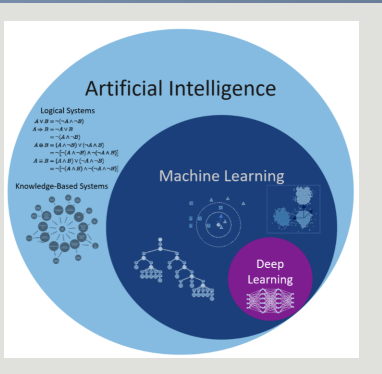




# M A D S

Management and Data Science.

An very short Introduction



While the success of “Data minded” companies who have seen data as an asset which is worthwhile investing resources into is well known, also more traditional companies especially in the B2C business apply Data Science in order to gain a competitive advantage.

But can we use it also in more B2B oriented companies (e.g. environments which generate much less marketing data)?

Shall Management understand the fundamental concepts ?

## OVERVIEW

There are various representations of the history of Data Science and Machine Learning. However it is clear that it is based on mathematical foundations like statistics, linear algebra & calculus which are up to 200 years old. This basis is supplemented by visualization techniques, database technology and computer science. After the second WW it started slowly . The large development in this field is not older than 20 years. Thus it is a relatively young area of science and is not yet intellectually digested by all corporate management.

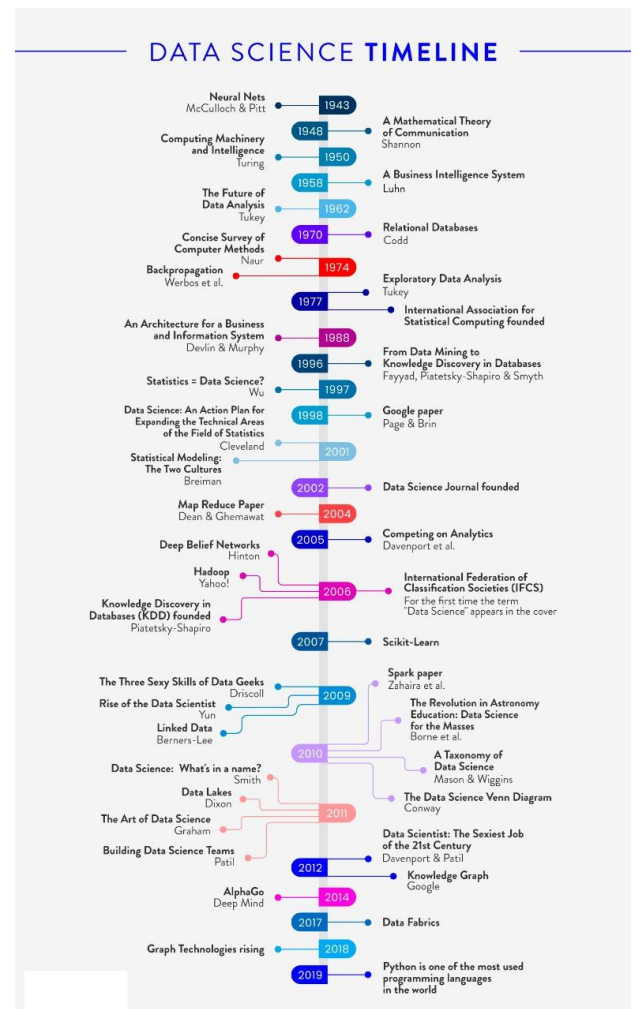
First contact with data science and machine learning of almost everyone has been the search engine. With its ground breaking algorithm Google took the market and translated this technological success also in an astonishing commercial success. Second and third contact are eventually the very well functioning speech recognition (audio) and the object recognition (video).

The sheer mass of data which the PC's, the smartphones and the internet produce alone, lead to an ubiquity of data , which has made it necessary to reuse known methods and to develop new methods for extracting useful information and knowledge from data.

This extraction of knowledge is the field of Data Science.

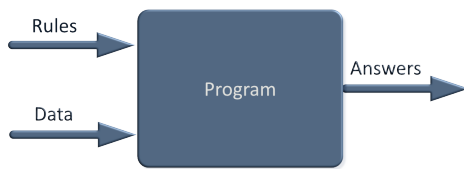
The rough process is prepare, analyze and eventually visualize Data in order to first create insight and second to inspire action.

Another application is to define & collect the necessary data.

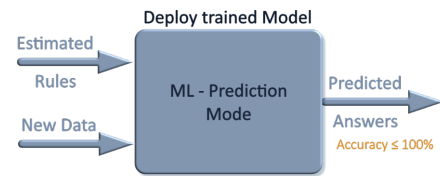


# ESSENCE OF ML

## Programming



## Machine Learning



All know data analyses and visualization from spreadsheet programs (e.g Excel). Data science uses programming languages (Python or R ) and is more difficult in application, however much stronger especially for large or complex data. The programming languages are also the main entry point into Machine learning and its powerful possibilities, which are not yet fully uncovered and applied, especially in B2B contexts.

But what is Machine Learning, without much lingo ? The comparison to traditional programs illustrates in the most accessible manner what ML is.

Whereas a program establishes a defined set of rules, so that feeding data it produces answers in a deterministic way. In Machine Learning you are most often confronted with problems, which are difficult or practically impossible to program. Thus you feed a suited algorithm with data and corresponding answers<sup>1</sup> and it will estimate the rules. These estimated rules can be interpreted by humans and give insight into the problem at hand. Additionally these estimated rules can be used to now feed the trained Model with new data and predict the answers. These predicted answers do have an accuracy! In recognition of handwritten figures the accuracy might be 99%, in speech recognition it is lower. Thus first it is about to develop a model which works and second to optimize it in direction maximum accuracy.



Googles large TPU's Farms

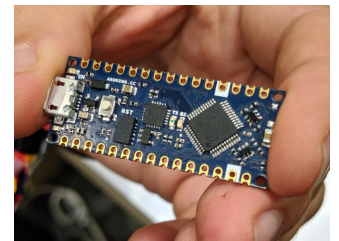
Practically this work is performed by powerful laptops or desktops and if not sufficient with rented servers from providers such as Amazon and Google.

In complementary addition there is a new field which brings machine learning onto very small and cheap devices with minimal power consumption. This field is called Tiny ML, it is quite new but up & running and celebrates first successes. For large ML tiny devices can record data from the field in the first place. Thus not only will be computers anywhere but also machine learning will pervade the world into the last corner.

**Check out**  
**edX:**

- UCSD- Data Science
- HarvardX- Tiny ML

**Google:** Tensorflow (lite)



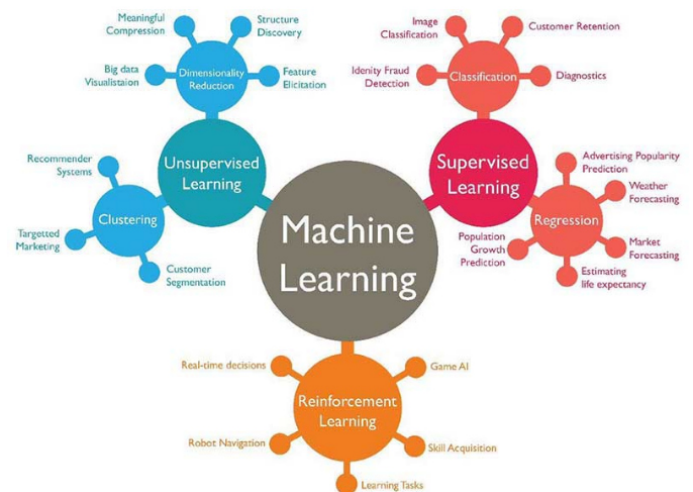
Tiny ML

# APPLYING DATA SCIENCE ?

Yes I am biased, however I think it is obvious that all managers should try to understand the basic concepts of Data Science and Machine Learning, even if they now work in a not yet "data minded" company.

After first acquaintance they should consider applying data science in their organization. Sooner is better than later.

Do get a little M A D and have a Nice Day.



ML Methods & Classifications

1-This is a simplification and it is true for supervised learning