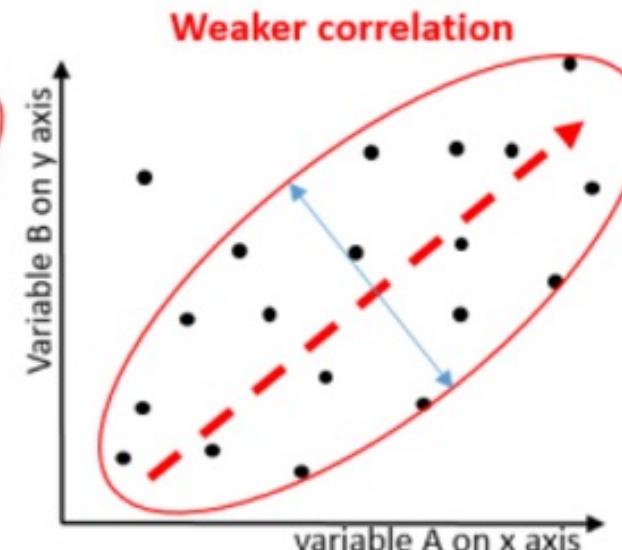
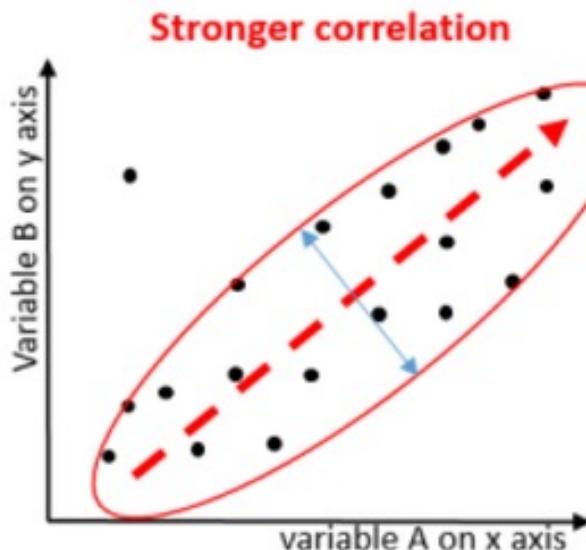
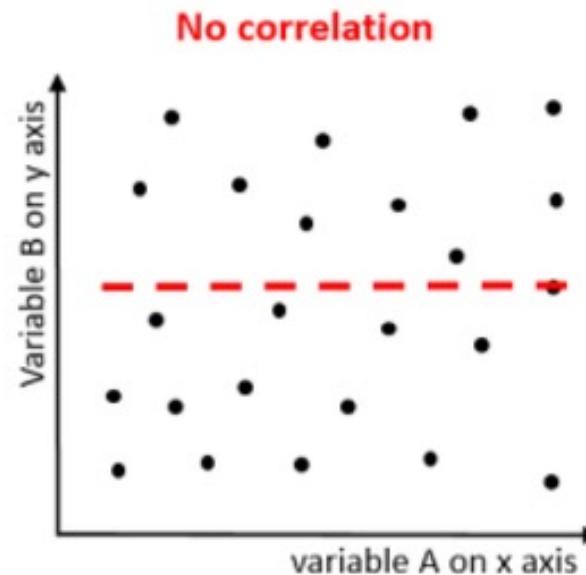
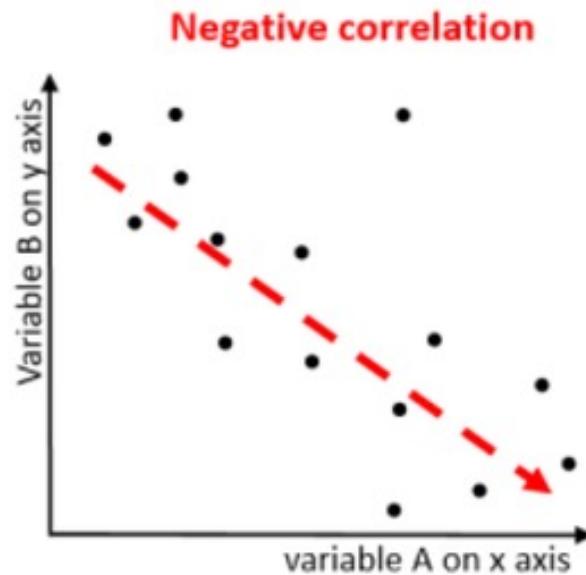
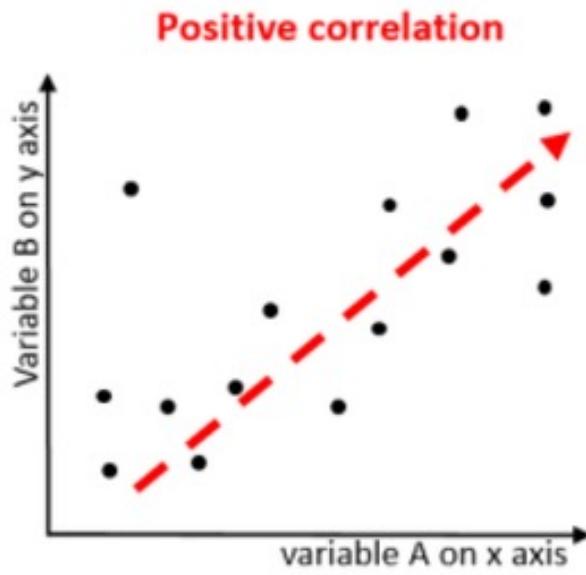
Pandas DataFrame <-> HANA DataFrame



Train datasets in Supervised Machine Learning

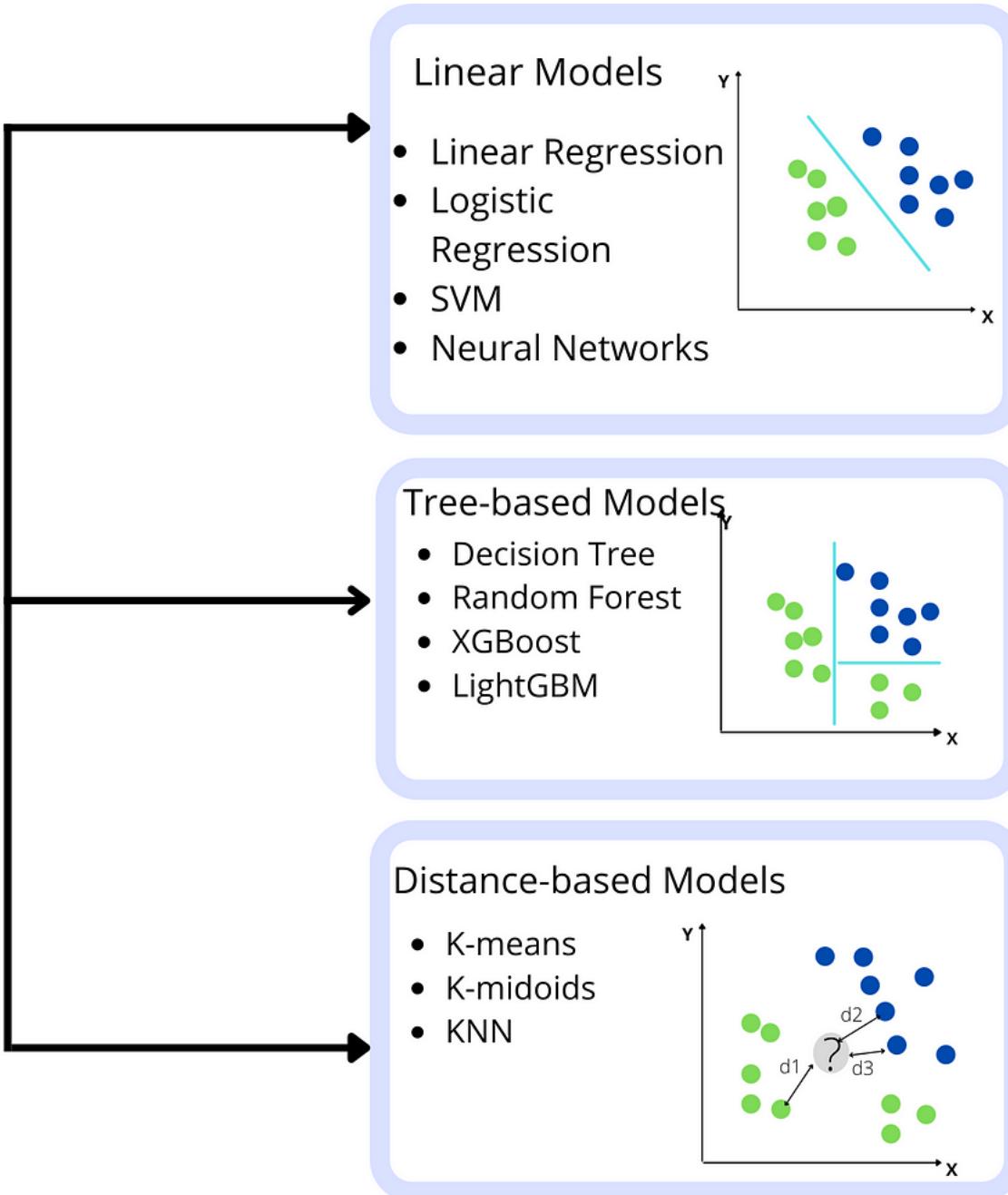


Correlation based on direction, form, and dispersion strength

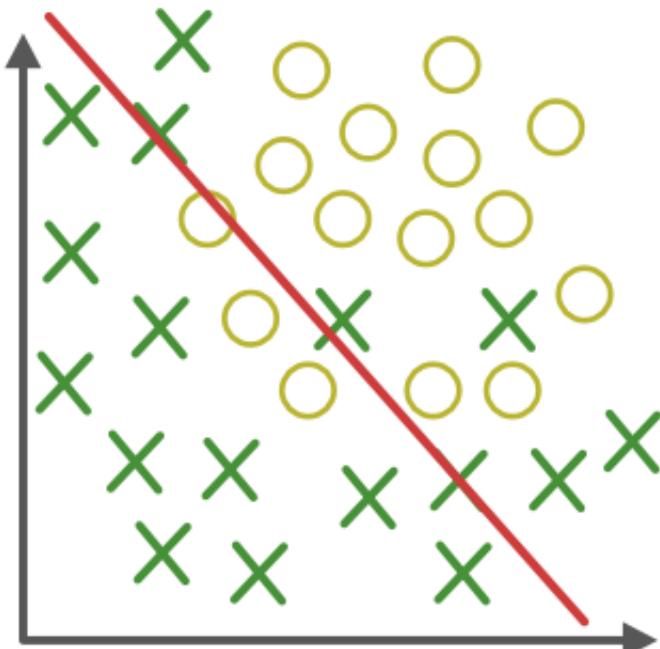


Decision Boundary

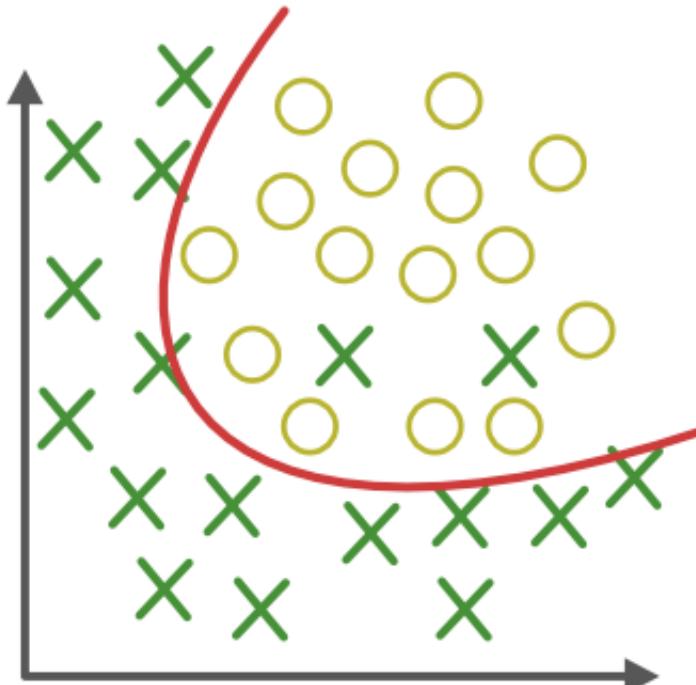
Decision
Boundary



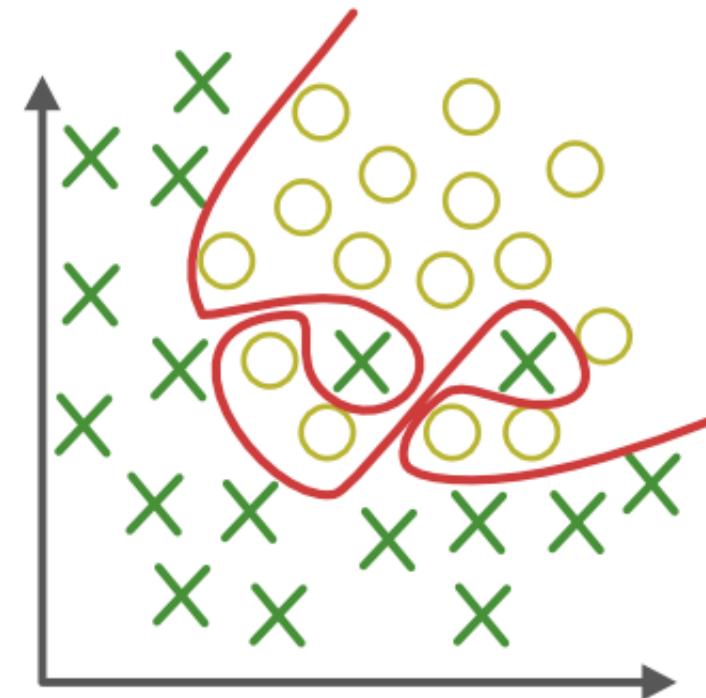
Underfitting and Overfitting



Under-fitting
(too simple to
explain the variance)



Appropriate-fitting



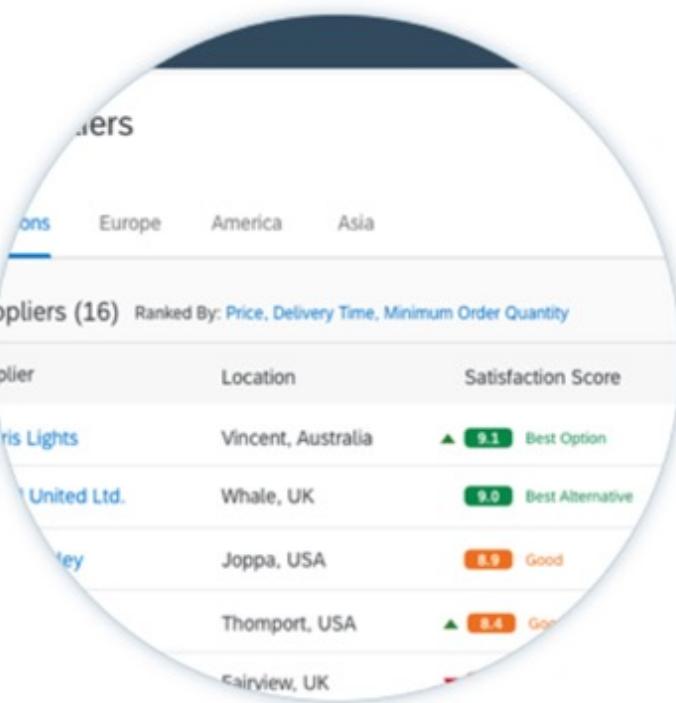
Over-fitting
(forcefitting--too
good to be true)

DG

<https://experience.sap.com/fiori-design-web/explainable-ai/>

Level 1

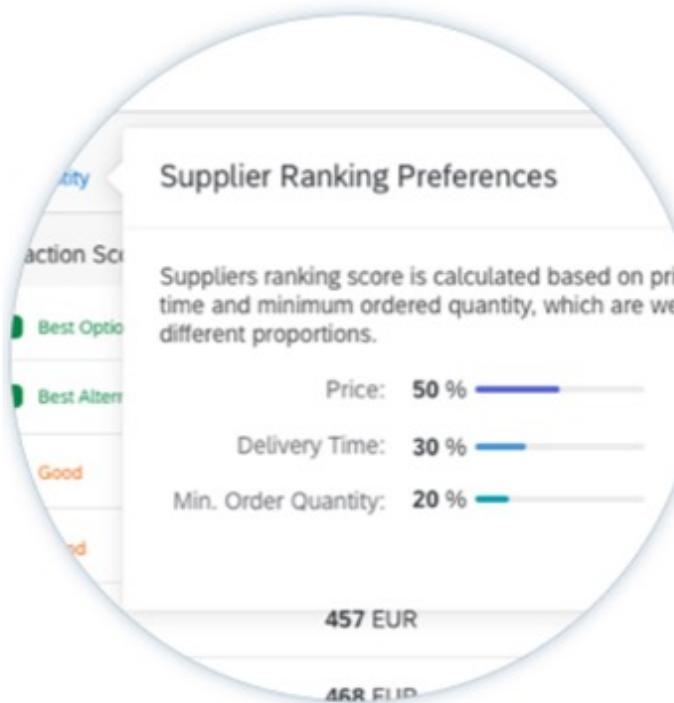
WHAT



Minimum

Level 2

WHY



Simple

Level 3

HOW



Expert

Confusion matrix

In predictive analytics, a **table of confusion** (sometimes also called a **confusion matrix**) is a table that reports the number of true positives, false negatives, false positives, and true negatives.

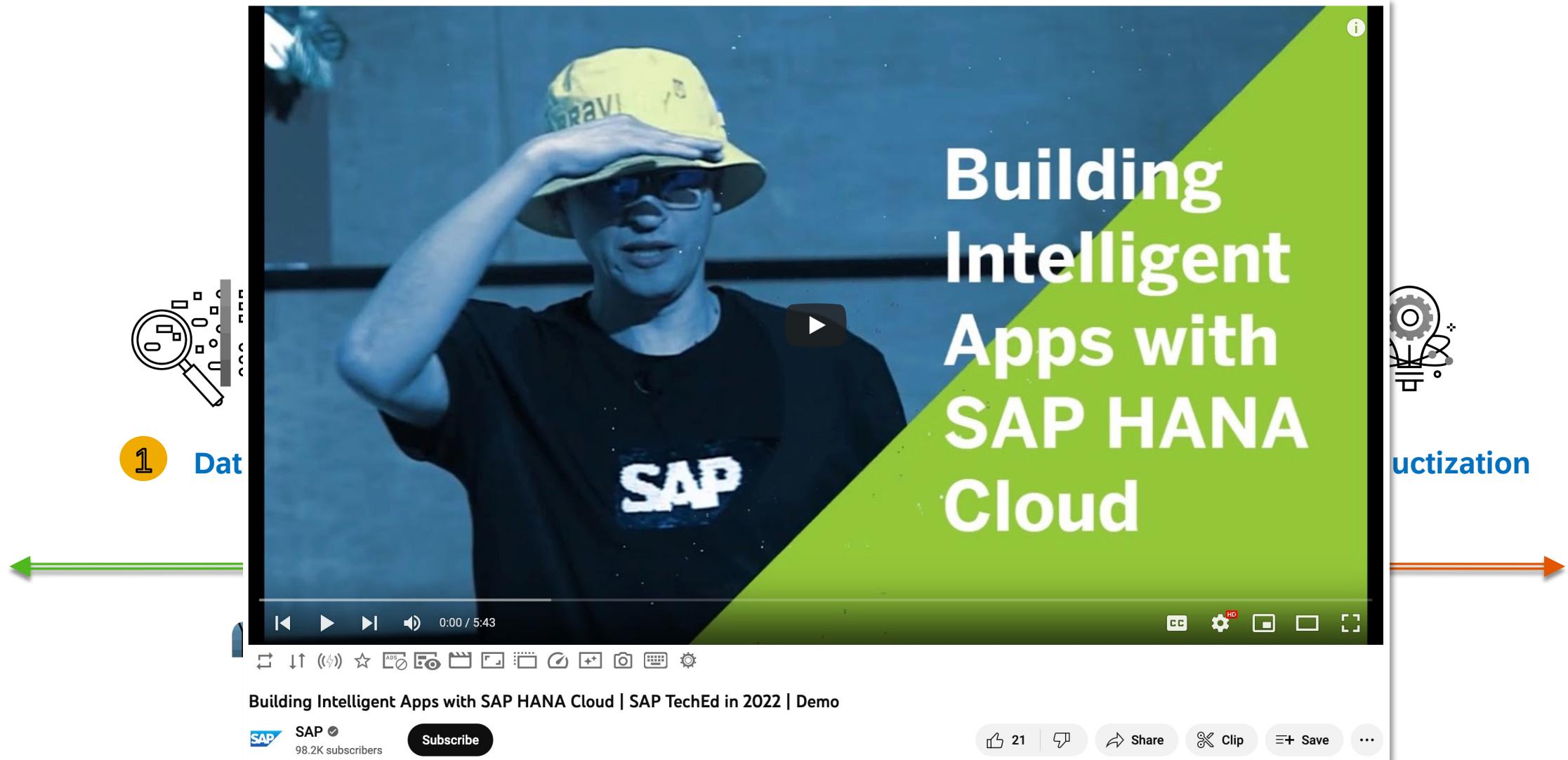
		Predicted class
		P
		N
Actual class	P	True positives (TP)
	N	False negatives (FN)
N	P	False positives (FP)
	N	True negatives (TN)

source: <https://subscription.packtpub.com/book/data/9781787125933/6/ch06lvl1sec41/looking-at-different-performance-evaluation-metrics>

Additional content



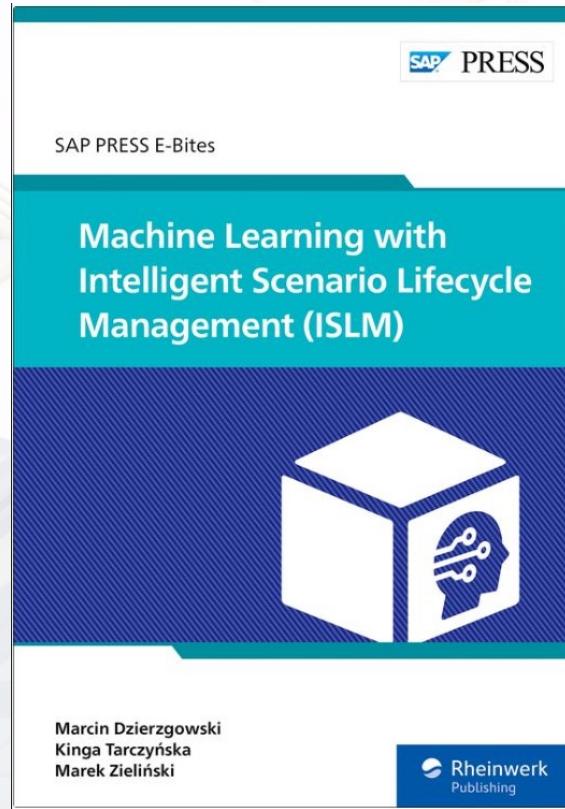
Development Approach | Building an Intelligent Data Application (demo)



Code samples: <https://github.com/SAP-samples/hana-ml-samples>

Screenshot of a GitHub repository page for "hana-ml-samples / Python-API / usecase-examples /". The repository was created by cmog (FairML - Fair Recruiting Model) on f009115 · 3 weeks ago. The page shows a list of code samples with their names, last commit messages, and dates.

Name	Last commit message	Last commit date
..		
diabetes-classification	Create OpenSAP-SAPHANA-HANA Machine Learning Demo (2...	2 years ago
estimate-car-price	update estimate car price	3 years ago
fairml-examples	FairML - Fair Recruiting Model	3 weeks ago
fraud-detection	fraud-detection use case	2 years ago
melbourne-housing-price	Add files via upload	4 years ago
ml-anonymized-data	Tutorial example - ML with HANA-ML Python ML client on HAN...	4 years ago
multimodel-analysis-airroutes	Update README.md	4 years ago
sapcommunity-automl-examples	update community call examples	2 years ago
sapcommunity-hanaml-challenge	Create SAP HANA Cloud Machine Learning Demo - Employee C...	7 months ago



Machine Learning with Intelligent Scenario Lifecycle Management (ISLM)

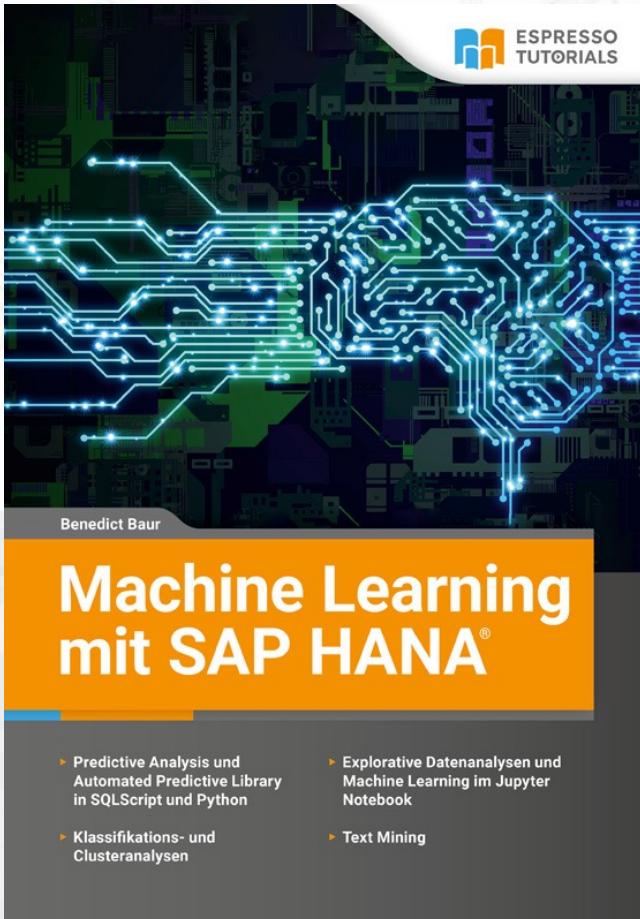
115 pages, 2023, E-Book
ISBN 978-1-4932-2395-4

www.sap-press.de/5668

Update your machine learning skills with Intelligent Scenario Lifecycle Management (ISLM)!

In this E-Bite, you'll develop a complete machine learning application for SAP S/4HANA using SAP HANA PAL, from data preparation and model building to training and prediction generation. You'll learn to use the ISLM framework to simplify machine learning implementation with standard apps for managing intelligent scenarios. Learn the ins and outs of machine learning with ISLM in this how-to guide!

- Learn to use the ISLM framework in SAP S/4HANA
- Develop an end-to-end machine learning scenario with SAP HANA PAL
- Prepare data, train models, and implement predictions with ISLM



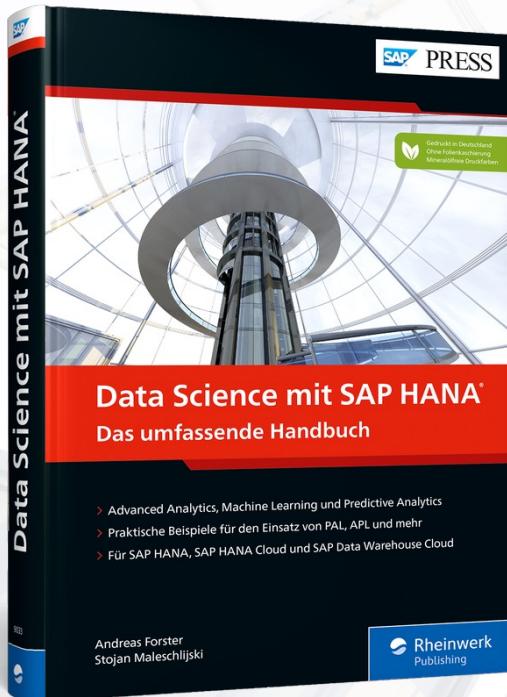
Machine Learning mit SAP HANA

von Benedict Baur

320 Seiten, 1. Auflage, ISBN: 9783960121237

Seit einigen Jahren preist die SAP das intelligente Unternehmen als Wettbewerbsvorteil an. Mit diesem Buch springen Sie mitten hinein in die Welt der künstlichen Intelligenz (KI). Erfahren Sie, welche Algorithmen die leistungsstarke In-Memory-Datenbank SAP HANA für das Machine Learning (ML) bereithält. Auf deren Basis lassen sich Muster und Gesetzmäßigkeiten in Datenbeständen erkennen und Vorhersagen treffen, die helfen, Geschäftsprozesse zu verbessern.

- Predictive Analysis und Automated Predictive Library in SQLScript und Python
- Klassifikations- und Cluster-Analysen
- Explorative Datenanalysen und Machine Learning im Jupyter Notebook
- Text Mining



Mit SAP HANA, SAP HANA Cloud und SAP Data Warehouse Cloud ist viel mehr möglich als das Speichern großer Datenmengen.

In diesem Buch erfahren Sie, wie Sie die Automated Predictive Library (APL) und die Predictive Analysis Library (PAL) einsetzen können, um komplexe Auswertungen vorzunehmen und Vorhersagen zu treffen. Praktische Beispiele zu Klassifizierung, Textanalyse, Clustering, Regression u.v.m. zeigen Ihnen die vielfältigen Möglichkeiten auf und lassen sich direkt auf Ihre Anwendungsfälle übertragen.

- Advanced Analytics, Machine Learning und Predictive Analytics
- Praktische Beispiele für den Einsatz von PAL, APL und mehr
- Für SAP HANA, SAP HANA Cloud und SAP Data Warehouse Cloud

Data Science mit SAP HANA

Das umfassende Handbuch

von [Andreas Forster, Stojan Maleschlijski](#)

<https://www.rheinwerk-verlag.de/data-science-mit-sap-hana/>

SAP HANA Cloud Multi-model Further Learning

SAP HANA Cloud Basic Trial

- 30-days own-schema shared-instance
- <https://www.sap.com/products/technology-platform/hana/guided-experience.html>

SAP HANA Cloud Trial

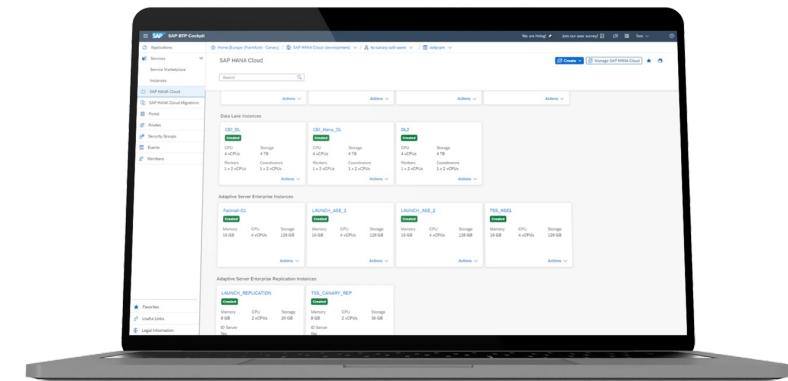
- 3x30-days own-instance in SAP BTP Trial
- 16GB RAM, 1 vCPU
- <https://developers.sap.com/tutorials/hana-trial-advanced-analytics.html>

SAP HANA Cloud Free Tier

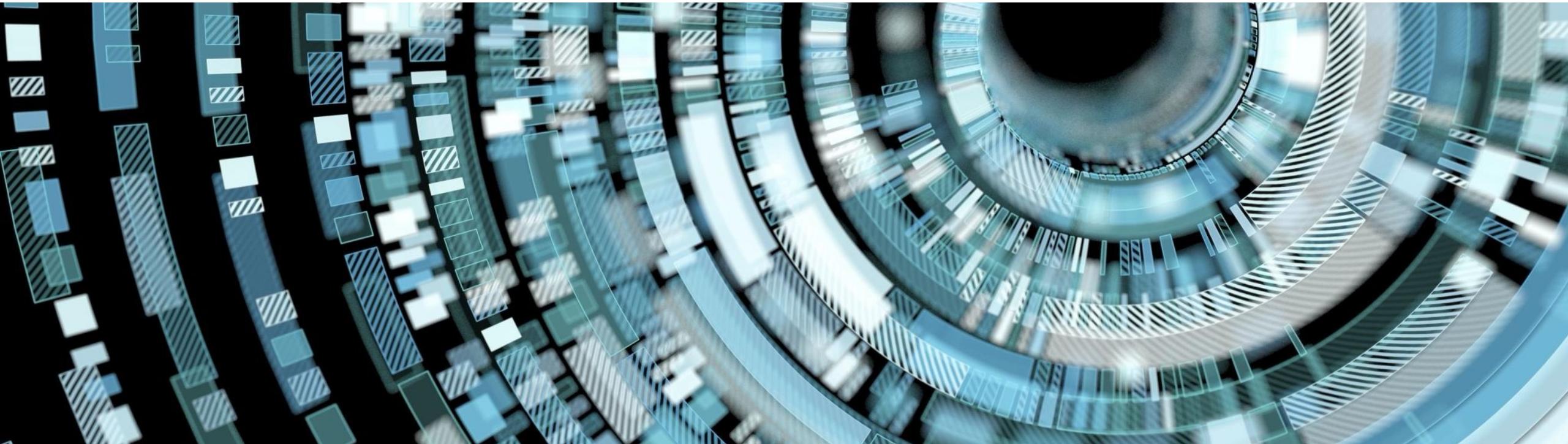
- 30 GB RAM, 2 vCPUs
- <https://developers.sap.com/mission.hana-cloud-database-get-started.html>

SAP TechEd 2023 exercises

- DAT285v - Building Intelligent Data Applications with SAP HANA Cloud: <https://github.com/SAP-samples/teched2023-DA285v>
- DA263 - Build Innovative Business Applications with Database Services: <https://github.com/SAP-samples/teched2023-DA263>



SAP Business AI portfolio



SAP Business AI approach

Relevant. Reliable. Responsible.

Finance | Supply Chain | HR | Procurement | Marketing and Commerce | Sales and Services | IT



A copilot that truly understands your business

Embedded AI capabilities

Cloud ERP

Human capital management

Spend management
and business network

Customer relationship
management

Business Technology
Platform

AI Foundation

on Business Technology Platform

AI ecosystem partnerships and investments



ANTHROPIC



cohere

databricks

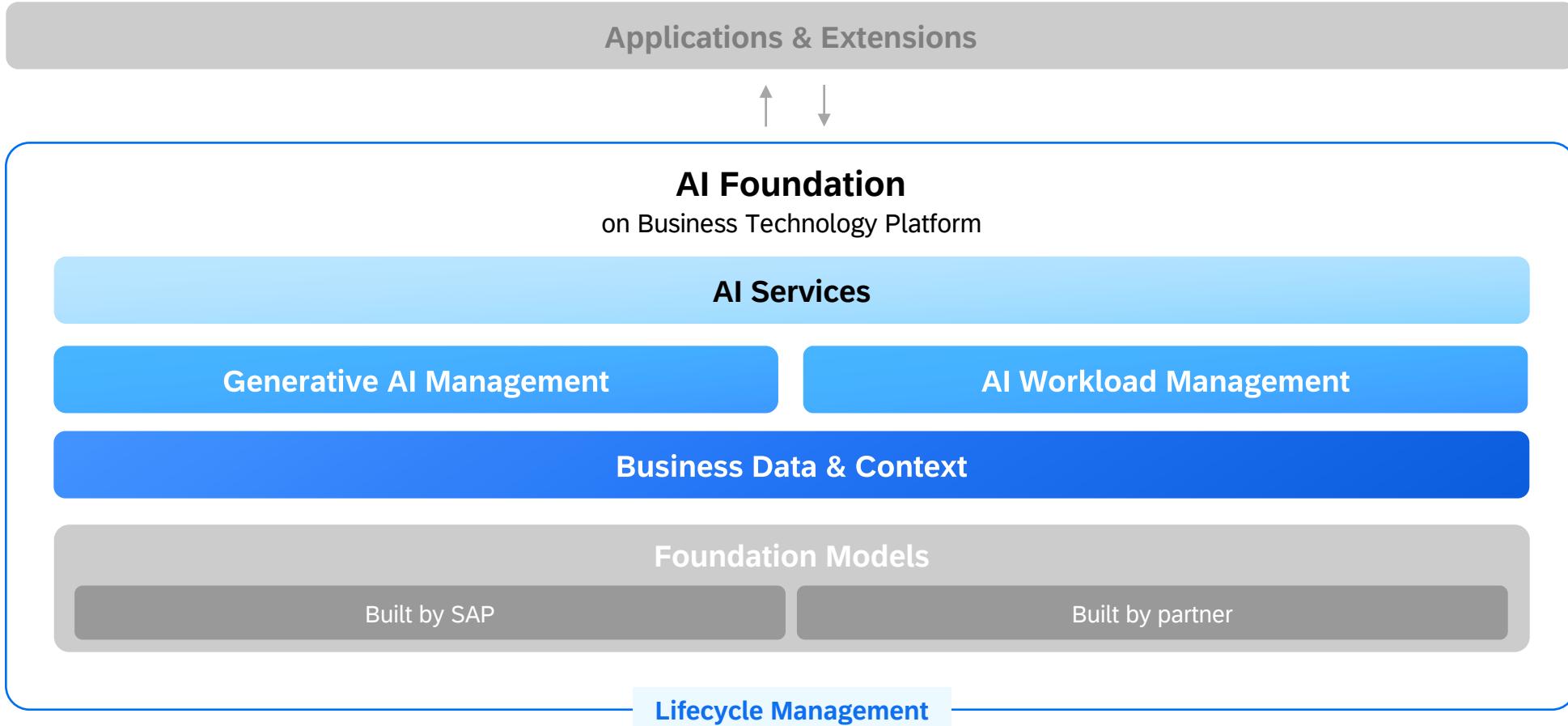
DataRobot

Google Cloud

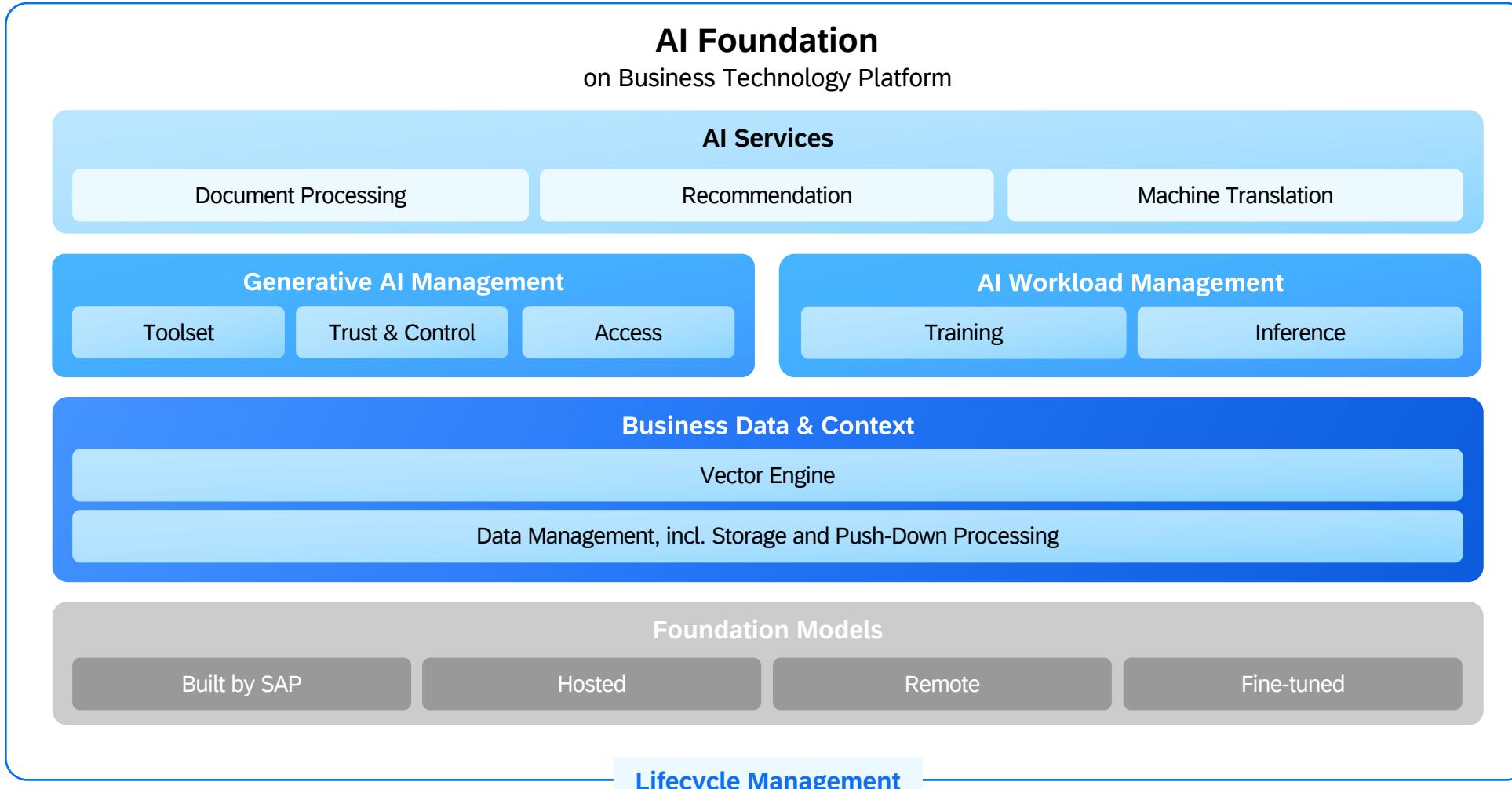
IBM

Microsoft

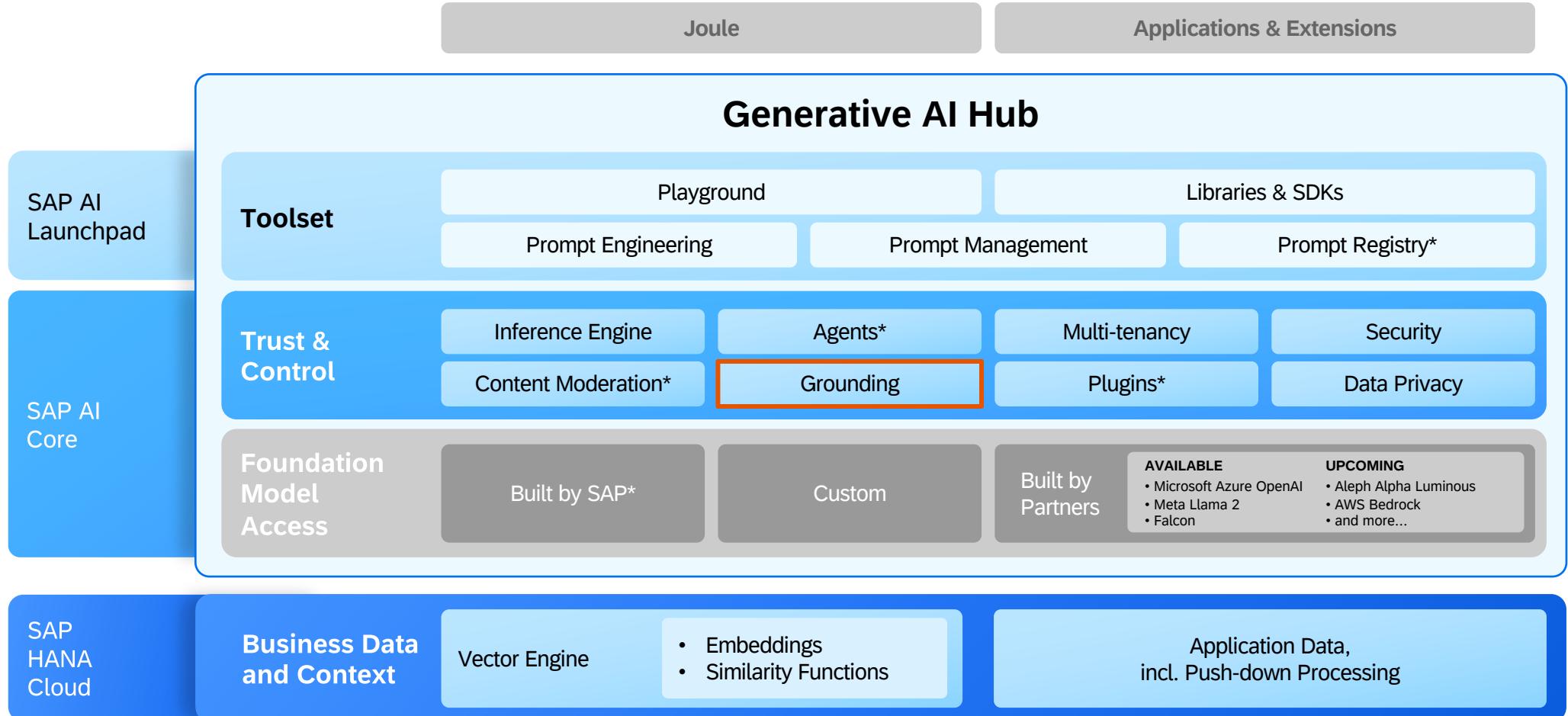
A complete set of services for AI developers on SAP BTP



A complete set of services for AI developers on SAP BTP



Generative AI Hub: integrate AI into applications, seamlessly



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<https://ugearsmodels.com/>

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UGEARs
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NASA SPACE SHUTTLE DISCOVERY

RESCUE HOVERCRAFT

STEGOSAURUS

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Details are already cut and ready to assemble

MECHANICAL

The models produce motion

EDUCATIONAL

Perfect for family projects through hands-on STEM learning

<https://ugearsmodels.com/catalogue/preorder5/>



Thank you // Дякую // Vielen Dank!

Contact information:

Witalij Rudnicki, **SAP Developer Advocacy**

