

Introduction to Machine Learning

Lecture 101

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Contents and Prerequisites

- Introduction to Machine Learning.
- Mainstream of Machine Learning Approaches.
- Applications and Examples of Data Science.
- Hands on exercise.
- Prerequisites
 - Having a machine that can run Python scripts.
 - Basic understanding of probability e.g. $100\% = 1.0$.

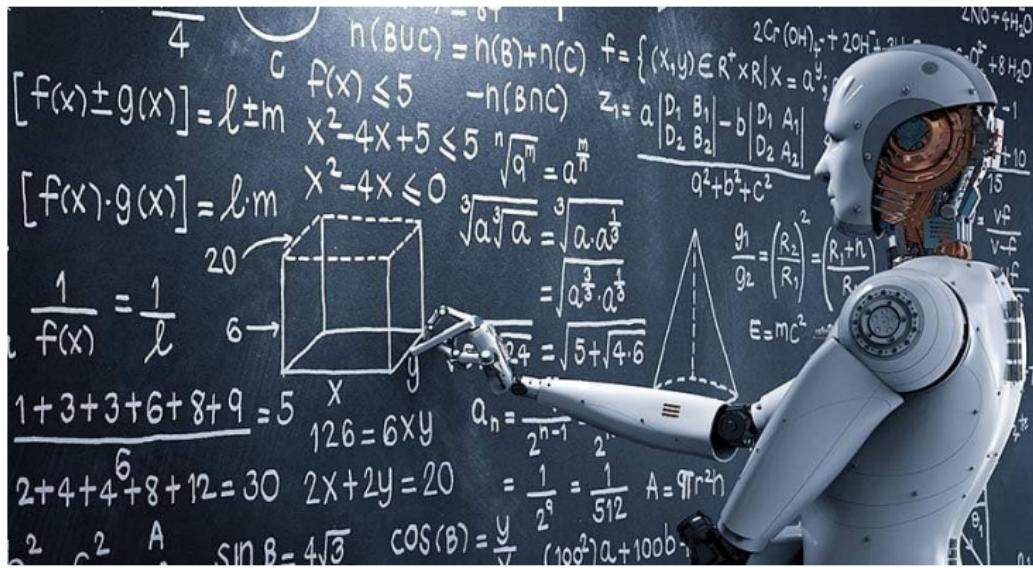
Artificial Intelligence

What is Artificial Intelligence(AI)?

Artificial Intelligence



Artificial Intelligence



Artificial Intelligence



Artificial Intelligence

Some of the definitions of Artificial Intelligence.

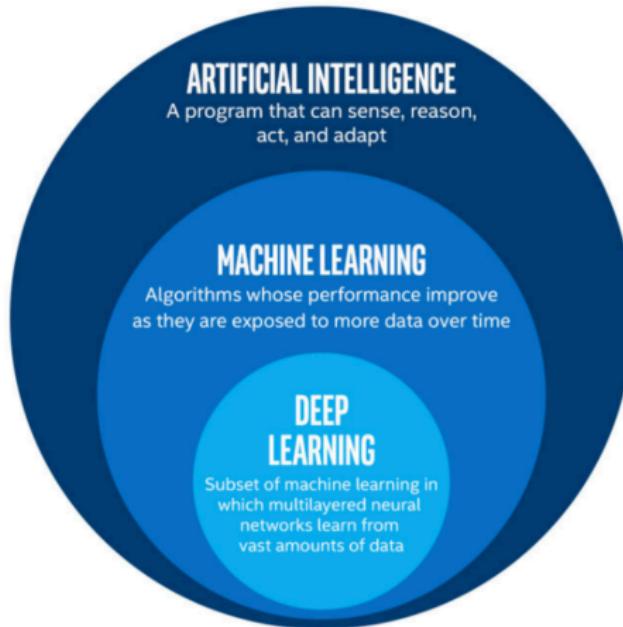
- Artificial intelligence (AI), the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings¹.
- Artificial intelligence leverages computers and machines to mimic the problem-solving and decision-making capabilities of the human mind².
- “I propose to consider the question ‘can machines think?’”³.

¹<https://www.britannica.com/technology/artificial-intelligence>

²<https://www.ibm.com/cloud/learn/what-is-artificial-intelligence>

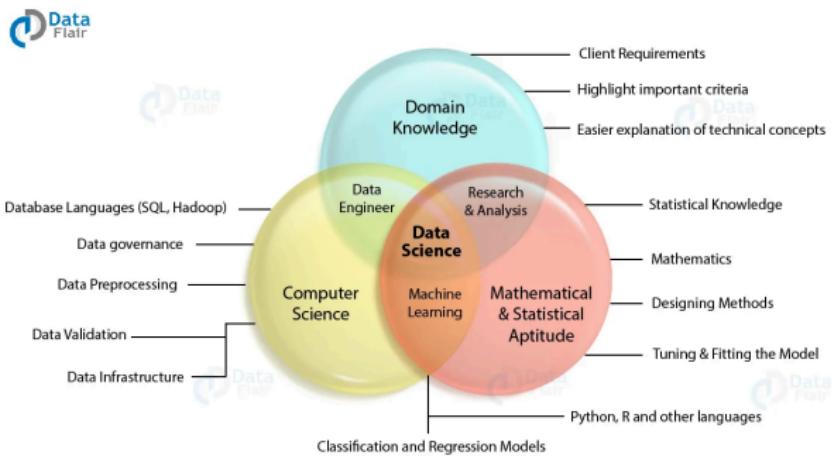
³A. M. TURING, Mind, Volume LIX, Issue 236, October 1950, Pages 433–460

Hierarchy of Artificial Intelligence



What is Data Science?

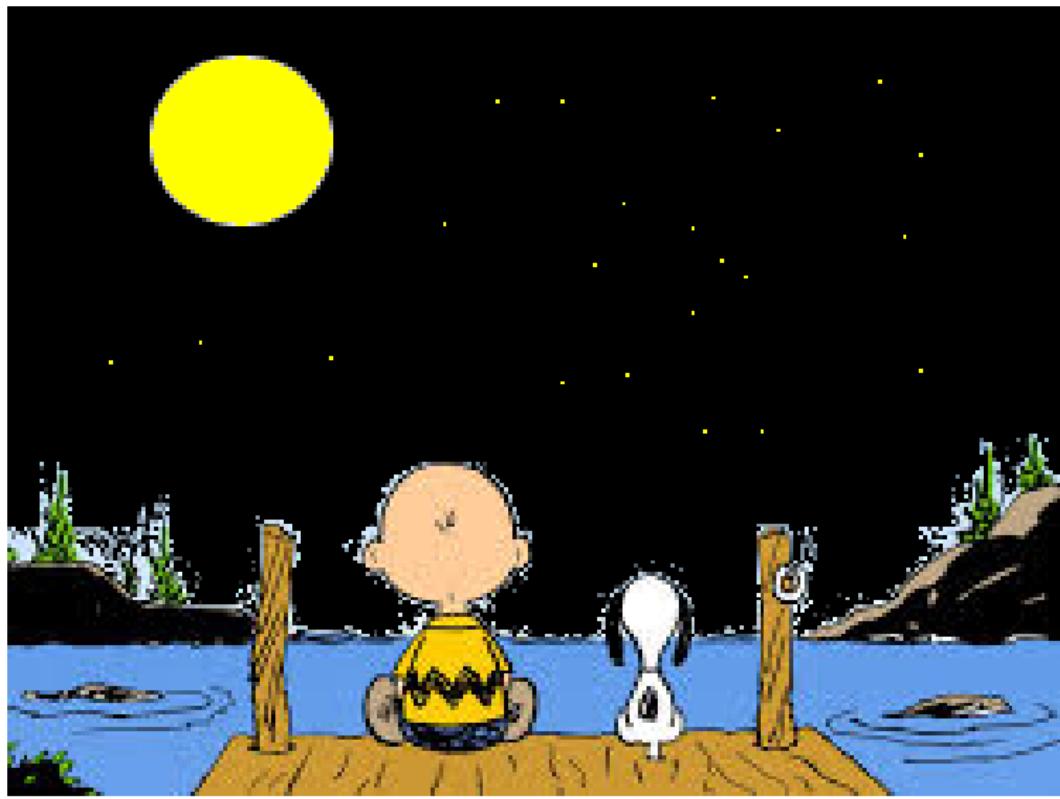
- Data Science/Scientist(DS) is a solution provider with synthesizing multidiscipline fields.
- Leverage Artificial Intelligence techniques to find a solution.



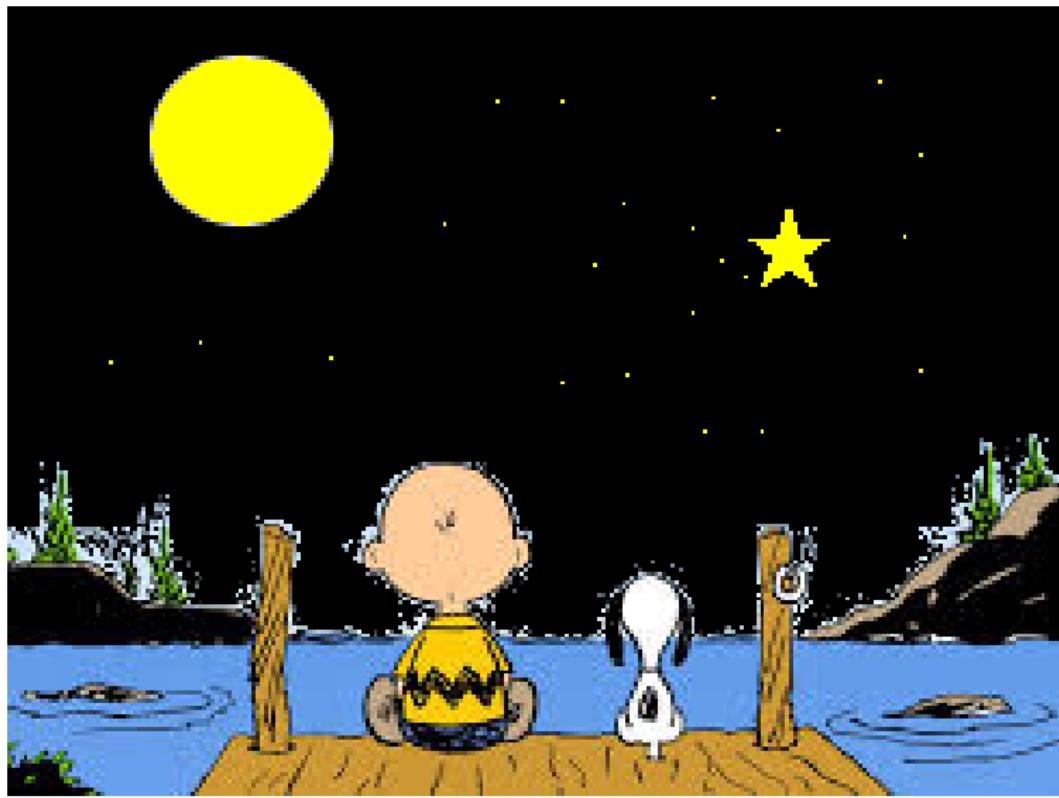
What is Data Science?

- DS is a “data” driven or oriented science.
- Data Science approaches exists for a long, long time ago.
- We will compare science and DS approaches.

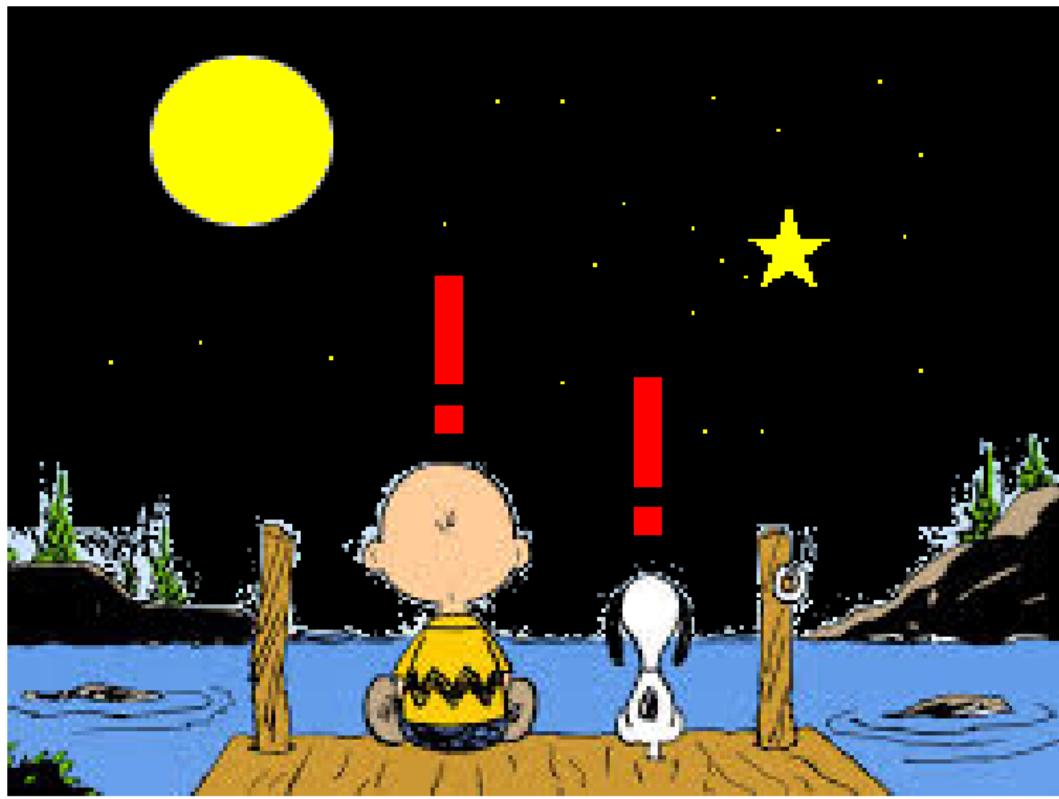
Example: A.C. 1231 in Japan



Example: A.C. 1231 in Japan



Example: A.C. 1231 in Japan



Example: A.C. 1231 in Japan



Example: A.C. 1231 in Japan



2-9

Oldest Record of Supernova in Japan

It was written in Chinese recode!
Not a sign of omen!!



八日、乙未、霜凝、天晴、北山雪白、客星事、依不審問泰
倭朝臣、過事如此、曉夕東西之條驚而有餘、客星一昨
日夜前空現候了、出現以後去二日陰雲不見候、其外者
天快晴、速日見候、而此兩日者無引運、天曉見良方候、
曉夕東西出現候之條以外候、
客星出現例、皇極天皇元年秋七月、甲寅、客星八月、
陽成院貞觀十九年正月廿五日丁酉戌時、客星在辟、
見西方、宇多天皇寔平三年三月廿九日、己卯、亥時、客
星在東成星東方、相去一寸所、醍醐天皇延長八年五月
以後七月以前、客星入羽林中、一條院宣弘三年四月二
日、癸酉、夜以降驕官中有大客星、如焚惑、光明動耀、
連夜正見南方、或云、驕闊照軍星變本體增光暉、後冷
泉院天喜二年四月中旬以後丑時、客星出皆參度、見東
方、辛天闕星、大如歲星、二條院永萬二年四月廿二日、
乙丑、亥時、客星替見大微宮事、高倉院治承五年六月
廿五日、庚午、戌時、客星見北方、近王良星守傅舍星、
午終許心寂房來、事外付滅之由加詞但惡血之充瀉非
嗣雖極難治云々、常隨侍之小婢、依病房危急行南
京、老病之最中失手背之便、

Meigetsuki: Record of astronomical phenomena in Japanese document by Fujiwarano Teika in 11th century.

Message from the Previous Example

- Data Science is data-driven science.
 - Observation of supernova.
 - Observe phenomena or signal that people want to know the meaning of.
 - Is it sign of omen?
 - Make a hypothesis.
 - Found Chinese recode.
 - Find data that is related to the phenomena.
 - Found it was not a sign of omen.
 - Conclude the hypothesis and provide a solution.

Main Stream of Machine Learning Approaches

- Supervised Learning
 - The goal of the task is taught by humans in a supervised manner.
- Unsupervised Learning
 - Humans explore data and seek what can be associated with it.
- Reinforcement Learning
 - Human teaches how to do the task and let the machine do it semi/automatical manner.



Let's begin!!

Citations

- Data Science for Business
 - ① https://www.researchgate.net/publication/256438799_Data_Science_for_Business
 - ② https://book.akij.net/eBooks/2018/May/5aef50939a868/Data_Science_for_Bus.pdf