

CAS ETH Machine Learning in Finance and Insurance

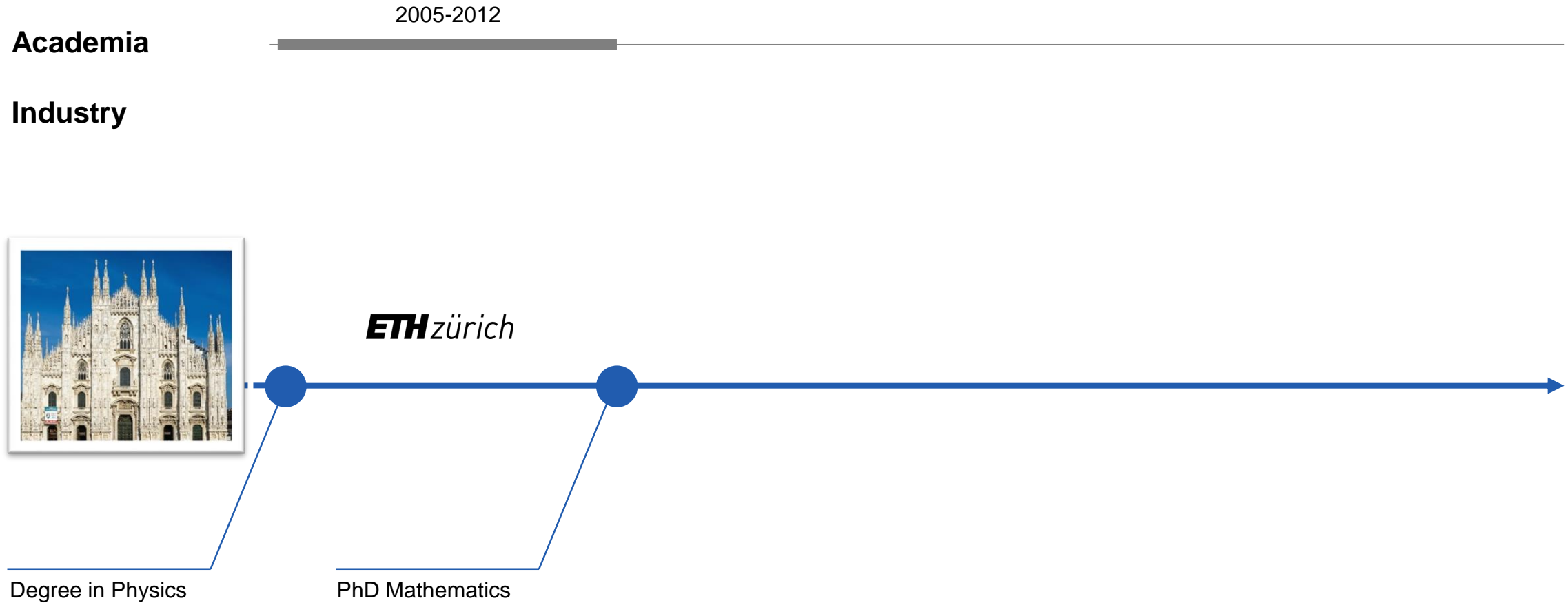
BLOCK I. Introduction to Machine Learning. Session 0.

Dr. A. Ferrario, ETH Zurich and UZH



Getting to know each other

Ciao! Ich bin der Andrea



Ciao! Ich bin der Andrea

Academia

2005-2012

Industry

2012-2017



ETH zürich

BearingPoint



Actuarial Data Science
An initiative of the Swiss Association of Actuaries

Degree in Physics

PhD Mathematics

Data & Analytics Advisory for
Financial Services

Big Data

Predictive Analytics

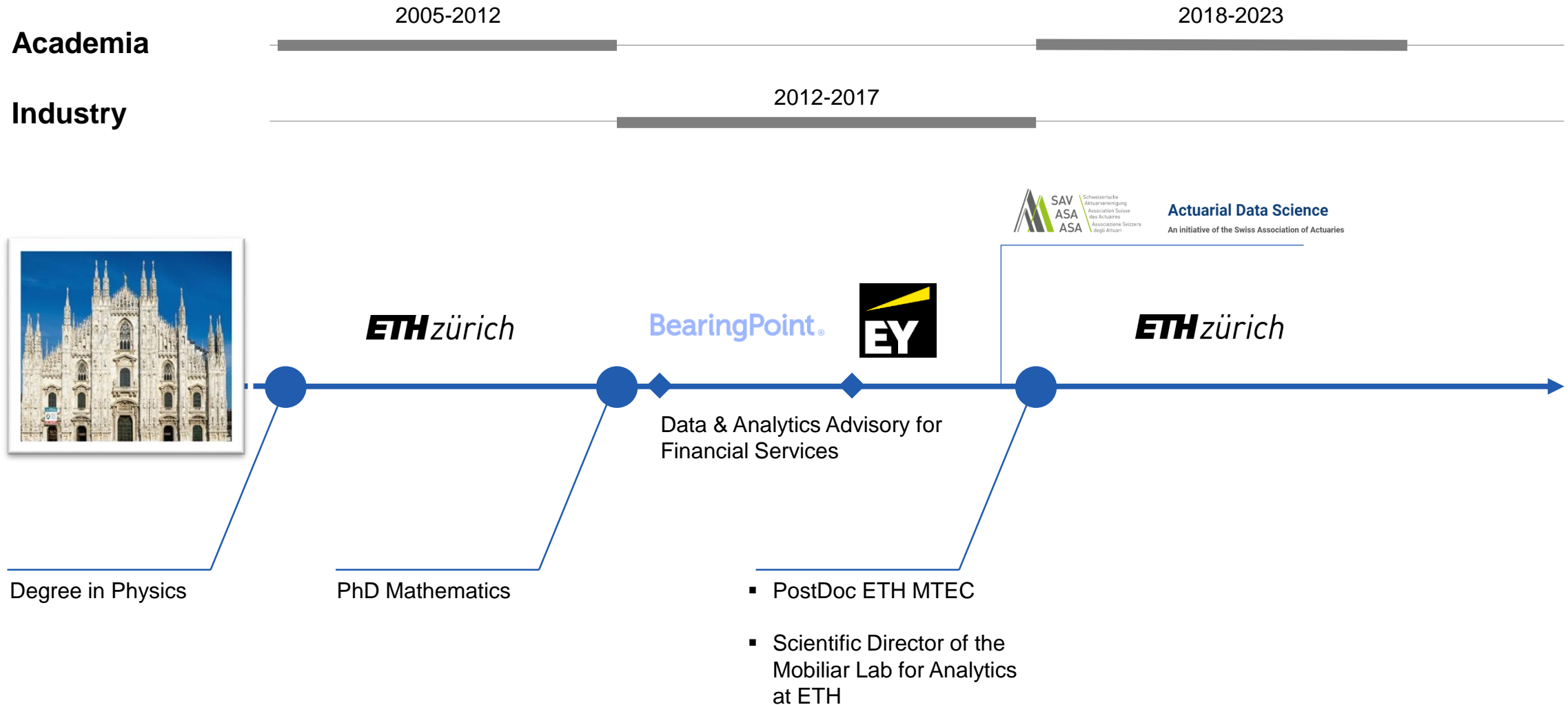
Robotic Process Automation

Cognitive Robotic Process Automation

Artificial Intelligence (AI)

Trustworthy AI

Ciao! Ich bin der Andrea



Ciao! Ich bin der Andrea

Academia

Industry

2005-2012



ETHzürich

Degree in Physics

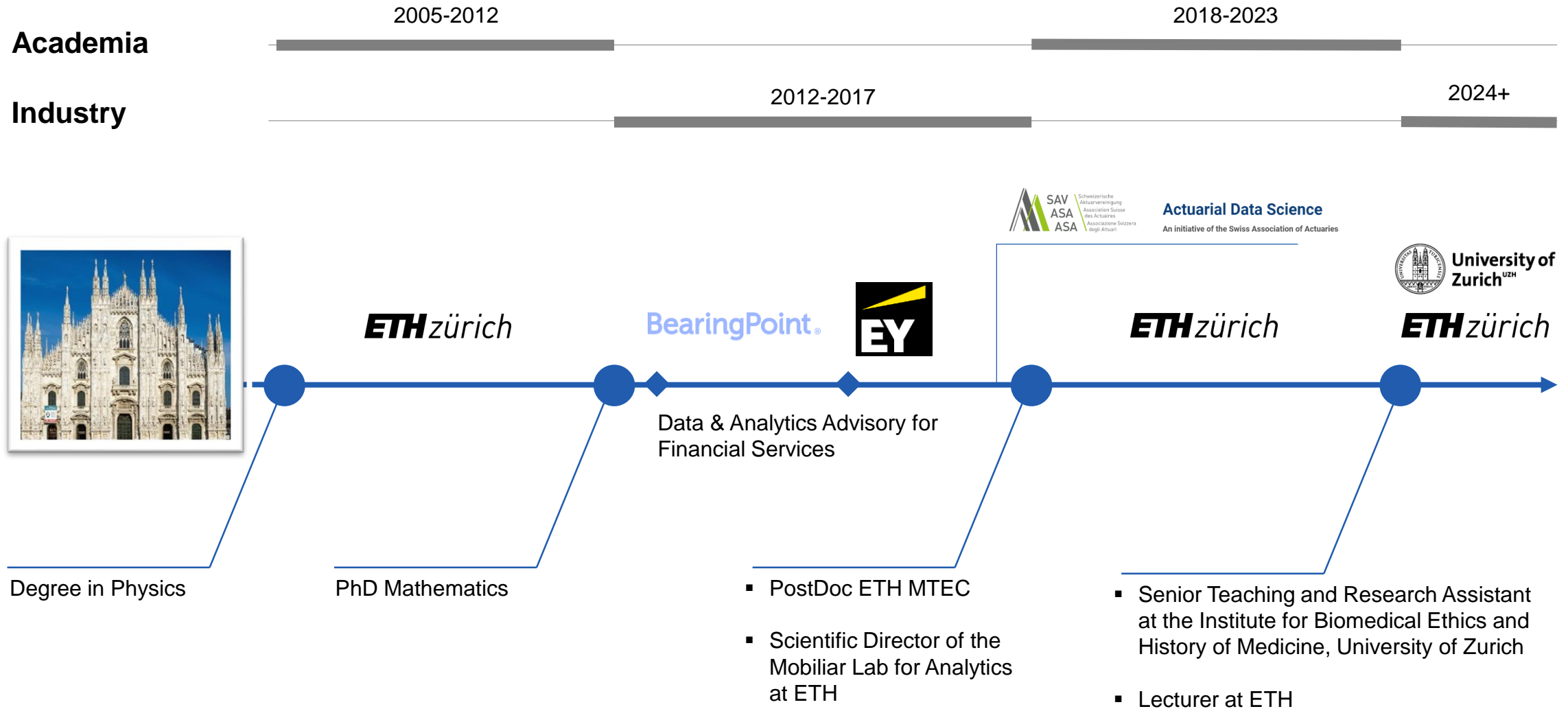
PhD Mathematics

The Mobiliar Lab for Analytics at ETH (2018-2023)

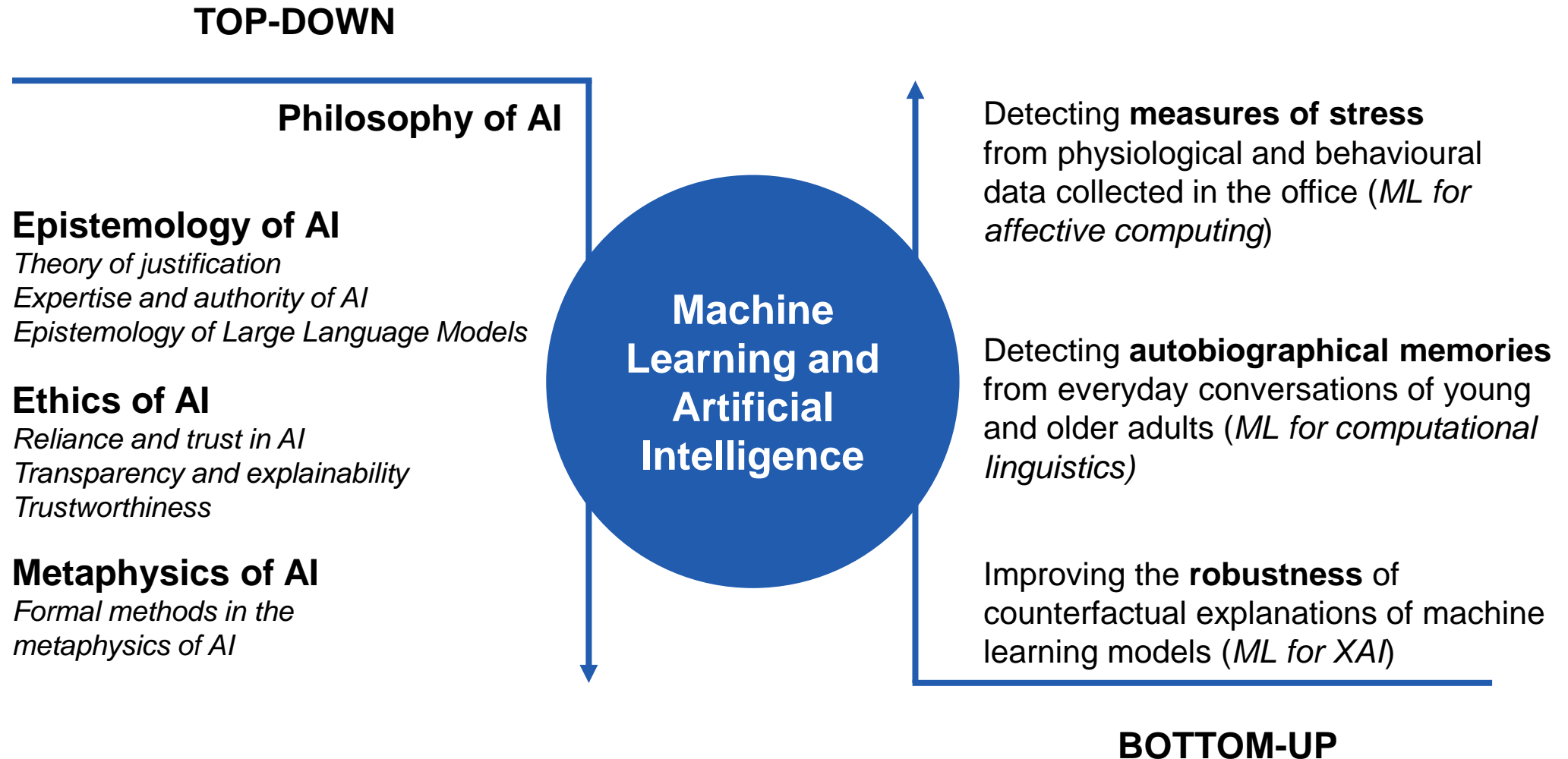


- Joint venture between die Mobiliar and ETH
- **Focus:** generating value for society through excellent research
- **Lab Lead (since 2018):** Prof. Dr. Florian von Wangenheim
- **Research:**
 - Interdisciplinary investigations on the implications of new technologies on human-machine interactions
 - Conception, design, development of digital technology-based artifacts to run experiments in order to test scientific hypotheses with statistics and machine learning methodologies
- **Methods:**
 - Core: data science (e.g. statistics and machine learning); signal processing and devices; software engineering
 - Cognitive and Behavioral Sciences, Service Marketing, Social Psychology and Bioethics

Ciao! Ich bin der Andrea



Some of my research in the machine learning and artificial intelligence fields



BLOCK I. Intro to Machine Learning: Overview

- Learning objectives
- Requirements
- Schedule
- Content, structure and success criteria
- A little extra

Learning objectives

I

Acquire a **good understanding of fundamental machine learning concepts** and their theoretical underpinnings

II

Perform **machine learning modeling in Python** using Google Colab infrastructure confidently

III

Cultivate an analytical mindset for identifying, developing and applying machine learning methodologies in financial services scenarios

By the way...equipment

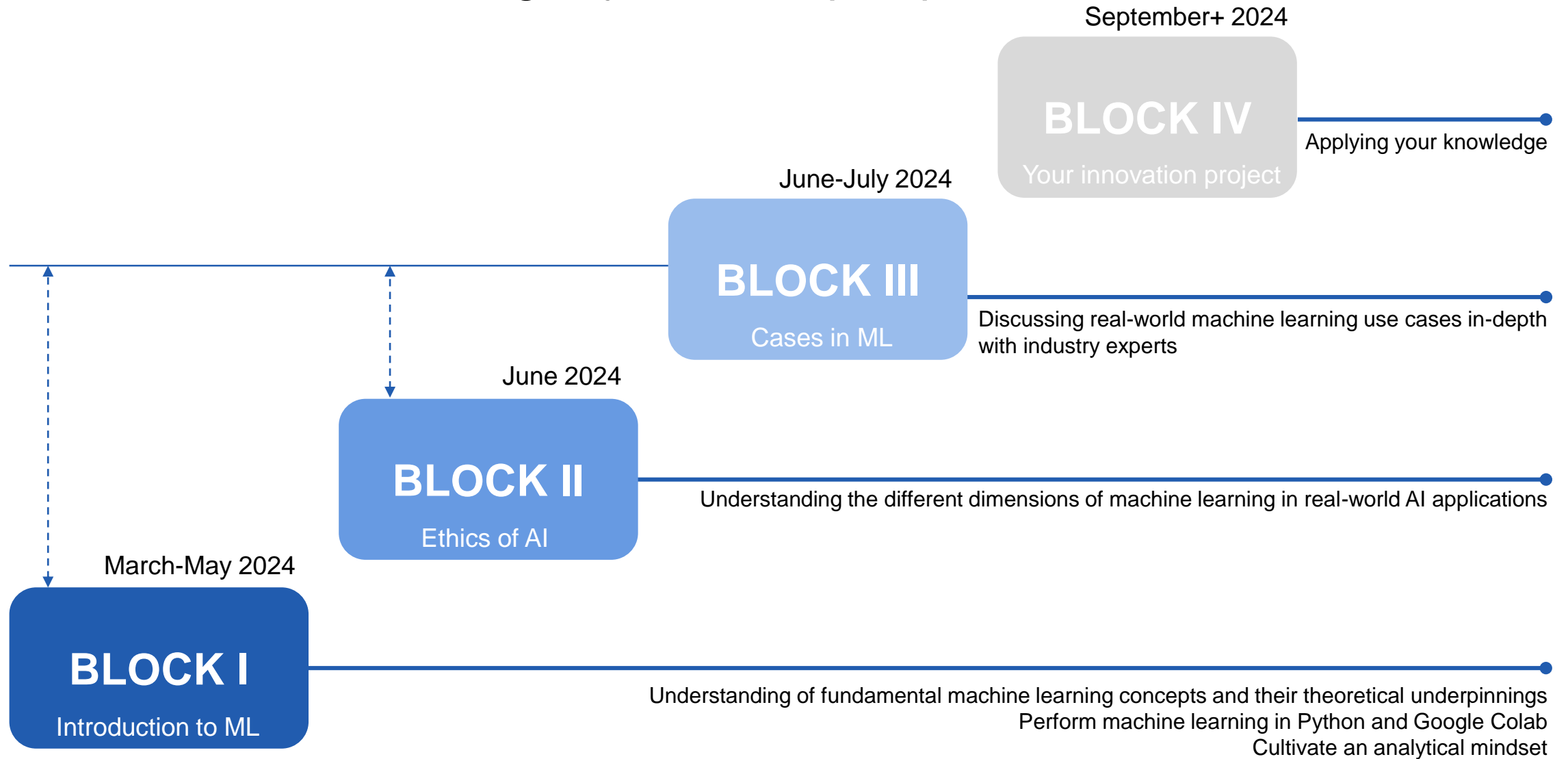


Personal Computer + Internet access



Paper and pen

BLOCK I and its learning objectives in perspective



Schedule of **BLOCK I: Intro to ML**

Date	Time	Location	Remark
March 01 st , 2024	09:15 - 16:00	HG E33.1 & Zoom (via Moodle)	Afternoon session: introduction to Block I
March 08 th , 2024	09:15 - 12:00	HG G19.1 & Zoom (via Moodle)	
March 15 th , 2024	09:15 - 12:00	HG G19.2 & Zoom (via Moodle)	
March 22 nd , 2024	09:15 - 16:00	Morning: HG G19.1 & Zoom (via Moodle) Afternoon: HG G19.2 & Zoom (via Moodle)	Afternoon session with Dr. Visentin
March 23 rd , 2024	09:15 - 16:00	HG G19.2 & Zoom (via Moodle)	Workshop on Large Language Models with E. Venteouri, Prof. Teichmann and Dr. Bergmann
April 12 th , 2024	09:15 - 16:00	HG G19.2 & Zoom (via Moodle)	Afternoon session with Dr. Visentin
April 13 th , 2024	09:15 - 16:00	HG G19.1 & Zoom (via Moodle)	Workshop on Large Language Models with E. Venteouri, Prof. Teichmann and Dr. Bergmann
April 19 th , 2024	09:15 - 12:00	HG G19.2 & Zoom (via Moodle)	Q&A session with Dr. Visentin
May 17 th , 2024	09:15 - 12:00	HG G19.2 & Zoom (via Moodle)	
May 24 th , 2024	09:15 - 16:00	HG G19.2 & Zoom (via Moodle)	Morning session with Prof. Teichmann

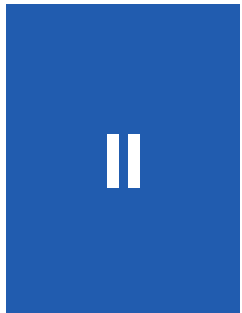
Content of **BLOCK I: Intro to ML**

I

Introducing Machine learning

- What is machine learning?
- How to do machine learning?
- How to learn to do machine learning?

Content of **BLOCK I: Intro to ML**

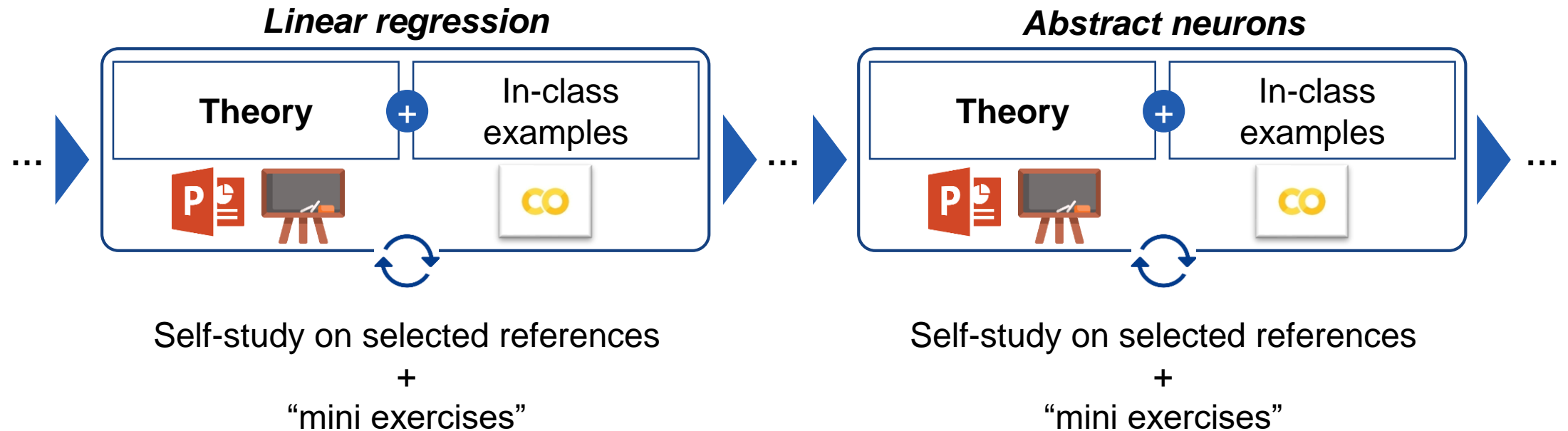


Methods of Machine learning

- Mathematical background
- Statistical learning
- Methods of supervised learning
 - Linear regression
 - (Stochastic) gradient descent
 - Logistic regression
 - Neural networks
 - Tree-based methods

Structure of **BLOCK I: Intro to ML**

We follow a modular learning experience. Each module comprises (1) theory, (2) an in-class exercise, and (3) suggestions for self-study and exercising



Our lectures focus on a “***well-structured intuition***” of key machine learning concepts accompanied by high-level mathematical formalism and hands-on tasks

Success criteria for **BLOCK I: Intro to ML**

Groups

- You will form groups of three students and work on two projects introduced by Dr. Visentin:
 - “Credit Analytics” (March 22nd)
 - “Insurance premium” (April 12th)
- You have total freedom on how to form groups. Send an email to Andrea with the group composition.
- Please nominate a spokesperson per group – it helps communication

Deliverables

- You will submit a structured report and a notebook per project
- Upload reports and notebooks on Moodle
- Report template will be found on Moodle
- You will receive feedback on the report and the code
- **Deadline:** May 17th

Remark

- “Mini-exercises” are not graded. If you want to discuss them, just let me know.

Before starting: Asking chatGPT 4.0 about this CAS

AN

You

Give me a bullet list of the main topics for a "Certificate of Advance Studies in Machine Learning in Finance and Insurance" that lasts two semesters at a top university. Students are professionals with degrees in engineering, mathematics and natural sciences. Be really concise.

Prompts and answers: chatGPT 4.0, February 2024

Before starting: Asking chatGPT 4.0 about this CAS



ChatGPT

Here's a concise bullet list of main topics for a "Certificate of Advanced Studies in Machine Learning in Finance and Insurance" program lasting two semesters at a top university, tailored for professionals with backgrounds in engineering, mathematics, and natural sciences:

- **Fundamentals of Machine Learning:**
 - Introduction to machine learning concepts
 - Supervised and unsupervised learning techniques
 - Deep learning fundamentals
- **Statistical Methods for Finance and Insurance:**
 - Probability models and statistical inference
 - Time series analysis and forecasting
 - Risk assessment and management
- **Computational Finance:**
 - Numerical methods for finance
 - Algorithmic trading strategies
 - Portfolio optimization
- **Machine Learning Applications in Finance:**
 - Credit scoring models
 - Fraud detection
 - Algorithmic trading and asset pricing
- **Machine Learning Applications in Insurance:**
 - Predictive modeling for insurance pricing
 - Claim prediction and processing
 - Customer segmentation and lifetime value analysis
- **Ethical and Regulatory Considerations:**
 - Data privacy and security in financial applications
 - Ethical AI use in finance and insurance
 - Regulatory environment for fintech and insurtech
- **Advanced Topics in Machine Learning:**
 - Natural language processing for financial analysis
 - Reinforcement learning in trading systems
 - Blockchain and cryptocurrencies analysis
- **Capstone Project:**
 - Real-world machine learning project in finance or insurance
 - Application of course concepts to a business challenge
 - Presentation and analysis of findings

Prompts and answers: chatGPT 4.0, February 2024

Before starting: Asking chatGPT 4.0 about this CAS

AN

You

Give me a bullet list of what to avoid discussing for a "Certificate of Advance Studies in Machine Learning in Finance and Insurance" that lasts two semesters at a top university. Students are professionals with degrees in engineering, mathematics and natural sciences. Be really concise.

Prompts and answers: chatGPT 4.0, February 2024

Before starting: Asking chatGPT 4.0 about this CAS



ChatGPT

For a "Certificate of Advanced Studies in Machine Learning in Finance and Insurance" aimed at professionals with backgrounds in engineering, mathematics, and natural sciences, it's important to maintain focus on relevant topics. Here's a concise bullet list of what to avoid discussing:

- **Basic Principles Unrelated to ML:**
 - Elementary principles of engineering, mathematics, or natural sciences not directly applicable to ML
- **General IT Skills:**
 - Basic computer literacy and software skills not specific to machine learning
- **Unrelated Business Disciplines:**
 - Areas of finance and insurance not impacted by machine learning (e.g., traditional marketing strategies, non-digital business operations)
- **Outdated Machine Learning Techniques:**
 - Obsolete algorithms and models that have been superseded by more efficient methods
- **Overly Theoretical Concepts Without Practical Application:**
 - Deep theoretical concepts in mathematics or computer science that do not directly contribute to practical ML applications in finance and insurance
- **Niche Programming Languages Rarely Used in ML:**
 - Focus on programming languages that are not widely used in the machine learning community
- **Non-ML Technologies Unrelated to Finance and Insurance:**
 - Emerging technologies that don't have a direct application or impact on finance and insurance sectors
- **Detailed Regulations Unrelated to ML Applications:**
 - In-depth exploration of financial and insurance regulations that do not intersect with ML applications
- **Excessive Focus on Manual Data Analysis Techniques:**
 - Traditional, manual statistical methods that are not relevant to machine learning processes

Prompts and answers: chatGPT 4.0, February 2024

Introducing Machine Learning

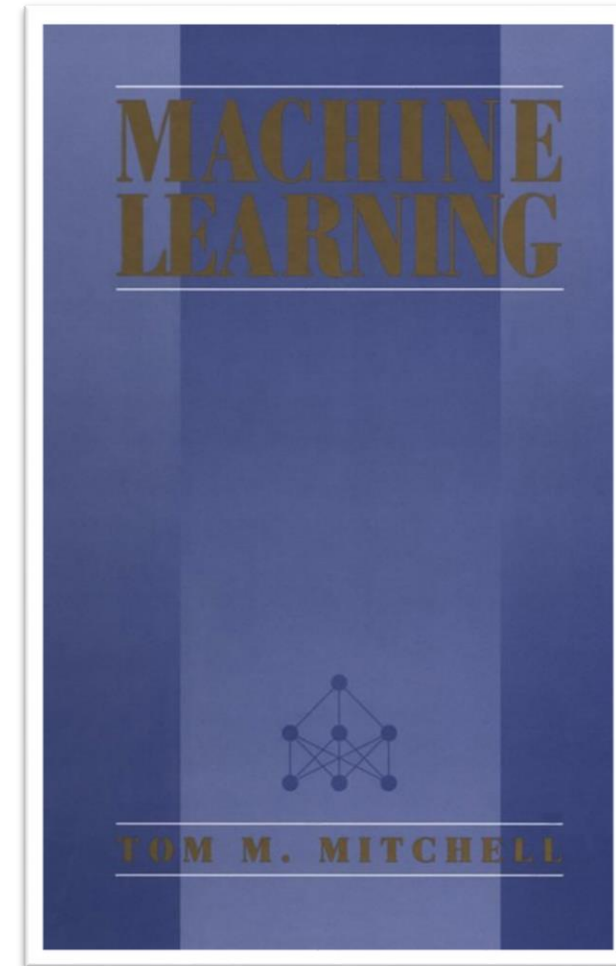
- What is machine learning?
- How to do machine learning?
- How to learn to do machine learning?
- Time to reflect
- Our first Google Colab exercise

Introducing Machine Learning

What is machine learning?

What is machine learning?

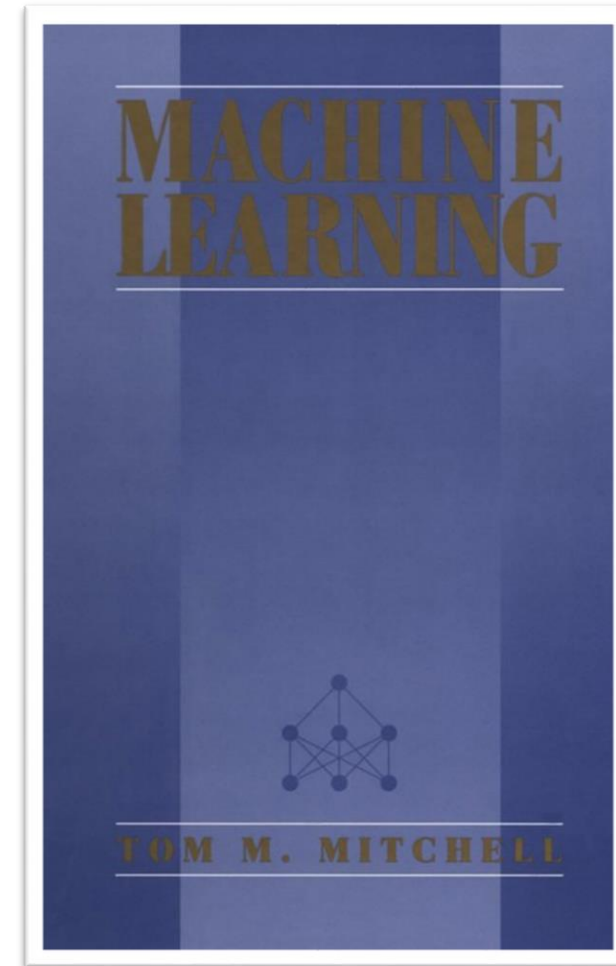
“The field of machine learning is concerned with the question of how to construct computer programs that automatically improve with experience” (pag. xv)



Mitchell, Tom M. “Machine Learning.” McGraw Hill, 1997.

What is machine learning?

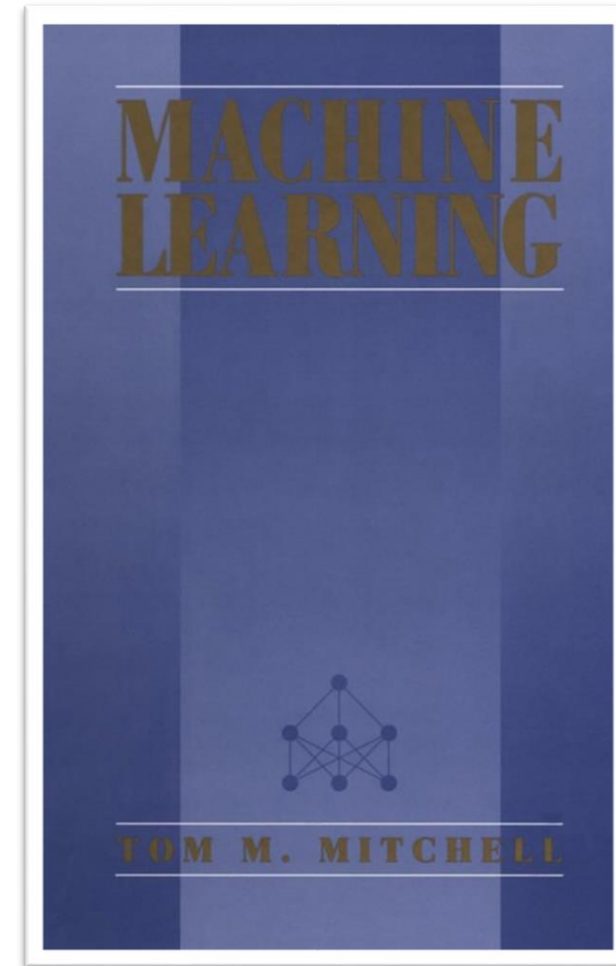
“Machine learning draws on concepts and results from many fields, including statistics, artificial intelligence, philosophy, information theory, biology, cognitive science, computational complexity, and control theory” (pag. xv)



Mitchell, Tom M. “Machine Learning.” McGraw Hill, 1997.

What is machine learning?

“A computer program is said to **learn** from experience E with respect to some class of tasks T and performance measure P , if its performance at tasks in T , as measured by P , improves with experience E ” (emphasis in original, pag. 2)



Mitchell, Tom M. “Machine Learning.” McGraw Hill, 1997.

What is machine learning?

Mitchell tells us that...

1

Machine learning is an interdisciplinary field (of research)

2

“Machine” stands for computer programs

3

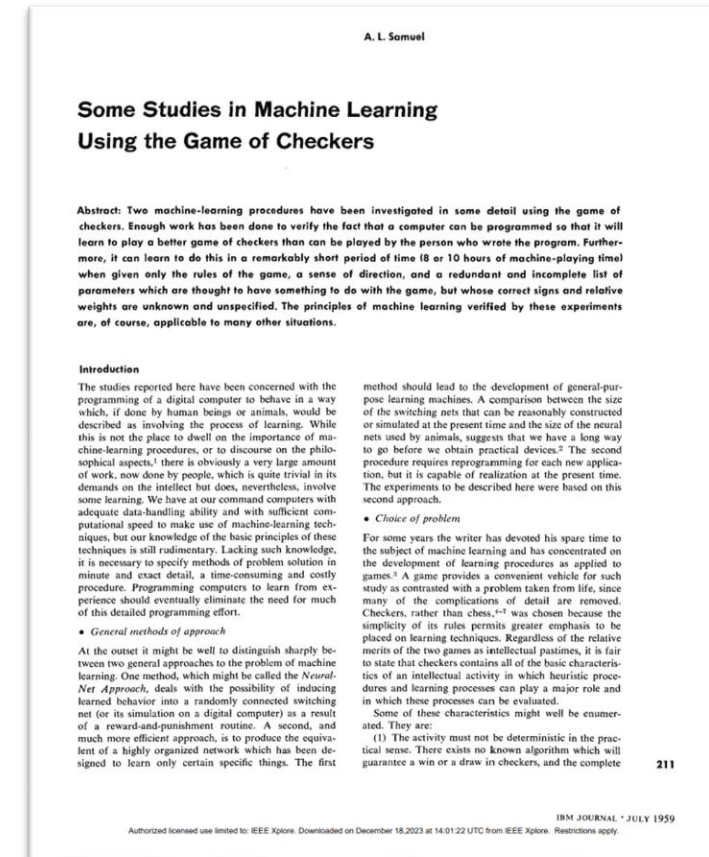
“Learning” has to do with improving performance at executing tasks using experience



Source: <https://www.ml.cmu.edu/news/news-archive/2016-2020/2017/june/mitchell-world-economic-forum.html>

What is machine learning?

“A field of study that gives computers the ability to learn without being explicitly programmed”

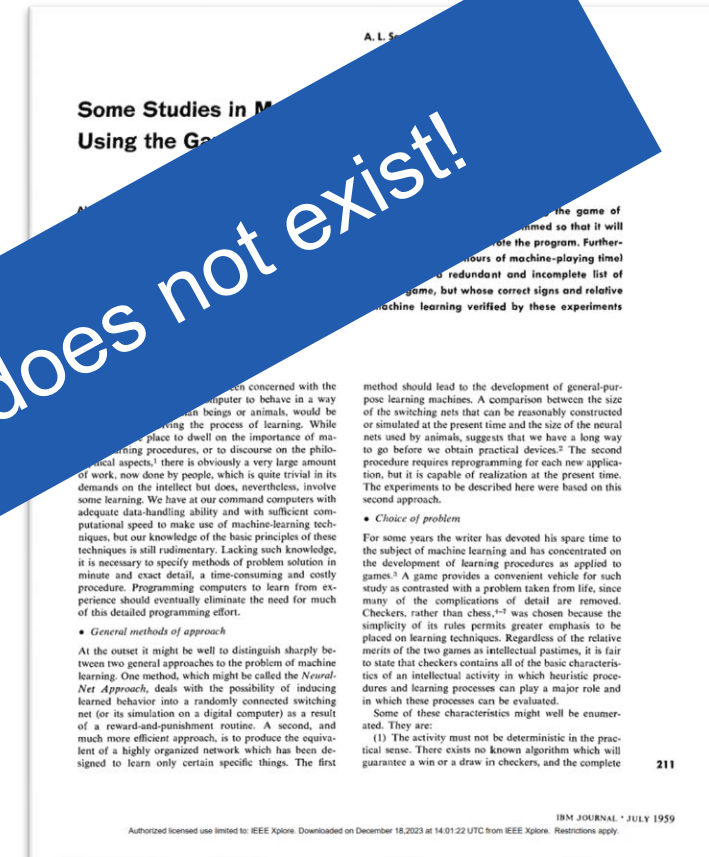


Samuel, Arthur L. “Some Studies in Machine Learning Using the Game of Checkers.” IBM Journal of Research and Development, vol. 3, no. 3, 1959, pp. 210–229

What is machine learning?

“A field of study that gives computers the ability to learn without being explicitly programmed.”

This famous quote does not exist!

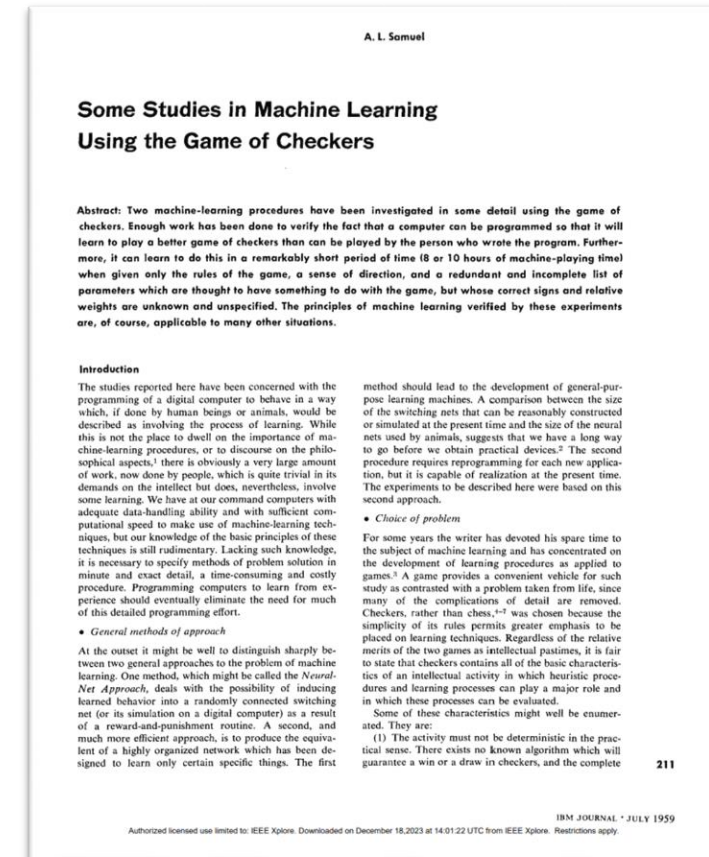


Samuel, Arthur L. “Some Studies in Machine Learning Using the Game of Checkers.” IBM Journal of Research and Development, vol. 3, no. 3, 1959, pp. 210–229

What is machine learning?

“A computer can be programmed so that it will **learn** to play a better game of checkers than can be played by the person who wrote the program.” (emphasis ours, pag. 211)

“Programming computers to learn from experience should eventually eliminate **the need for much of this detailed programming effort.**” (emphasis ours, pag. 211)



Samuel, Arthur L. “Some Studies in Machine Learning Using the Game of Checkers.” IBM Journal of Research and Development, vol. 3, no. 3, 1959, pp. 210–229

What is machine learning?

“Machine learning algorithms can figure out how to perform important tasks by generalizing from examples. This is often feasible and cost-effective where manual programming is not.”
(pag. 78)



Domingos, Pedro. “A Few Useful Things to Know about Machine Learning.” *Communications of the ACM*, vol. 55, no. 10, 2012, pp. 78–87

What is machine learning?

Our working definition

*research field + automation of tasks +
computer programs + learning + data =*

Machine learning is an interdisciplinary research **field** that explores the **automation of task** execution by **computer programs**, called *machine learning models*, which “**learn**” from digitized **data** following algorithms shaped by human design

What are “the tasks” that computer programs in machine learning perform?

1	Computing labels or numerical outcomes (“predicting”) Supervised learning	email filtering, fraud detection, image classification, text classification, language translation, medical diagnostics, derivative prices, claim prediction...
2	Identifying patterns in unlabeled data Unsupervised learning	dimensionality reduction, customer segmentation, anomaly detection in physical systems...
3	Optimizing actions to take in an environment Reinforcement learning	chess, AlphaGo, autonomous cars, robots, drones, automated trading...

Why is machine learning useful?

1	Computing labels or numerical outcomes (“predicting”) Supervised learning
2	Identifying patterns in unlabeled data Unsupervised learning
3	Optimizing actions to take in an environment Reinforcement learning

Machine learning is **useful** as it allows...

...processing high volumes of data in reduced time and automate processes by accurately predicting unseen test cases (**AUTOMATE**)

...improving the quality of existing products and services and create new ones (**CREATE**)

...learning new aspects of scientific phenomena by analyzing its models and their predictions (**DISCOVER**)

Why is machine learning useful in banks and insurance companies?

Banks

- Estimation of default/credit risk
- Pricing, hedging and calibration of derivatives
- Automated trading, market making

Insurance Companies

- Pricing and reserving for insurance contracts
- Automatic claim processing – e.g., assessment of damages from pictures of damaged cars
- Personalized risk assessment

Various companies

- Automated reading of reports/legal documents
- Fraud detection
- Targeted marketing

Self-study: some examples of machine learning for banks and insurance

Start reading one of them

European Central Bank (ECB)

Lenza, M., Moutachaker, I., & Paredes, J. (2023). Forecasting euro area inflation with machine-learning models. *Research Bulletin*, 112. Available at: <https://www.ecb.europa.eu/pub/economic-research/resbull/2023/html/ecb.rb231017~b910853393.en.html>

Hirschbühl, D., Onorante, L., & Saiz, L. (2021). Using machine learning and big data to analyse the business cycle. *Economic Bulletin Articles*, 5. Available at: https://www.ecb.europa.eu/pub/economic-bulletin/articles/2021/html/ecb.ebart202105_02~c429c01d24.en.html#toc6

Moufakkir, M. (2023). Careful embrace: AI and the ECB. Technical report, European Central Bank. Available at: <https://www.ecb.europa.eu/press/blog/date/2023/html/ecb.blog2309283f76d57cce.en.html>

Bank International Settlements (BIS)

Irving Fisher Committee on Central Bank Statistics. Machine learning in central banking, IFC Bulletin No 57 November 2022. Proceedings of the IFC-Bank of Italy Workshop on "Data Science in Central Banking", Part 1: Machine learning applications, Rome (virtual event), 19-22 October 2021. Available at: <https://www.bis.org/ifc/publ/ifcb57.htm>

Araujo, D., Doerr, S., Gambacorta, L. & Tissot, B. (2024). Artificial intelligence in central banking. *BIS Bulletin* (84). Available at: <https://www.bis.org/publ/bisbull84.htm>

Self-study: some examples of machine learning for banks and insurance

Start reading one of them

European Central Bank (ECB)

Lenza, M., I
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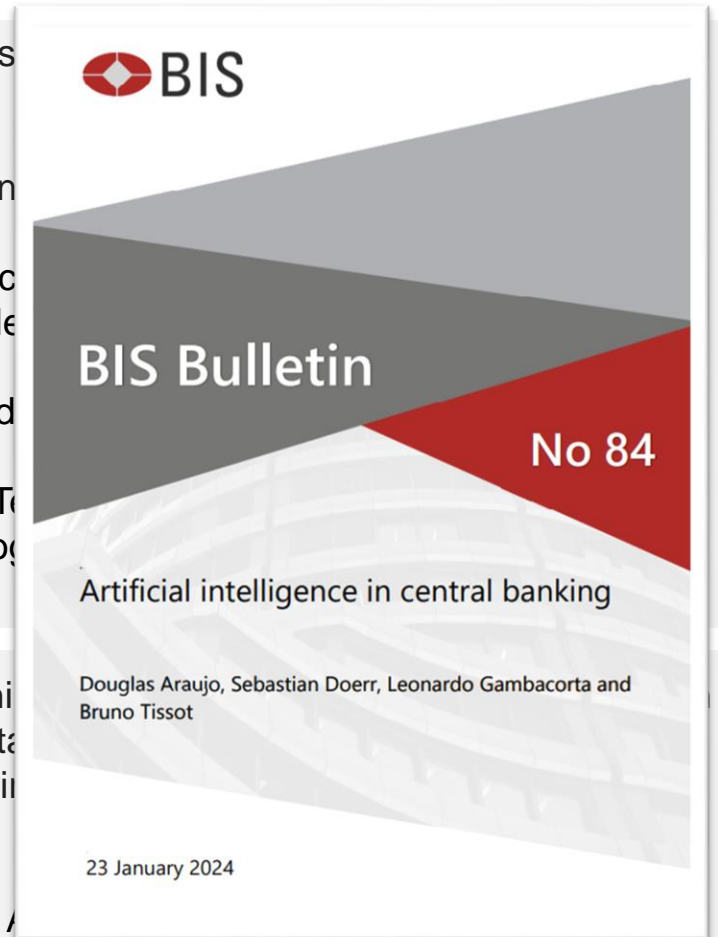
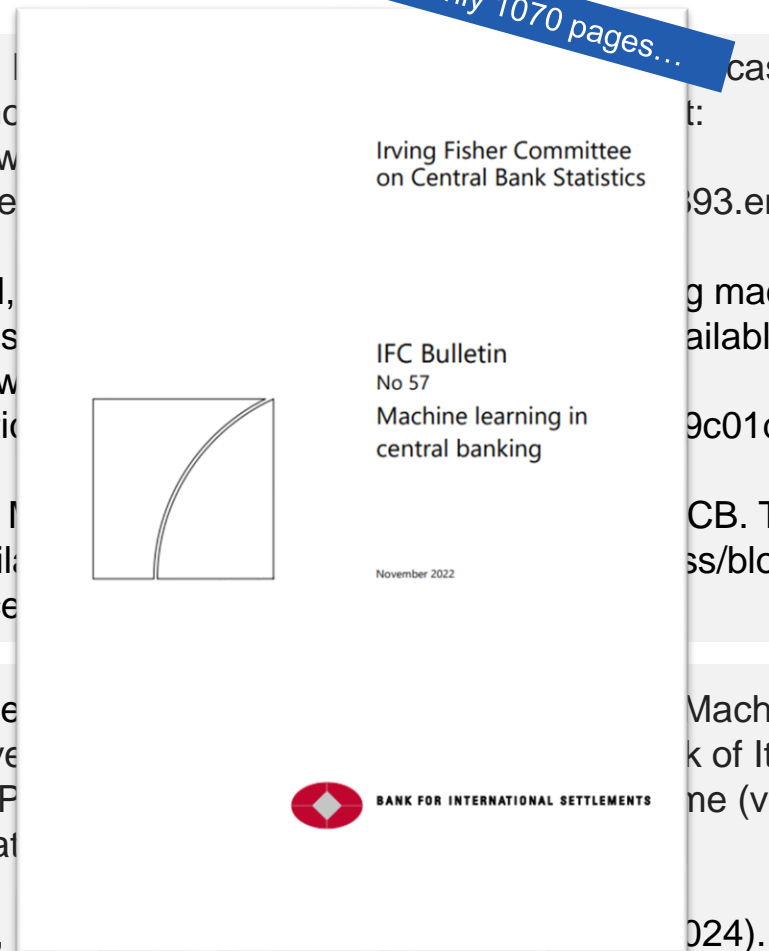
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Bank International Settlements (BIS)

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BIS Bulletin (84). Available at: <https://www.bis.org/publ/bisbull84.htm>

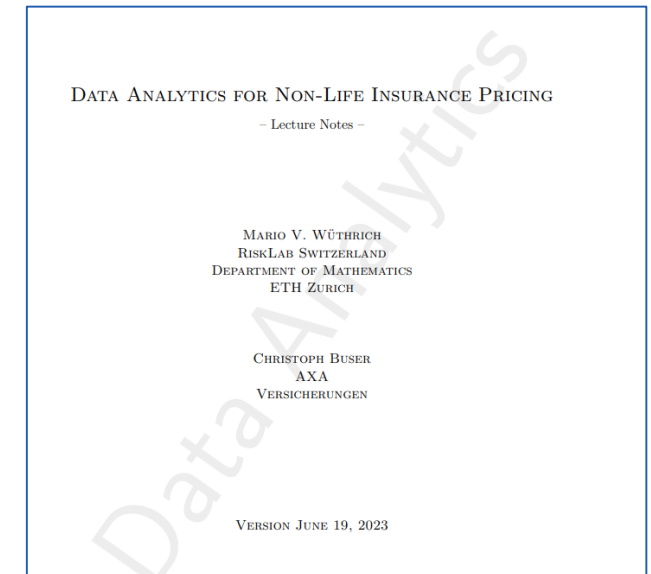
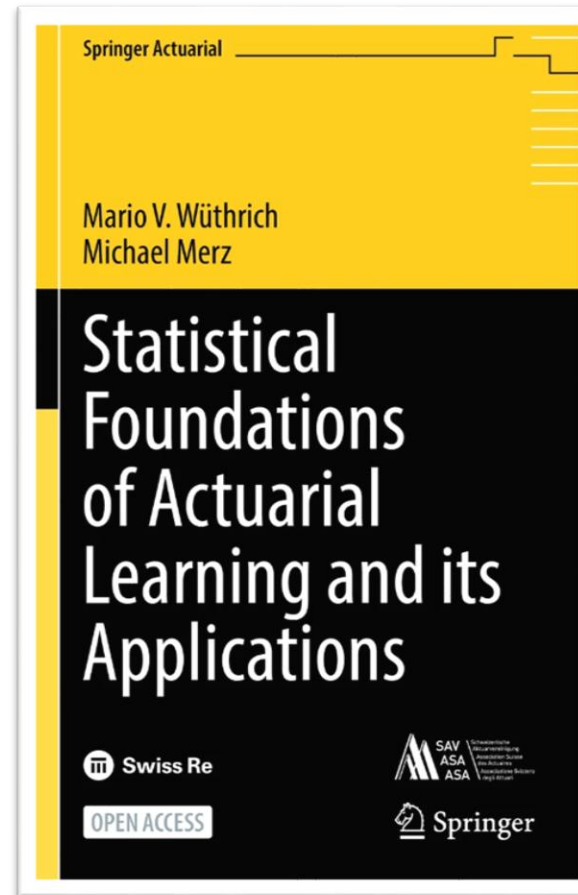


Self-study: some examples of machine learning for banks and insurance

Start reading one of them

Wüthrich, M. V., & Merz, M. (2023). *Statistical foundations of actuarial learning and its applications* (p. 605). Springer Nature. Available at: <https://link.springer.com/book/10.1007/978-3-031-12409-9>

Wuthrich, M. V., & Buser, C. (2023). Data analytics for non-life insurance pricing. *Swiss Finance Institute Research Paper*, (16-68). Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2870308



Introducing Machine Learning

How to do machine learning?

How to do machine learning?

We follow a three-step approach



Formulate.

Express the problem to be addressed with machine learning



Computing labels or numerical outcomes ("predicting")

- "Can we predict the future price of a stock *based on* historical price data and market indicators?"
- "Is this insurance claim likely to be fraudulent *based on* claim history and customer data?"
- "What is the risk profile of a loan applicant *based on* their credit history, income, and employment status?"
- "Can we forecast a customer's lifetime value for an insurance company *using* their demographics, policy details, and past interactions?"

Identifying patterns in data

- "How can customer segments be identified based on spending patterns and account behavior for targeted marketing strategies?"
- "What are the common patterns in investment portfolios that might indicate market trends or investor behavior?"
- "How can clusters of similar insurance claims be identified to understand common claim characteristics and streamline processing?"
- "What are the underlying patterns in financial transaction data that could indicate emerging risks or opportunities for investment?"

Formulate.

Express the problem to be addressed with machine learning



Computing labels or numerical outcomes (“predicting”)

- “Can we predict the future price of a stock *based on* historical price data and market indicators?”
- “Is this insurance claim likely to be fraudulent *based on* claim history and customer data?”
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- “Can we forecast a customer's lifetime value for an insurance company *using* their demographics, policy details, and past interactions?”

Identifying patterns in data

- “How can customer segments be identified *based on* risk profiles and preferences to offer personalized policies?”
- “What are the common *patterns in investment portfolios* that might indicate market trends or investor behavior?”
- “How can clusters of *similar insurance claims* be identified to understand common claim characteristics and streamline processing?”
- “What are the underlying *patterns in financial transaction data* that could indicate emerging risks or opportunities for investment?”

Formalize and compute.

Translate the question into a mathematical problem that can be computed



Statistical Learning is the datum of a
(1) **Representation**, (2) **Evaluation** and
(3) **Optimization** of the problem at hand.

From Domingos, P. (2012)

Representation

It involves specifying

1. Empirical evidence (data)
2. The class of mathematical structures, called machine learning models, that will “learn” from data.

Neural network Random forest
Logistic regression Linear regression
Decision tree ...

Formalize and compute.

The “learning” in machine learning



Statistical Learning is the datum of a
(1) **Representation**, (2) **Evaluation** and
(3) **Optimization** of the problem at hand.

From Domingos, P. (2012)

Evaluation

It involves defining an objective function—also called scoring function or loss function—that allows discriminating between good and bad models, given the empirical evidence (data). It is a measure of performance of machine learning models

Formalize and compute.

The “learning” in machine learning



Statistical Learning is the datum of a
(1) **Representation**, (2) **Evaluation** and
(3) **Optimization** of the problem at hand.

From Domingos, P. (2012)

Optimization

It involves defining an algorithm that searches for model(s) which optimize the objective function specified in **Evaluation**. It is when we “train” the machine learning model

Formalize and compute.

The “learning” in machine learning. A summary.



I

A statistical learning framework is the formalization of a machine learning problem. It requires specifying (1) data, (2) class of models, (3) performance measure, and (4) optimization problem

II

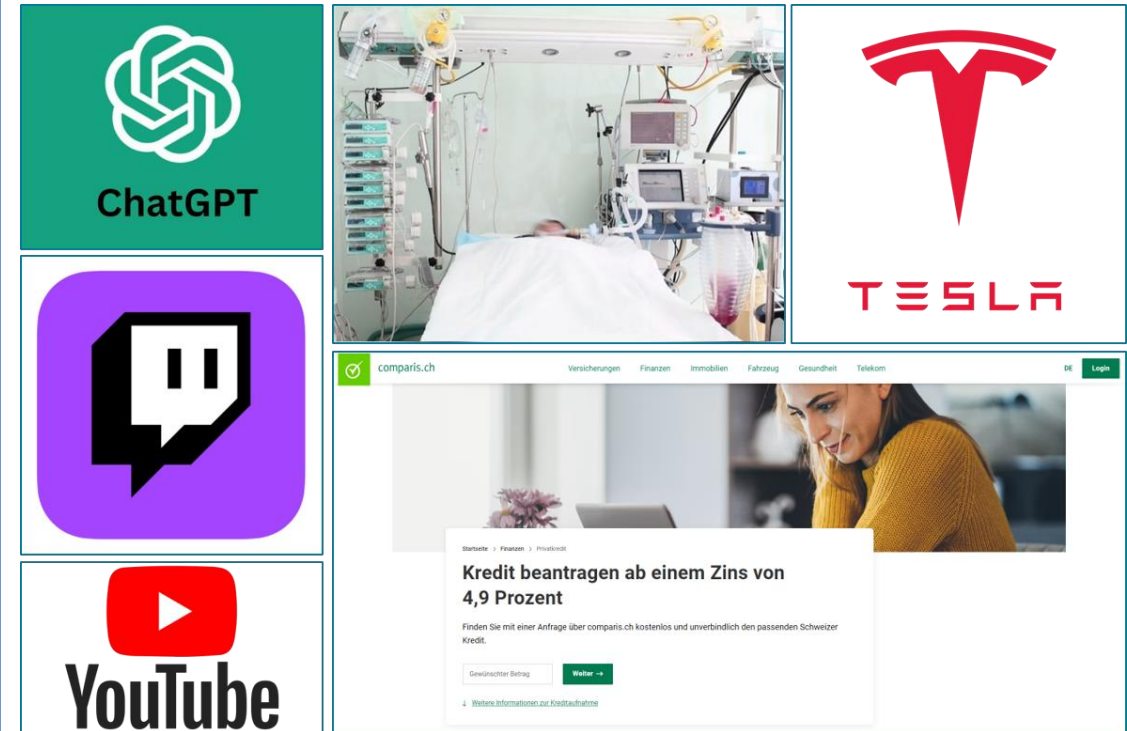
Learning is the process of finding algorithmically the machine learning model that optimizes a performance measure, given empirical evidence (training data) and the class of models

Deploy.

Embed machine learning models in real-world applications to compute predictions



Deploying a trained/learned machine learning model := putting a trained model into production, where it can start making **accurate** predictions or decisions based on **new** data



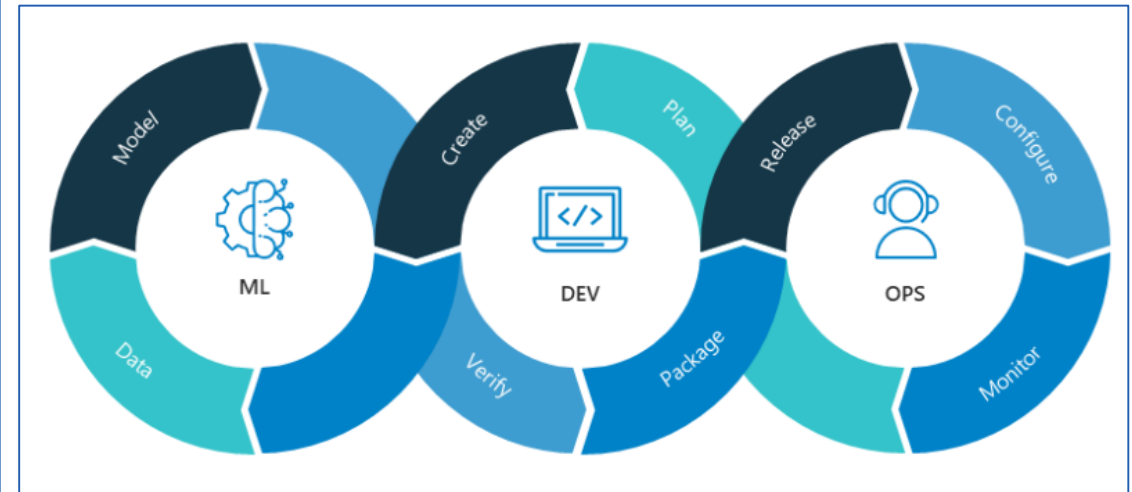
Deploy.

MLOps are best practices to run machine learning-infused applications in business



Deploying a trained/learned machine learning model := putting a trained model into production, where it can start making **accurate** predictions or decisions based on **new** data

Machine Learning Operations (MLOps)



Source: <https://blogs.nvidia.com/blog/what-is-mlops/>

Security and Compliance

Version Control and Model Management

Monitoring and Maintenance

Integration into Production Systems

Scalability and Performance

Feedback Loops for Continuous Improvement

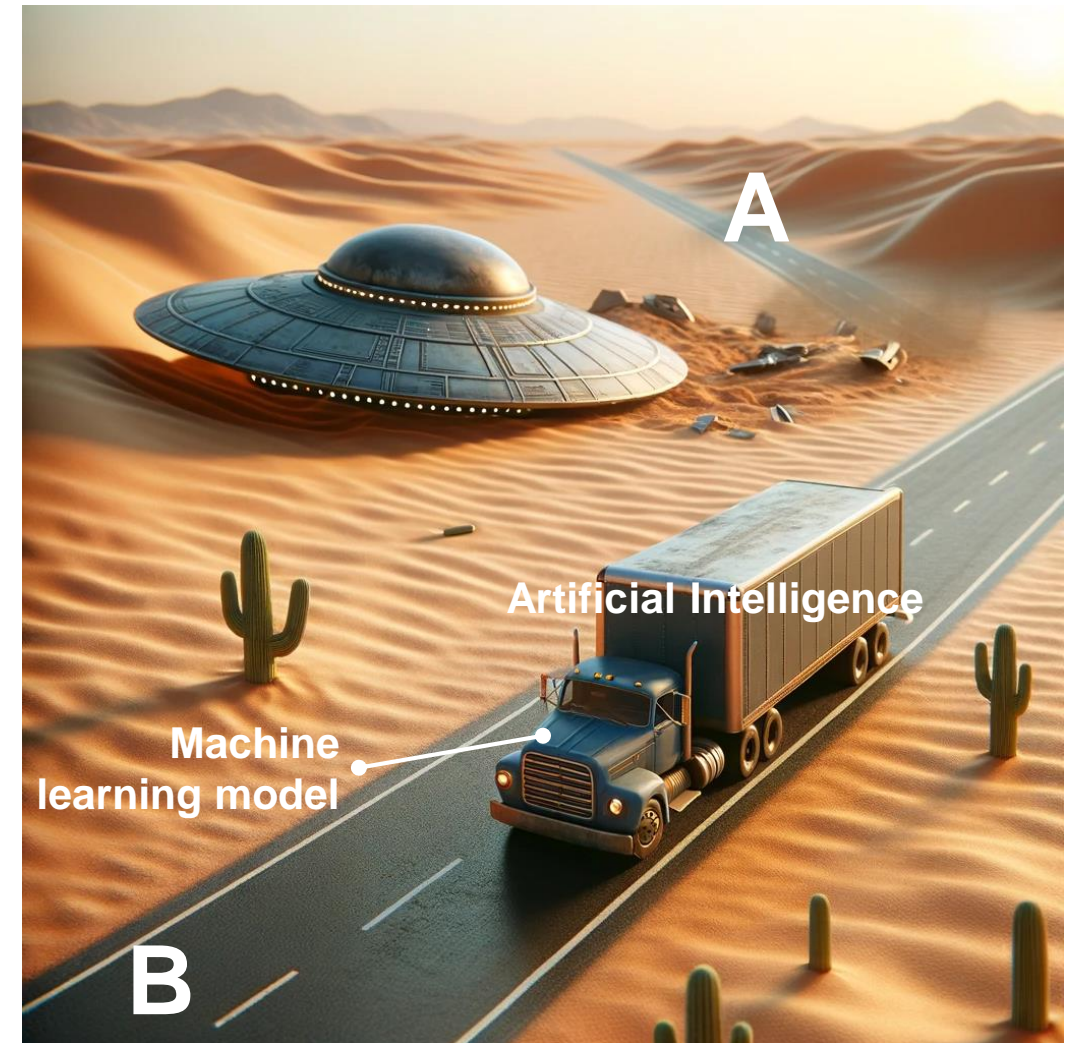
Deploy.

Machine learning models are not artificial intelligence systems



BLOCK II

Machine learning models are proper parts of **artificial intelligence systems**. These, in turn, are key to deliver **services/products** to target stakeholders.



Created with chatGPT 4.0, December 2023

How to do machine learning? Key takeaways

1. **Formulate a problem** to be addressed with ML

Formulate



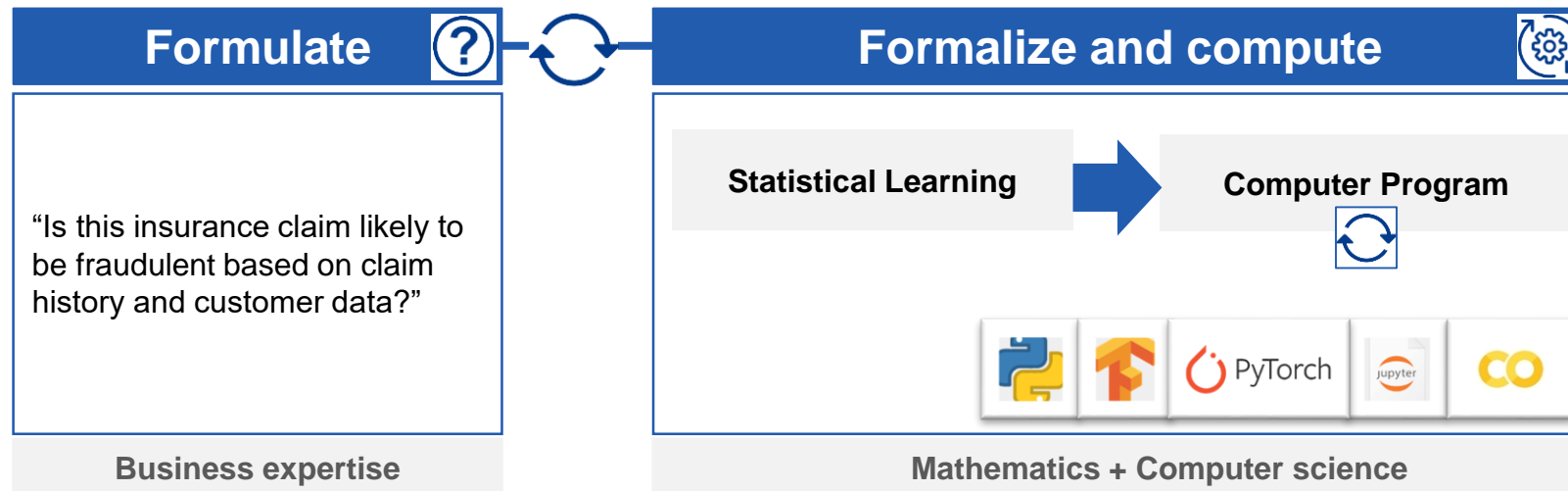
“Is this insurance claim likely to be fraudulent based on claim history and customer data?”

Business expertise

How to do machine learning? Key takeaways

1. **Formulate a problem** to be addressed with ML

2. **Formalize the problem** using statistical learning
3. **Implement the problem** in a computer program and learn/train the machine learning model

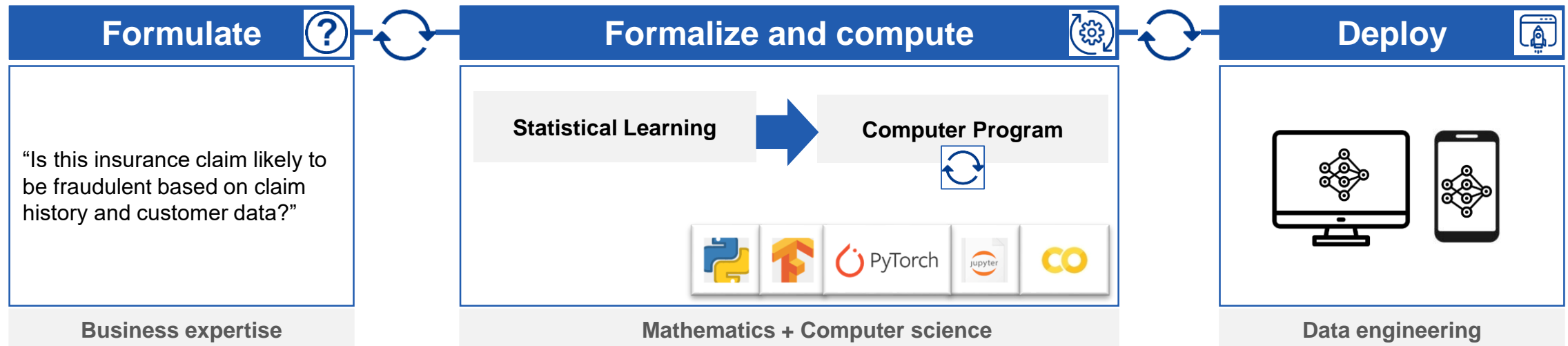


How to do machine learning? Key takeaways

1. **Formulate a problem** to be addressed with ML

2. **Formalize the problem** using statistical learning
3. **Implement the problem** in a computer program and learn/train the machine learning model

4. **Use the learned/trained machine learning model** to compute predictions on “new” input data



How to do machine learning? Key takeaways

BLOCK I

1. **Formulate a problem** to be addressed with ML

2. **Formalize the problem** using statistical learning
3. **Implement the problem** in a computer program and learn/train the machine learning model

4. Use the learned/trained machine learning model to compute predictions on “new” input data

Formulate



“Is this insurance claim likely to be fraudulent based on claim history and customer data?”

Business expertise

Formalize and compute



Statistical Learning



Computer Program



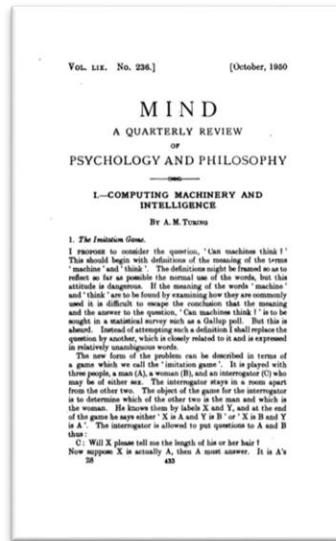
Mathematics + Computer science

Deploy



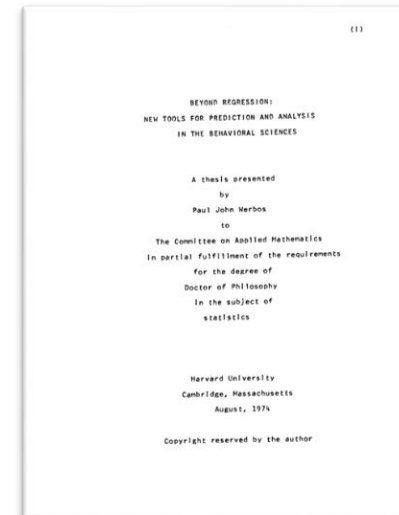
Data engineering

A selection of successes in machine learning



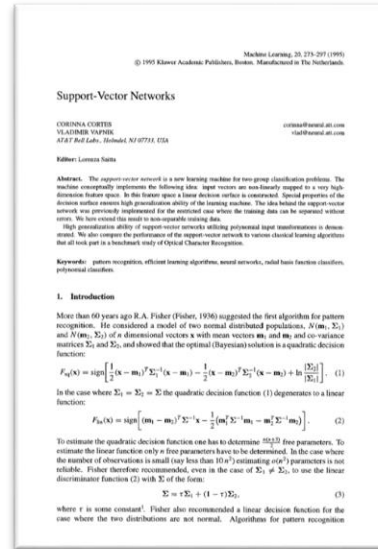
1967 - Nearest Neighbor Algorithm:
Cover, T., Hart, P. (1967). Nearest neighbor pattern classification. IEEE Transactions on Information Theory, 13(1), 21-27.

1950s - The Beginning: Turing, A. M. (1950). Computing Machinery and Intelligence. Mind, LIX(236), 433-460.



1970s - Backpropagation:
Werbos, P. (1974). Beyond Regression: New Tools for Prediction and Analysis in the Behavioral Sciences.

A selection of successes in machine learning



1990s - Support Vector Machines:
Cortes, C., Vapnik, V. (1995). Support-Vector Networks. Machine Learning, 20(3), 273-297.

1980s - Rise of Decision Trees:
Quinlan, J. R. (1986). Induction of Decision Trees. Machine Learning, 1(1), 81-106.

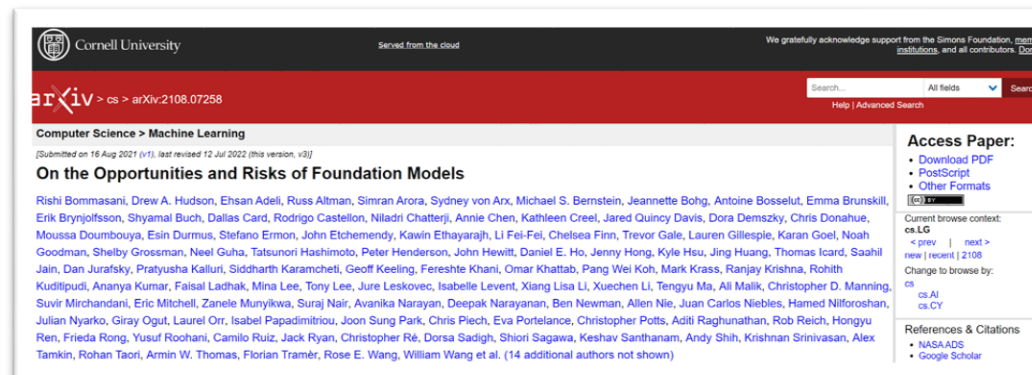


2006 - Deep Learning Emerges:
Hinton, G. E., Osindero, S., Teh, Y. W. (2006). A fast learning algorithm for deep belief nets. Neural computation, 18(7), 1527-1554.

A selection of successes in machine learning

2014 - GANs (Generative Adversarial Networks):
Goodfellow, I. J., et al. (2014). Generative Adversarial Nets. Advances in neural information processing systems, 27.

2018 - Attention Mechanisms and Transformers: Vaswani, A., et al. (2017). Attention Is All You Need. Advances in neural information processing systems, 30.

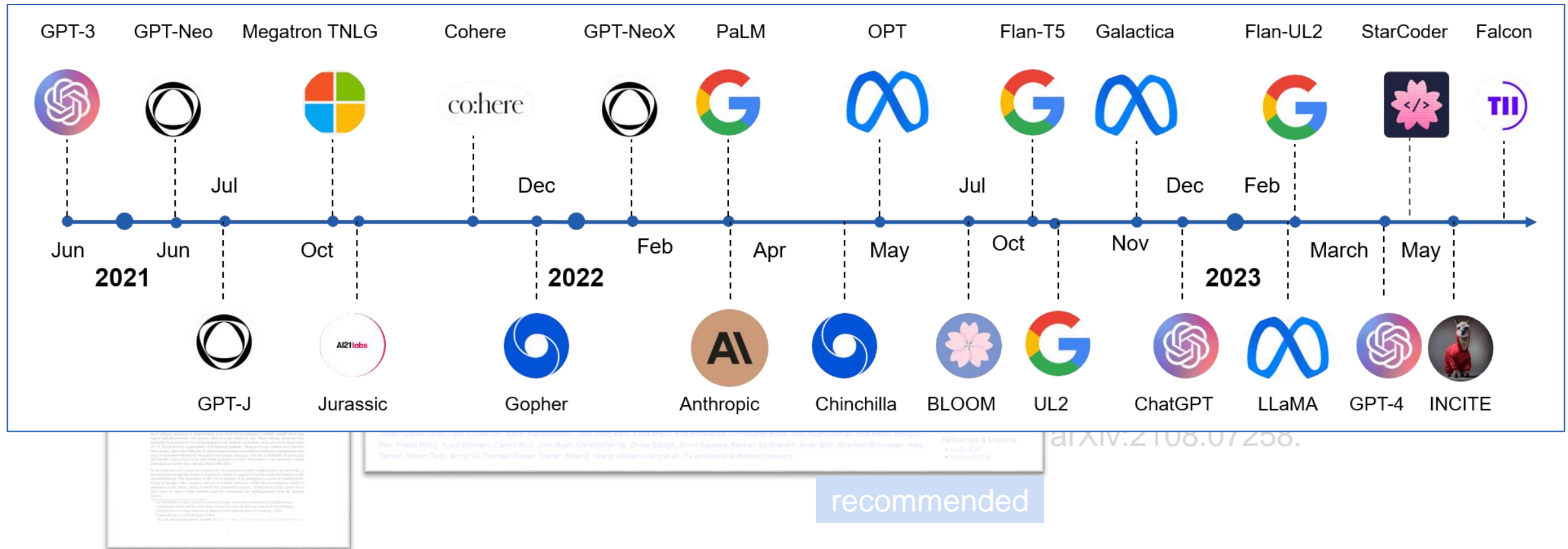


recommended

2020s - Foundation Models:
Bommasani, R., et al. (2021). On the Opportunities and Risks of Foundation Models. arXiv preprint arXiv:2108.07258.

A selection of successes in machine learning

Main Foundation Models since GPT3



Key takeaways

I

Machine learning is an interdisciplinary domain that investigates how computer programs can automatically perform tasks by “learning” from data and following human-made procedures

II

To do machine learning is to (1) formulate a problem, (2) formalize it into a statistical learning framework and (3) learn a computer program (“trained model”) that can be deployed to compute predictions on “new” input data

III

The history of machine learning is rich in theoretical and practical successes

Introducing Machine Learning

How to learn to do machine learning?

A few recommendations to improve your expertise in machine learning

1

Revise your notions of modelling and statistics – you (may) have already used some of the fundamental concepts of machine learning!

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6

Learn best practices from data scientists at your organization. Networking and collaboration are key!

A few recommendations to improve your expertise in machine learning




You

You are a student of a "Certificate of Advance Studies in Machine Learning in Finance and Insurance" that lasts two semesters at a top university. You are a professional with degrees in engineering, mathematics and natural sciences. You are really interested in improving your knowledge in machine learning in finance and insurance. What should you do to optimize your learning experience? Be concise.

Prompts and answers: chatGPT 4.0, February 2024

A few recommendations to improve your expertise in machine learning

 ChatGPT

To optimize your learning experience in a "Certificate of Advanced Studies in Machine Learning in Finance and Insurance," consider the following concise strategies:

- **Engage Fully in Coursework:**
 - Actively participate in all classes, workshops, and discussions.
 - Complete all assignments and projects, aiming to apply concepts in practical contexts.
- **Deepen Your Understanding:**
 - Seek to understand the underlying mathematical and statistical principles behind machine learning algorithms.
 - Regularly review and study course materials to reinforce your knowledge.
- **Practical Application:**
 - Engage in hands-on projects that apply machine learning to real-world finance and insurance problems.
 - Use datasets from the finance and insurance sectors for your projects to gain practical insights.
- **Leverage Resources:**
 - Utilize the university's resources, such as libraries, online databases, and software tools specific to machine learning in finance and insurance.
 - Attend guest lectures and seminars offered by the program to gain industry insights.
- **Collaborate and Network:**
 - Work with peers on group projects to enhance collaborative skills and learn from different perspectives.
 - Network with faculty, industry professionals, and alumni to build connections and explore career opportunities.
- **Stay Current:**
 - Follow current trends and advancements in machine learning, finance, and insurance through journals, websites, and professional groups.
 - Join relevant forums and online communities to discuss topics and share knowledge.
- **Seek Feedback and Mentorship:**
 - Regularly seek feedback on your work from professors and industry professionals.
 - Consider finding a mentor in the field for guidance and career advice.
- **Reflect and Adapt:**
 - Continuously reflect on your learning progress and areas for improvement.
 - Be open to adapting your learning strategies based on feedback and self-assessment.

↓

Prompts and answers: chatGPT 4.0, February 2024

Introducing Machine Learning

Time to reflect

In the next 15' please complete the following exercises

You can use paper and pen, or any text processing software. Be concise!

1

Briefly describe your industry, company and role

2

Take your time to go through the machine learning material so far. Revise the different definitions and the “how to” approach.

3

Answer the question: *Did you encounter machine learning in your professional career already?*

...**if yes**, then describe (1) a business-related situation where machine learning was key, (2) the machine learning (high-level) steps, and (3) what benefit did machine learning deliver to you, your team, your company in that instance

...**if no**, then describe a business line in your company where machine learning could be currently under use or that could benefit from it

I. Introducing Machine Learning

Our first Google Colab exercise

Go to our Moodle page and download the file under
Notebooks and Colab Instructions/0_Introductory_Session_March_01_2024

Google Colab: `first_colab.ipynb`

Feedback! See you on March 8th