

The Developer Advocates present

# SAP CodeJam 2025



Getting Started with  
Machine Learning using SAP HANA



Kolkata, India   
Mar 4, 2025



# Witalij Rudnicki

aka @Sygyzmundovych  
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aka Віталій Рудницький

- 10 years **tech consultant** in SAP BI/BW
- 10+ years as 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**

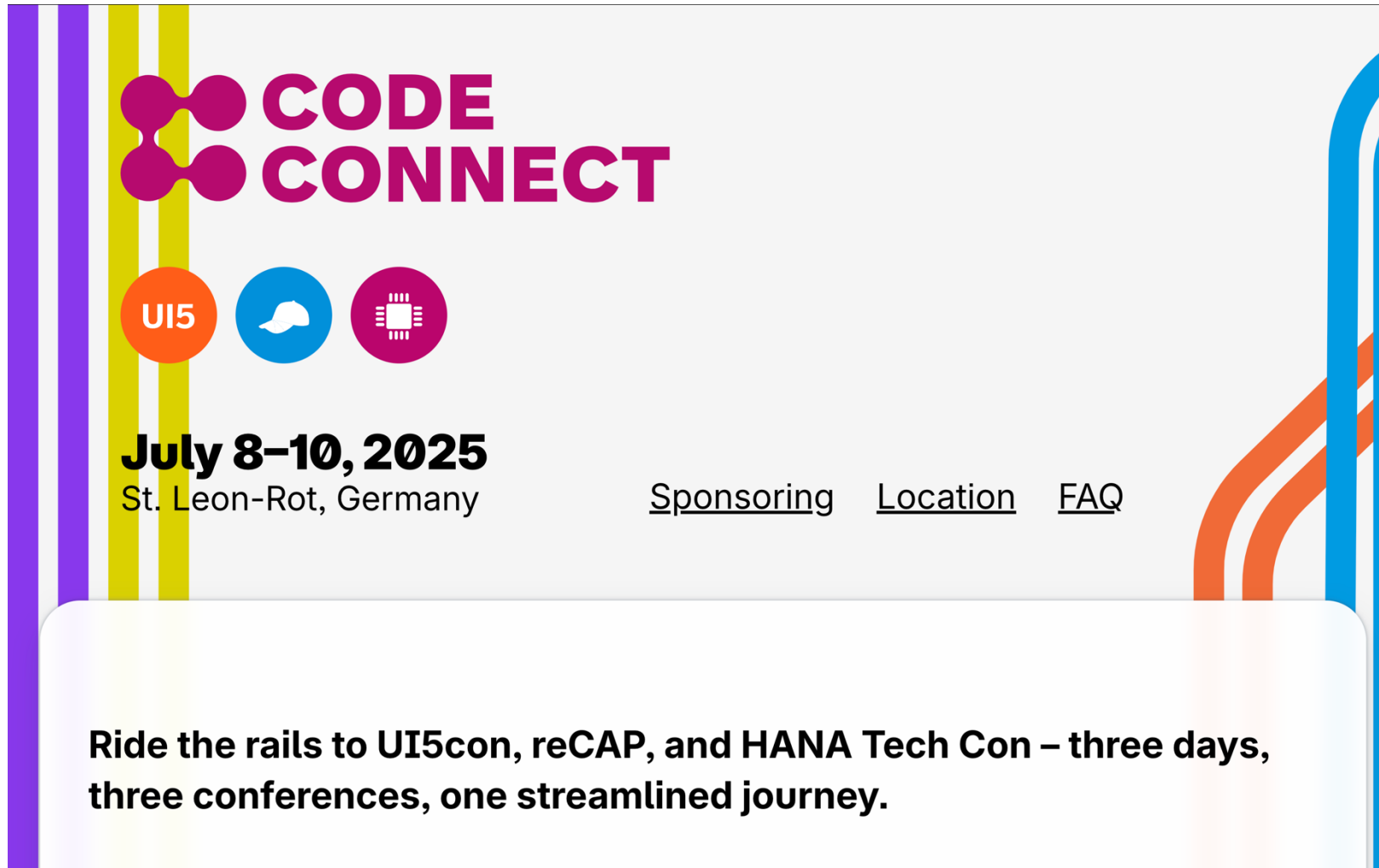


# Events not be missed



## Code Connect:

<https://code-connect.dev/>

The banner features a light gray background with vertical purple and yellow stripes on the left and blue and orange curved stripes on the right. The 'CODE CONNECT' logo is in purple, with 'CODE' above 'CONNECT'. Below the logo are three circular icons: an orange one with 'UI5', a blue one with a speech bubble, and a purple one with a microchip. The dates 'July 8-10, 2025' and location 'St. Leon-Rot, Germany' are in bold black text. Navigation links 'Sponsoring', 'Location', and 'FAQ' are underlined. A white rounded rectangle at the bottom contains the event description.

**CODE  
CONNECT**

UI5

**July 8-10, 2025**  
St. Leon-Rot, Germany

[Sponsoring](#) [Location](#) [FAQ](#)

**Ride the rails to UI5con, reCAP, and HANA Tech Con – three days,  
three conferences, one streamlined journey.**

## Devtoberfest:

<https://www.youtube.com/playlist?list=PL6RpkC85SLQDH97qsNTNAE2jnUKj8X5d>

1. ABAP and SAP Cloud Application Programming Model
2. Tooling
3. Integration
4. MAD  
(Machine Learning, AI, and Data)
5. Frontend



# SAP TechEd

## Where ideas get real

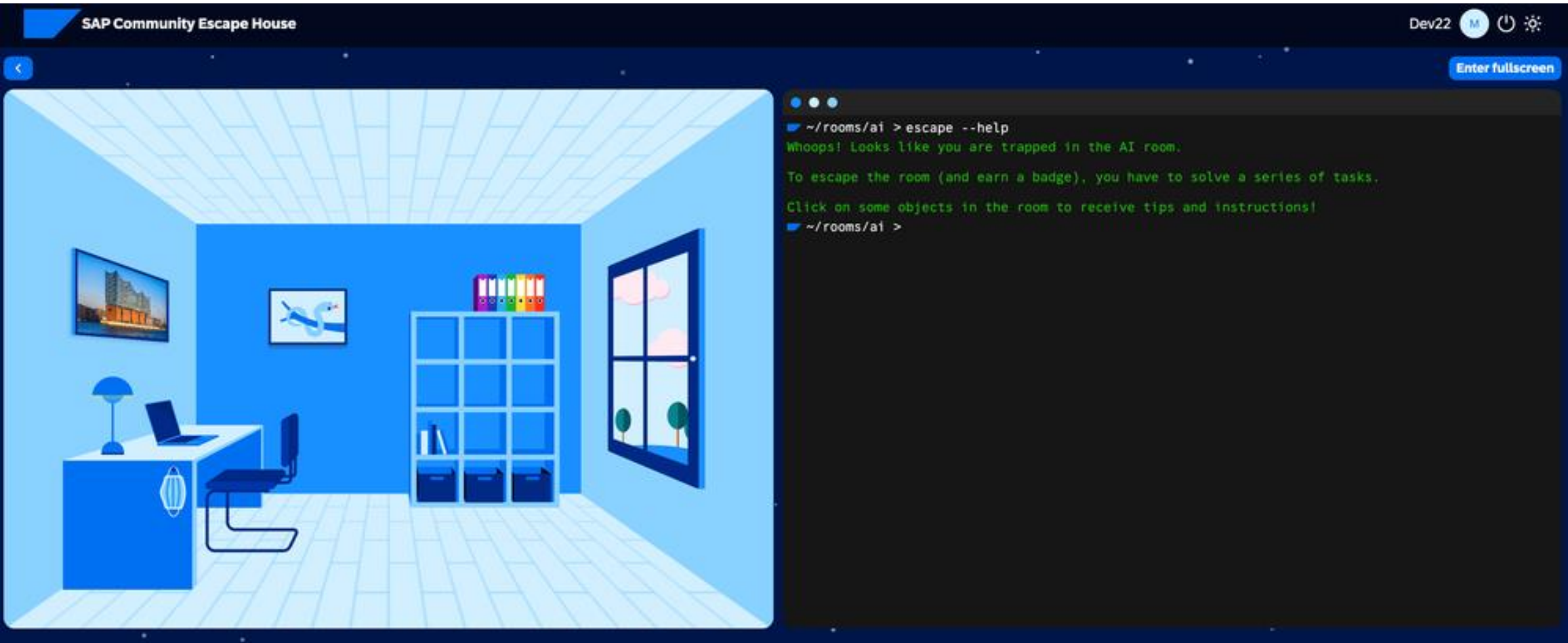
The SAP TechEd event brings together developers, practitioners, enterprise architects, and global IT leaders. Joined by SAP experts and partners, they'll unite to explore innovations in app development tools, generative AI, clean core for cloud ERP, and much more.



<https://www.sap.com/events/teched/virtual.html>:

Berlin and Virtual: **November 4-6, 2025**

# SAP Developer Challenge March - Community Escape House - AI 🤖 🧠



source: <https://community.sap.com/t5/artificial-intelligence-and-machine-learning-blogs/sap-developer-challenge-march-sap-community-escape-house-ai/ba-p/14030669>



# A bit of theory before we start

The image shows a chalkboard with several handwritten mathematical expressions. On the left, there is a diagram of a coordinate system with a horizontal axis. A point is labeled  $x+h$  with an arrow pointing to it. Above this, the word "Tangent" is written, followed by "line" and a small "T". In the center, the derivative of  $f(x)$  is calculated using the limit definition:

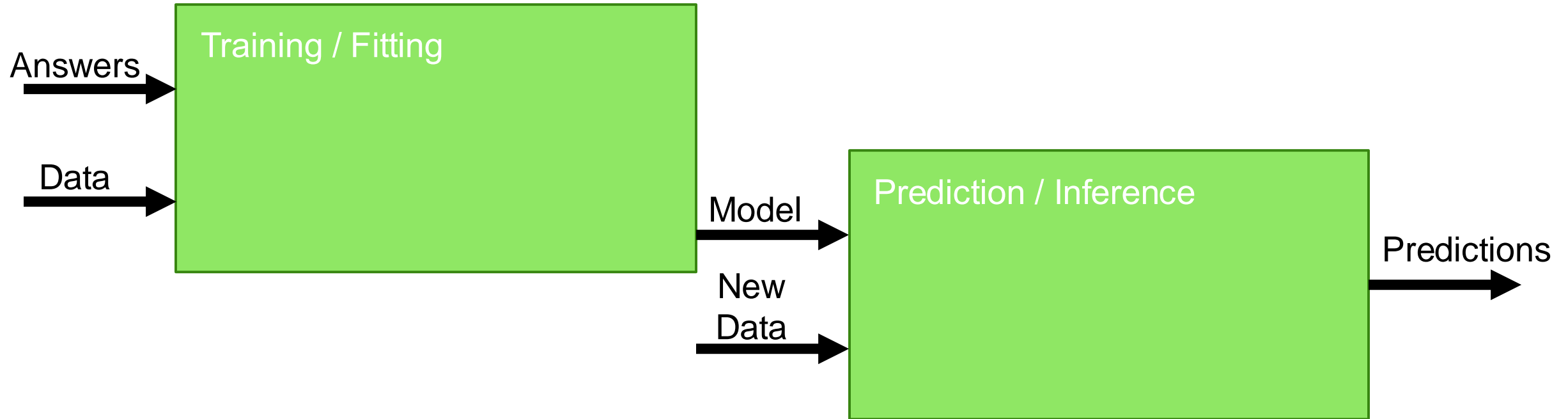
$$f'(x) = \lim_{h \rightarrow 0} \frac{(x+h)^2 - x^2}{h}$$
$$= \lim_{h \rightarrow 0} \frac{x^2 + 2xh + h^2 - x^2}{h}$$

To the right of this, another limit calculation is shown, resulting in  $\frac{1}{2\sqrt{x}}$ . Further to the right, the general limit definition for the derivative is written:

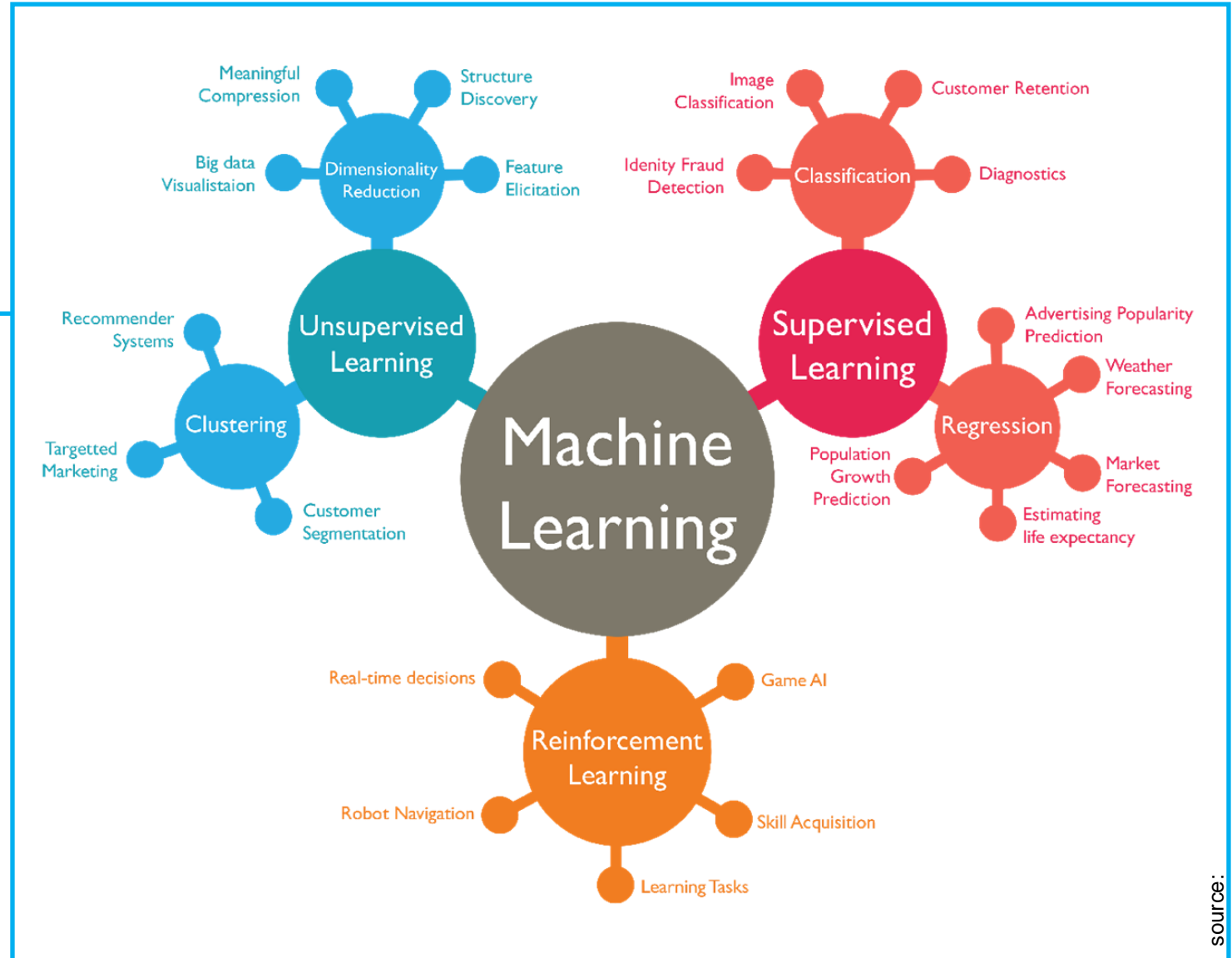
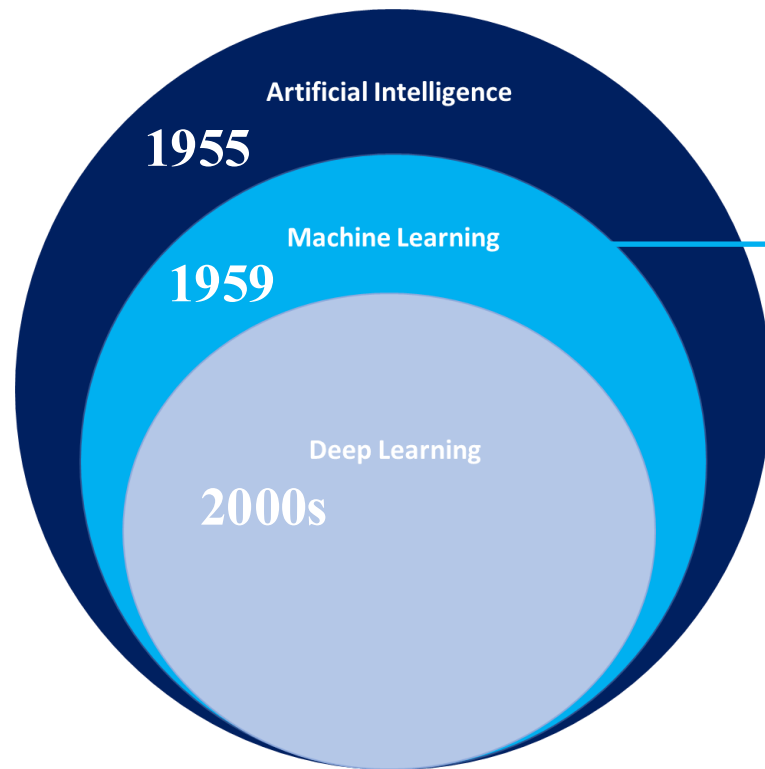
$$f'(x) = \lim_{\Delta x \rightarrow 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$$



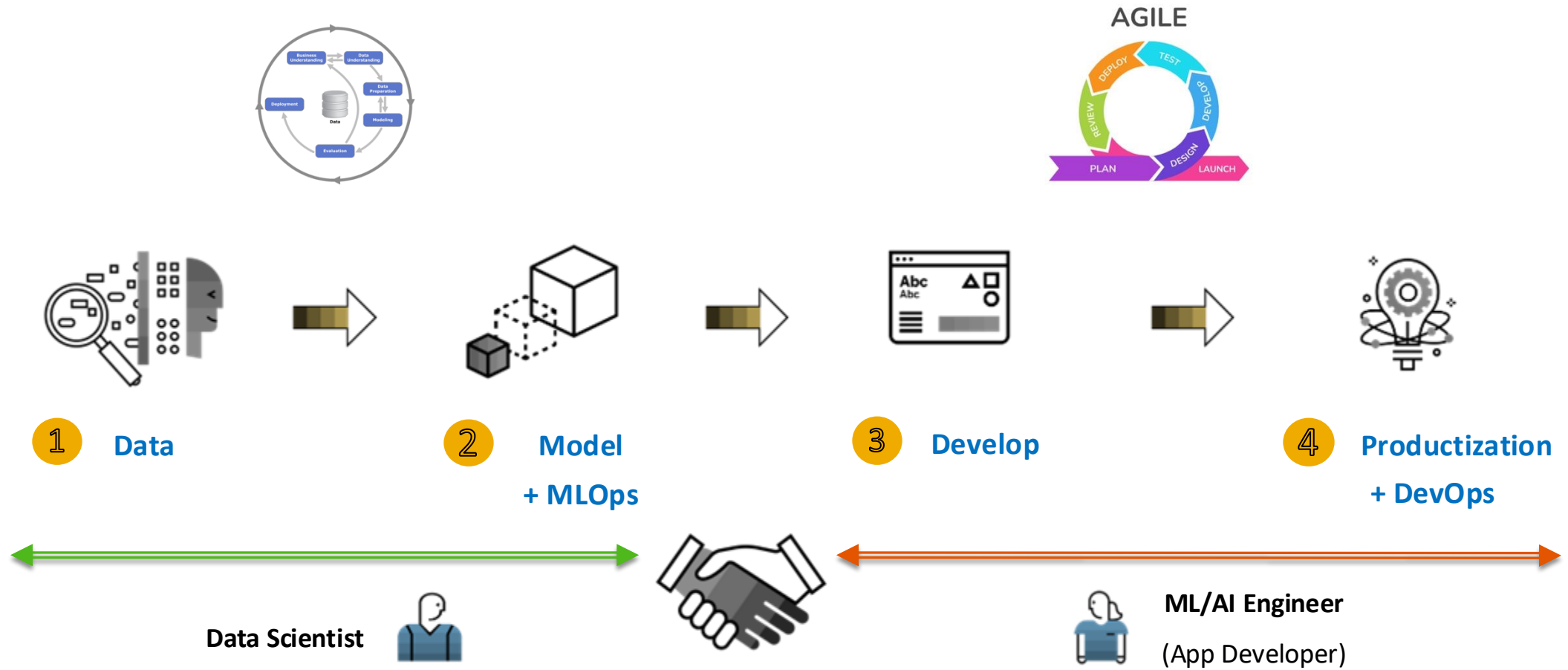
# Machine Learning



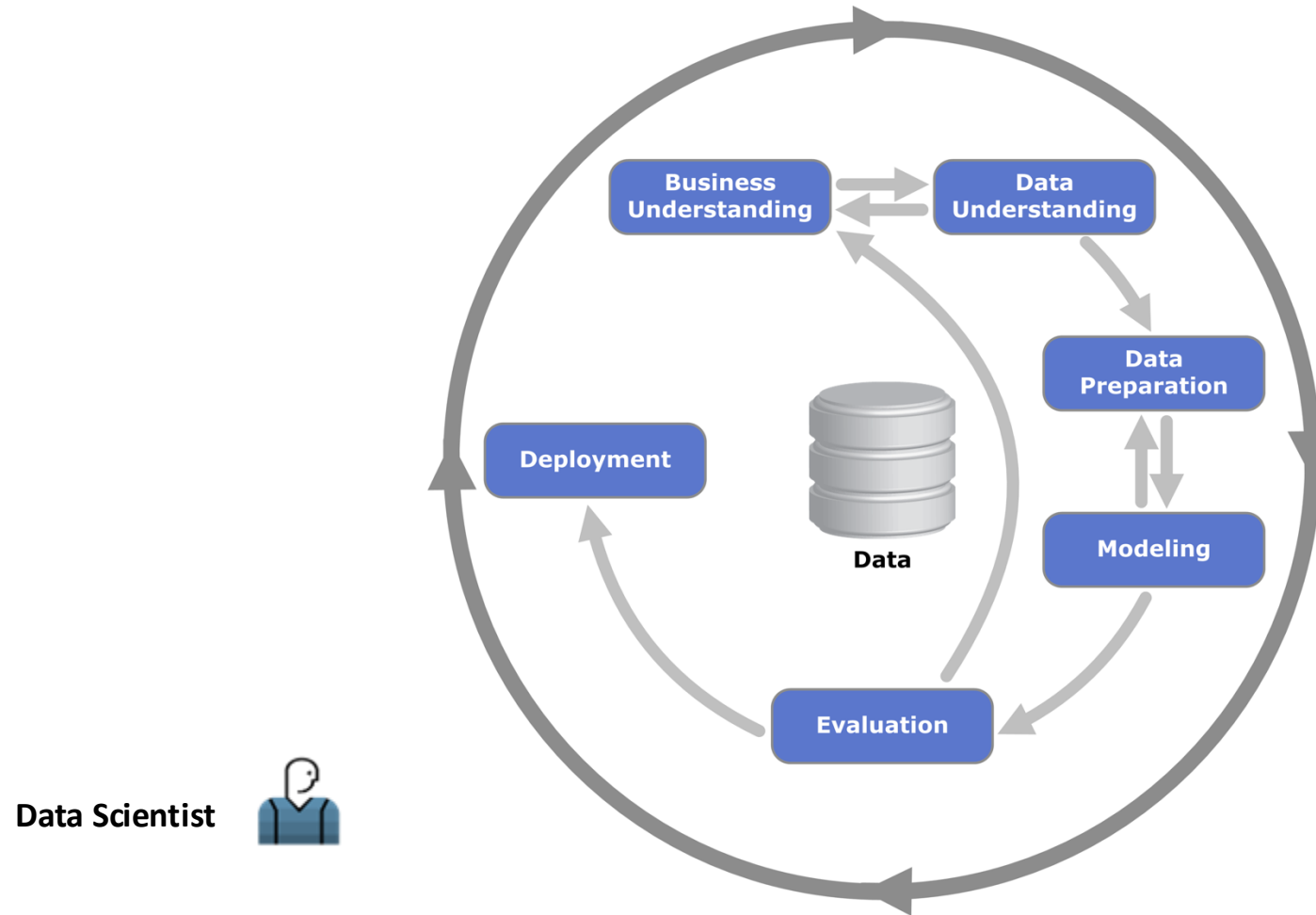
# Machine Learning Terminology



# Development Approach | Building an Intelligent Data Application




# Development Approach | Training a Model





```
top:-4px\0/;left:-6px\0/;right:  
-moz-inline-box;display:inline-block;fo  
gmo(display:block;list-style:none;  
play:inline-block;line-height:27px;padd  
cursor:pointer;display:
```

# Your ML Challenge today:



Create

Home

Competitions

Datasets

Models

Code

Discussions

Learn

More

## 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

See all

### 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

KnowledgeOngoing




House Prices - Advanced Regression Techniques

Predict sales prices and practice feature ...

Getting Started

4328 Teams

KnowledgeOngoing



Spaceship Titanic

Predict which passengers are transported...

Getting Started

2506 Teams

KnowledgeOngoing

Public

30

<https://www.kaggle.com/competitions>



# Exercises



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

(→ [https://bit.ly/CJ\\_HANAML](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>

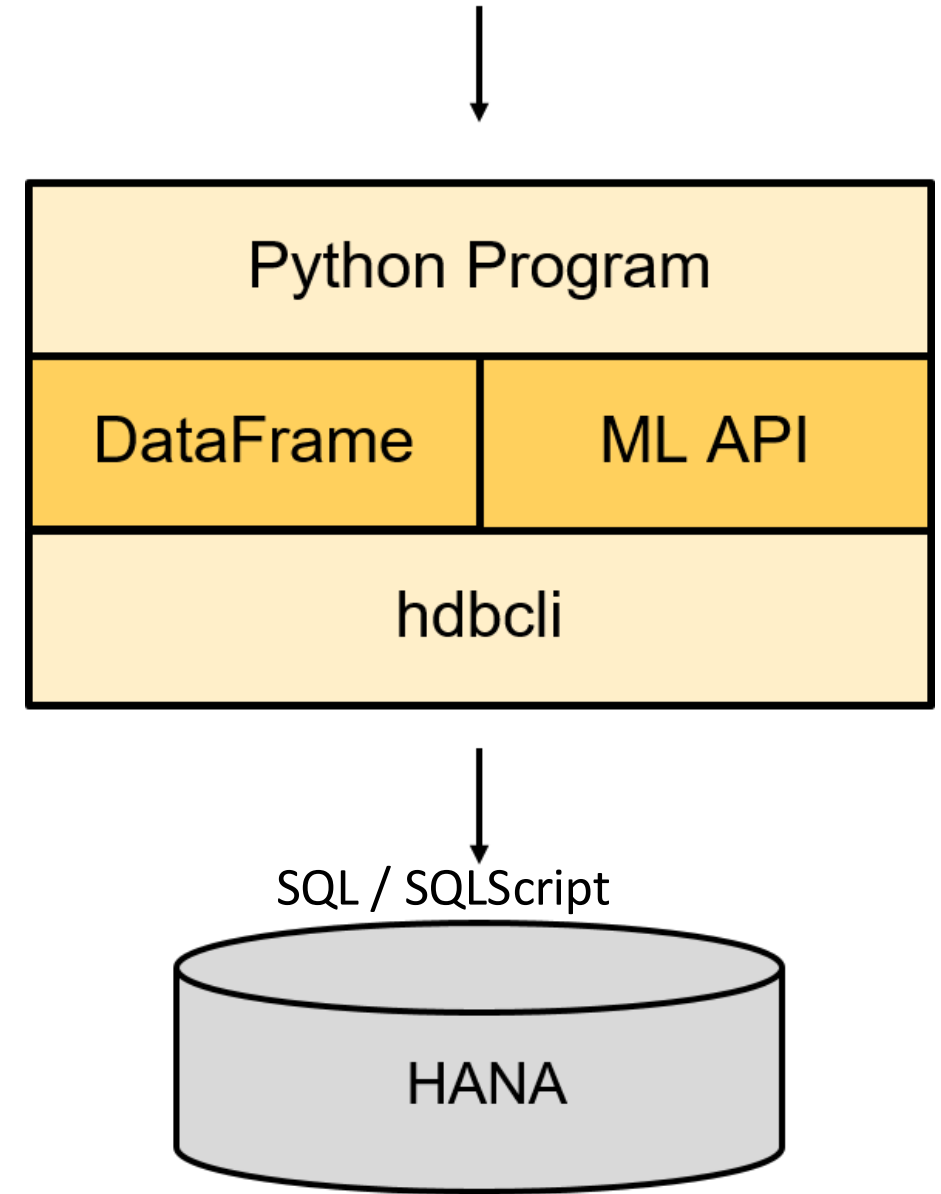
### **4. Try at home in your SAP BTP Trial:**

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

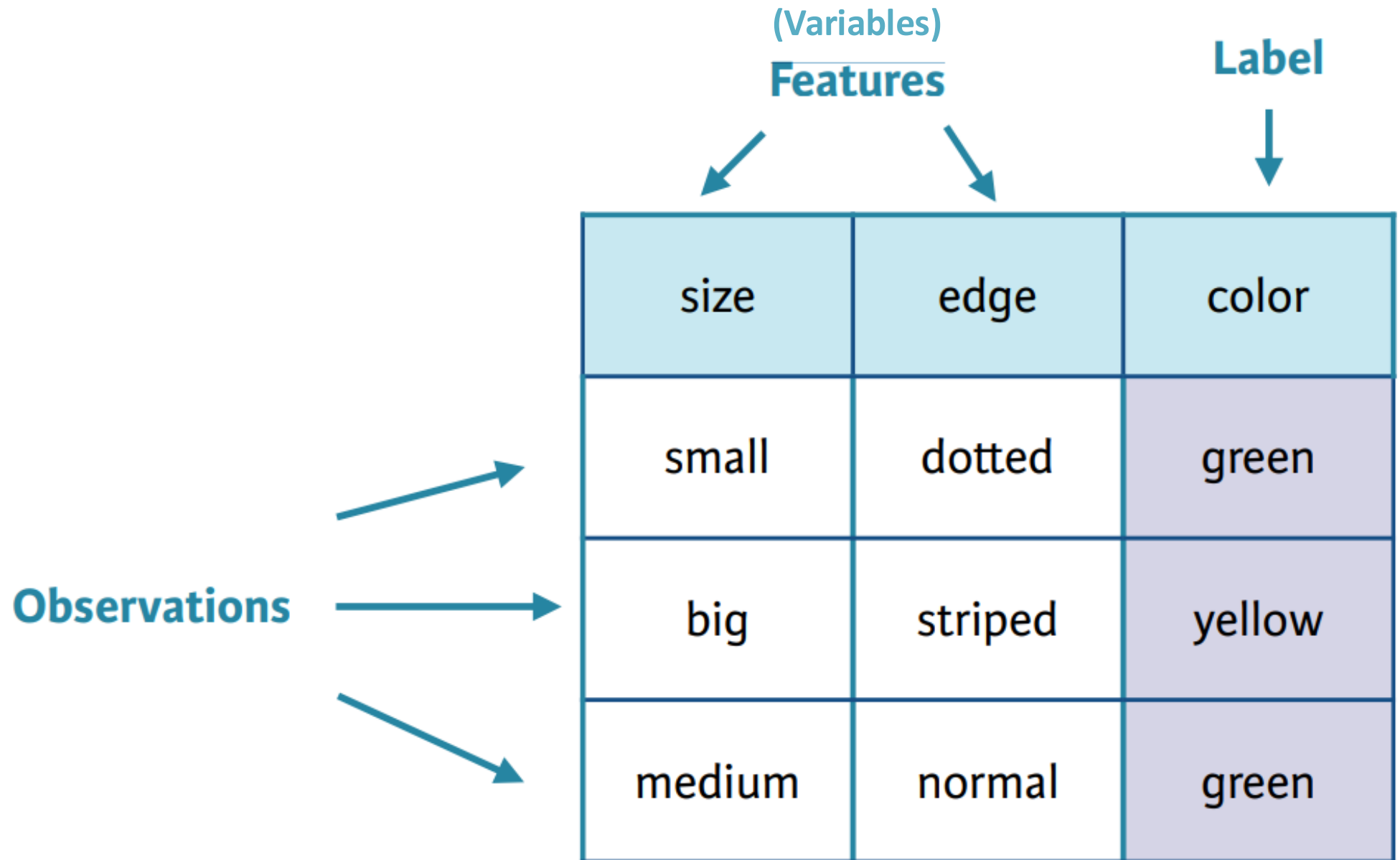
## Understand DataFrame(s)

Pandas DataFrame <-> HANA DataFrame

## Data Scientist using Python

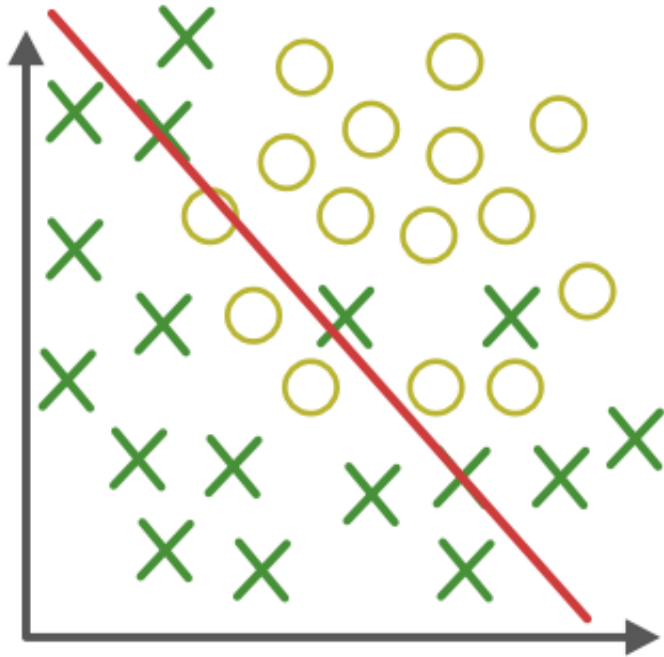


# Train datasets in Supervised Machine Learning

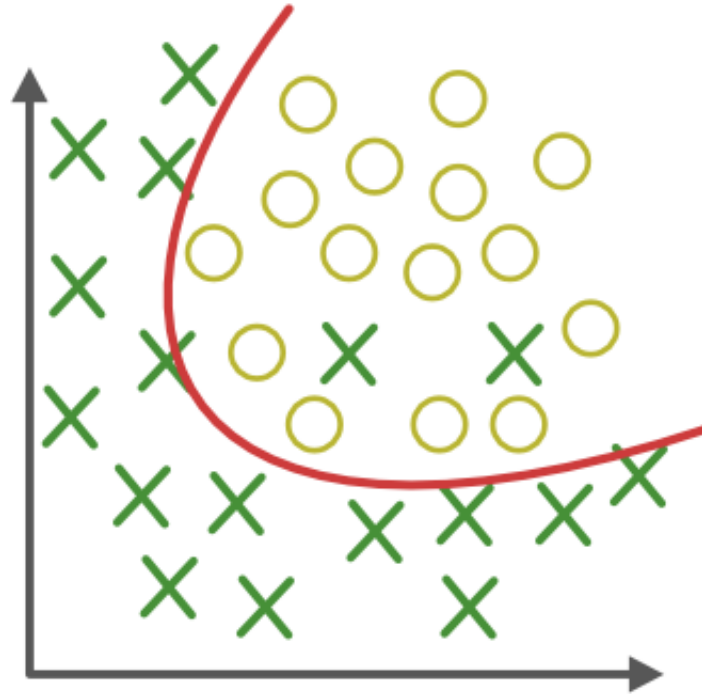


source: <https://zinayouhan33.medium.com/machine-learning-can-be-divided-into-3-categorizations-supervised-unsupervised-and-reinforcement-9a1b47460f5d>

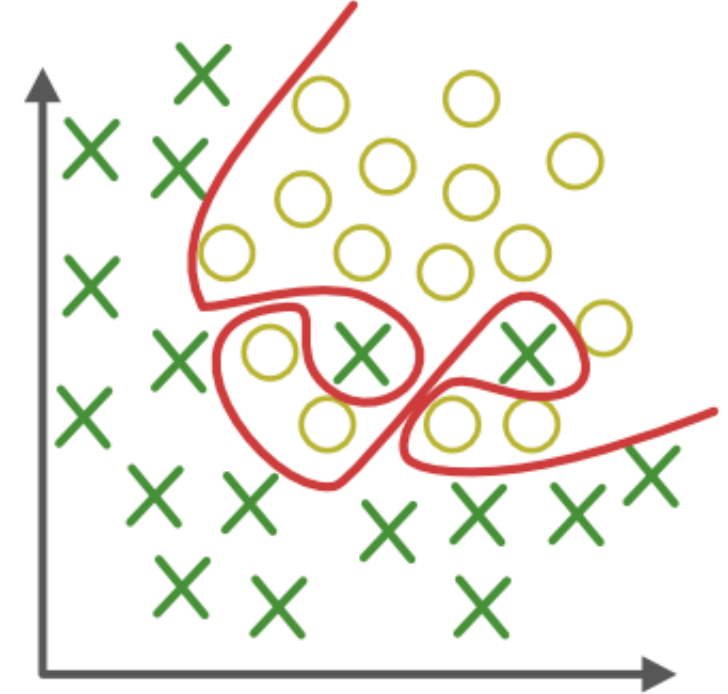
# Underfitting and Overfitting



**Under-fitting**  
(too simple to  
explain the variance)



**Appropriate-fitting**



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



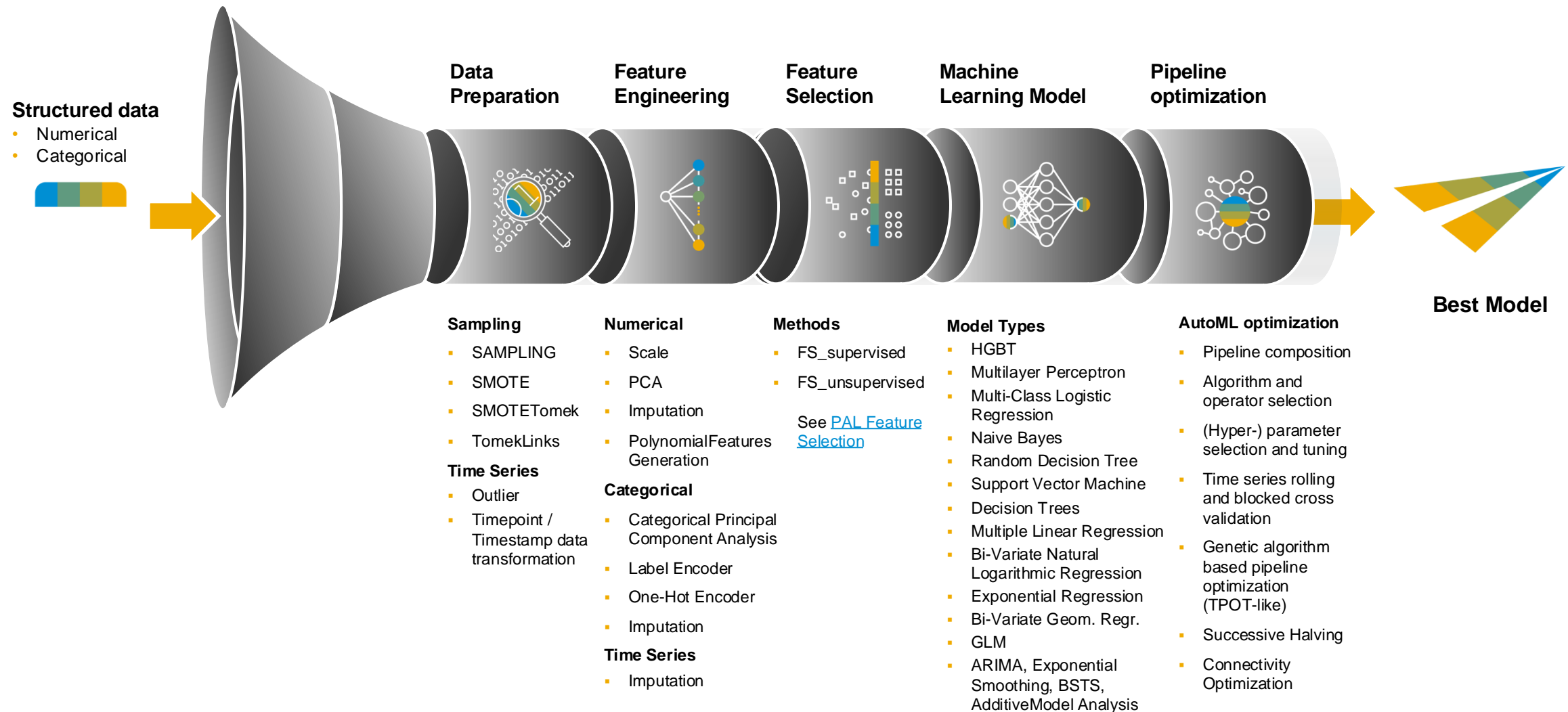
## Confusion matrix

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)	False negatives (FN)
	$N$	False positives (FP)	True negatives (TN)



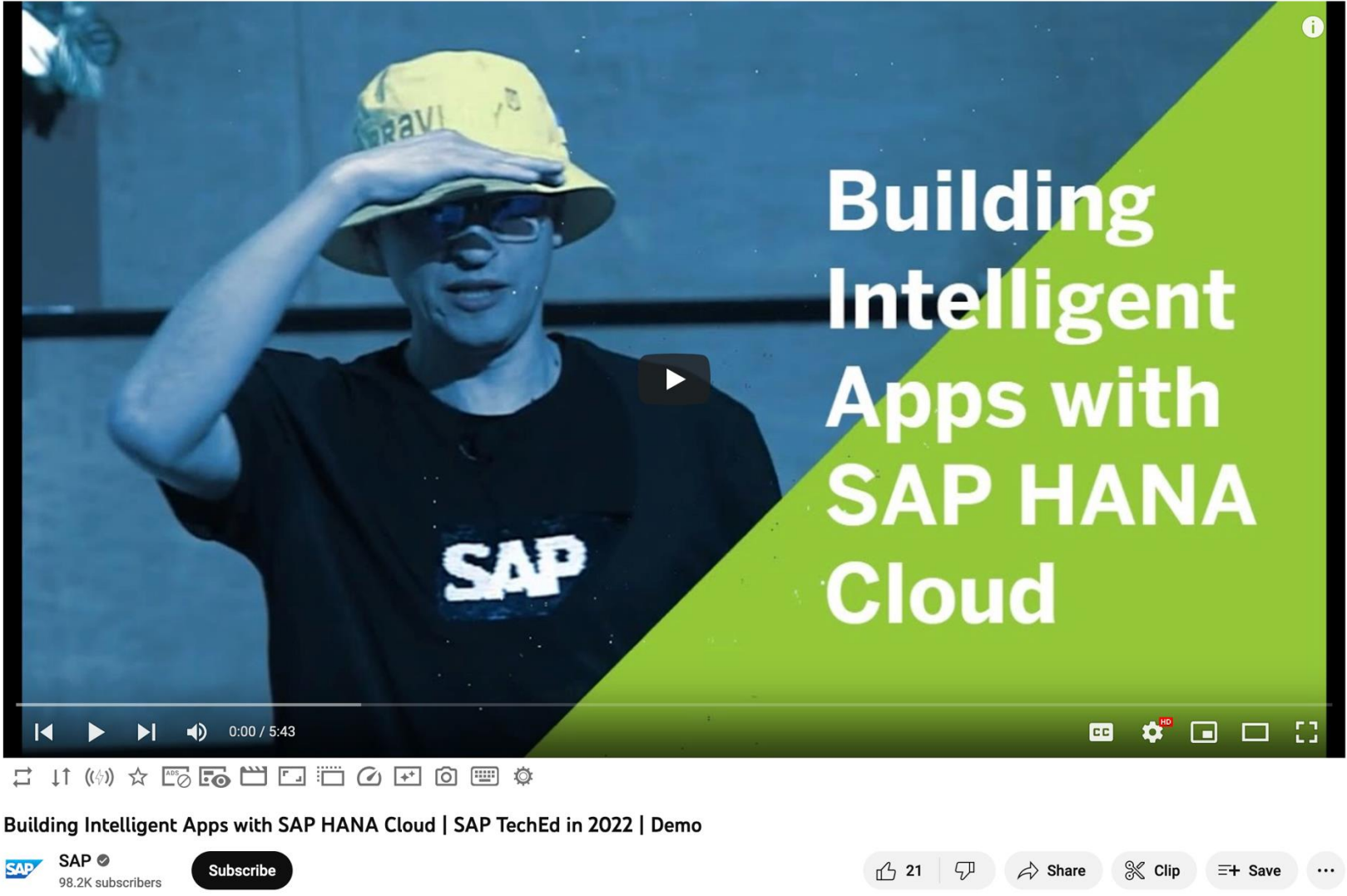
# Predictive Analysis Library | Automated Machine Learning – Supported Operators



# Additional content



## Development Approach | Building an Intelligent Data Application (demo)



The image shows a YouTube video player interface. The video title is "Building Intelligent Apps with SAP HANA Cloud". The channel is "SAP TechEd in 2022" with 98.2K subscribers. The video has 21 likes and a play button icon. The video content shows a person wearing a yellow hard hat and a black t-shirt with the SAP logo, standing in front of a blue background. The text "Building Intelligent Apps with SAP HANA Cloud" is overlaid on the right side of the video. The video player includes standard controls like play, pause, volume, and a progress bar showing 0:00 / 5:43. Below the video player, there are icons for various actions like share, clip, and save.

1 Data

Automation

## ● Embed the latest from SAP HANA's AI functions into your SAP BTP Application

### Devtoberfest

● MAD (Machine Learning, AI, and Data)

## Embed the latest from SAP HANA AI functions into your SAP BTP App

Christoph Morgen, SAP



# Learning journey: Developing Regression Models with the Python Machine Learning Client for SAP HANA

The screenshot shows the SAP Learning interface for a specific course. At the top, the SAP Learning logo is on the left, and navigation links (Browse, Get Certified, My Learning, Subscribe) and a search bar (Explore SAP) are on the right. Below the header, a breadcrumb trail shows 'On this page: Course Content' and 'SAP Learning Group'. The main title of the course is 'Developing Regression Models with the Python Machine Learning Client for SAP HANA'. The course is divided into two units. Unit 1, 'Introducing SAP HANA Machine Learning', is currently selected and highlighted with a green vertical bar on the left. It includes 2 lessons and takes 1 hour. The learning objectives for Unit 1 are: identifying the two main components of the Python ML client, defining the core features of SAP HANA Cloud, configuring the SAP HANA Cloud environment, utilizing SAP HANA DataFrames for data handling, and visualizing the attributes of the California housing dataset. The content for Unit 1 consists of 'Setting Up the Environment', 'Exploring Data with SAP HANA DataFrames', and a 'Quiz'. A 'Go to learning' button is located at the bottom right of the Unit 1 section. Unit 2, 'Building and Evaluating Regression Models', is listed below Unit 1. It includes 2 lessons and takes 45 minutes. The learning objectives for Unit 2 are: exploring the capabilities of the Hybrid Gradient Boosting Tree (HGBT) algorithm for regression, evaluating the linear regression model's performance using the R-squared metric, and evaluating changes in feature importance in the re-trained model. The content for Unit 2 consists of 'Training a Regression Model with SAP HANA PAL', 'Understanding Model Evaluation and Optimization', and a 'Quiz'.

**SAP Learning** Browse Get Certified My Learning Subscribe Explore SAP

On this page: **Course Content** SAP Learning Group

## Developing Regression Models with the Python Machine Learning Client for SAP HANA

**UNIT 1**

### Introducing SAP HANA Machine Learning

2 Lessons 1 hr

After completing this unit, you will be able to:

- Identify the two main components of the Python ML client
- Define the core features of SAP HANA Cloud
- Configure the SAP HANA Cloud environment
- Utilize SAP HANA DataFrames for data handling
- Visualize the attributes of the California housing dataset

Content

- Setting Up the Environment
- Exploring Data with SAP HANA DataFrames
- Quiz

**Go to learning**

**UNIT 2**

### Building and Evaluating Regression Models

2 Lessons 45 mins

After completing this unit, you will be able to:

- Explore the capabilities of the Hybrid Gradient Boosting Tree (HGBT) algorithm for regression
- Evaluate the linear regression model's performance using the R-squared metric
- Evaluate changes in feature importance in the re-trained model

Content

- Training a Regression Model with SAP HANA PAL
- Understanding Model Evaluation and Optimization
- Quiz

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

main

hana-ml-samples / Python-API / usecase-examples /

Go to file

Add file

cmog

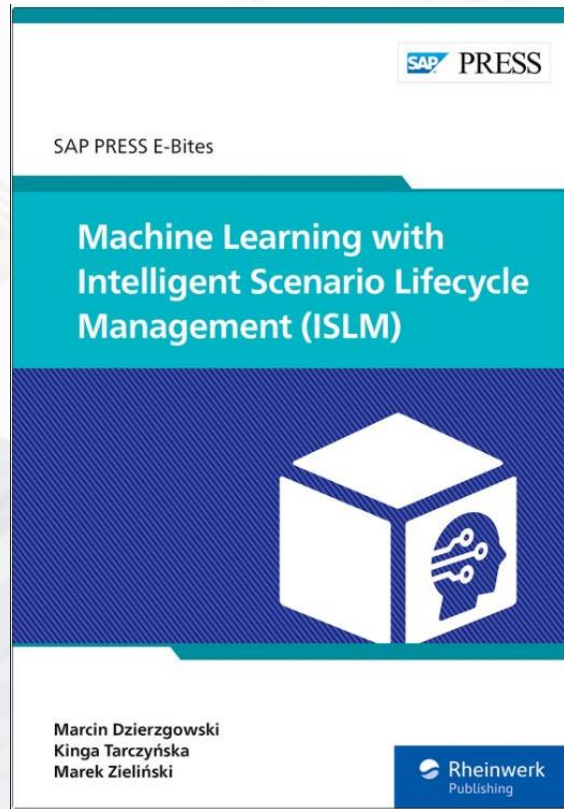
FairML - Fair Recruiting Model

f009115 · 3 weeks ago

History

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](http://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

# SAP HANA Cloud – Free offering

## SAP HANA Cloud Basic Trial

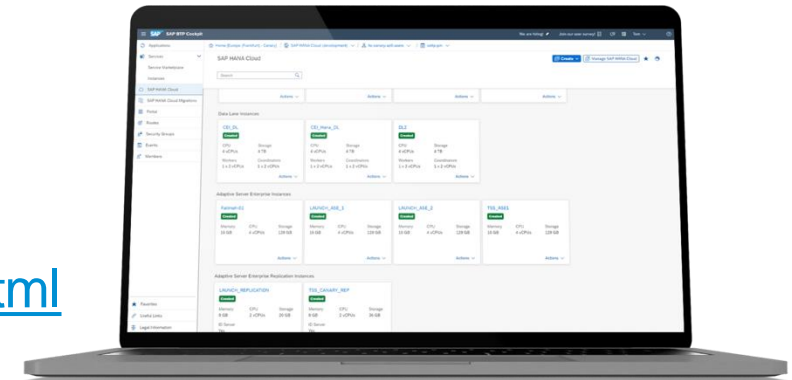
- 30-days own-schema shared-instance
- <https://www.sap.com/products/technology-platform/hana/trial.html>

## SAP HANA Cloud (Advanced) 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>



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<https://ugearsmodels.com/>

Free shipping on all orders of €60 or more!


UGEAR'S  
Mechanical Models

CATALOG ▾ BEST DEALS CUSTOMER SERVICE ▾ UGEARS WORLDWIDE GIFT IDEAS ❤️


# NEW RELEASE



SERENITY'S DREAM YACHT

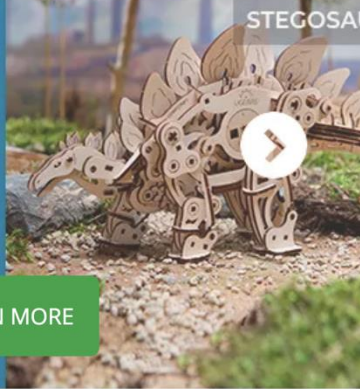


NASA SPACE SHUTTLE DISCOVERY




RESCUE HOVERCRAFT


LEARN MORE




STEGOSAUR



**SELF ASSEMBLY**  
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/>



SCAN ME

# Thank you // Дякую! // ধন্যবাদ

Contact information:

Witalij Rudnicki, **SAP Developer Advocacy**

