# 1. Data Science – Machine Learning – Introduction

## Contents

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## 1. Machine learning

- ✓ It is a technique which enables computers to learn automatically from past data.
- ✓ It is an approach to train the models.
- ✓ It is helpful to predict the future values.

## 2. Is machine learning hard?

- ✓ No, never
- ✓ Machine learning is very easy.
- ✓ It requires imagination, creativity, and a visual mind.
- ✓ Key point is, we should learn how to play with data and applying logic on data.
- ✓ This material helps how to do all these things.

## 3. Program

- ✓ A program is a group of instructions to perform the task; computer can execute these instructions to finish the task.
- ✓ This is very good approach for simple task

## 4. What is an algorithm?

- ✓ An algorithm is program which having group of instructions to perform a task.
  - Input + Logic = Output
  - Data + Program = Result

## 5. What is machine learning algorithm?

- ✓ Machine Learning algorithm is an application.
- ✓ It learns knowledge (patterns) automatically from the data without being explicitly programmed.
    - Data + Result = Program(Model)

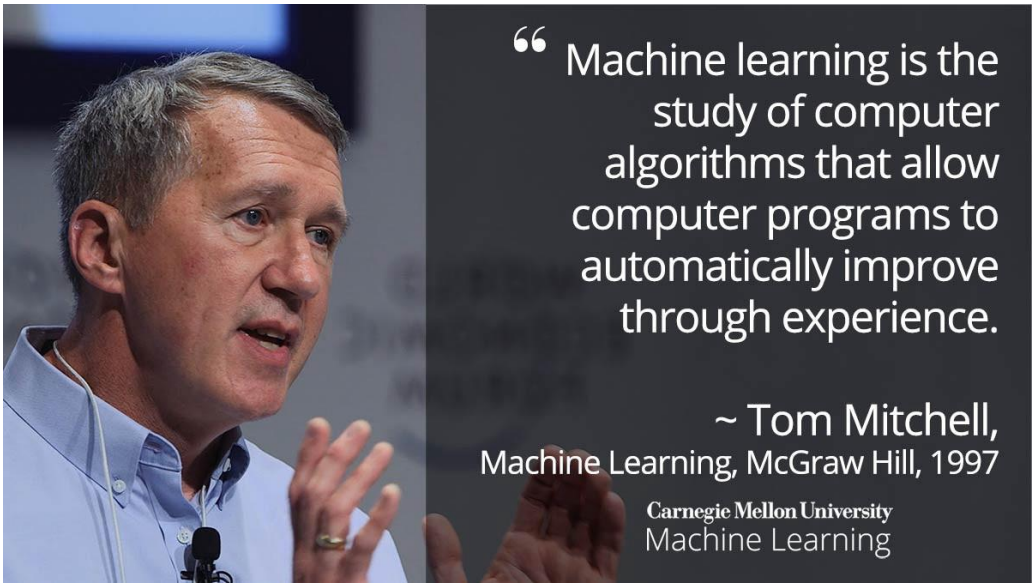
## 6. Diff b/n machine learning algorithm and normal algorithm?

- ✓ Machine Learning algorithm learns knowledge (patterns) from the Data.
- ✓ Normal algorithm cannot learn anything on its own.

## 7. Why Machine learning?

- ✓ Currently every company is generating huge amount of the data.
- ✓ So, the volume of data is increasing on every day.
- ✓ Machine learning algorithms can extract information from data.
- ✓ The major use cases of Machine learning,
    - Creating models.
    - Getting deep insights & etc.
- ✓ Machine learning is going to be the center point of all fields.

## 8. Machine learning definitions



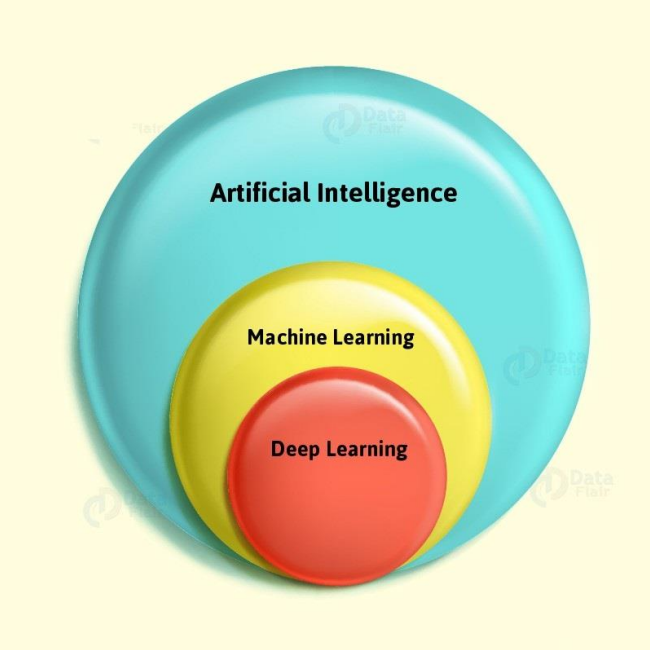

### Arthur Samuel definition

- ✓ Machine learning term was introduced by Arthur Samuel in the year of 1959 and he defined in this way,
  - Machine learning is,
    - Enables a machine to learn automatically from data,
    - Improve performance from experiences,
    - Predict things without being explicitly programmed

### Daniel’s definition

- ✓ Teaching to computers how to learn by using data and experience, rather than by instructions.

## 9. Artificial intelligence vs Machine Learning vs Deep Learning



## 9.1. Machine learning

- ✓ Machine learning is a part of artificial intelligence
- ✓ Machine Learning is a technique enable computer to learn automatically from the data, then to do the prediction.

### Examples

- ✓ Amazon using machine learning to give better product choice recommendations to their costumers based on their preferences.
- ✓ Netflix uses machine learning to give better suggestions to their users of the TV series or movie or shows that they would like to watch & many more

## 9.2. Deep learning

- ✓ Deep learning is actually a subset of machine learning.
- ✓ The main difference between deep and machine learning is, machine learning models works better but the model still needs some guidance.
- ✓ If a machine learning model returns an inaccurate prediction then the programmer needs to fix that problem explicitly.
- ✓ In the case of deep learning, the model does it by itself.

### Example

- ✓ Automatic car driving system is a good example of deep learning.

## 9.3. Artificial intelligence

- ✓ AI is an ability of computer program to function like a human brain.
- ✓ Machine learning and deep learning are the subsets of AI
- ✓ The MOTO of AI is to replicate a human brain, the way a human brain thinks, works and functions.
- ✓ Currently AI is not yet fully implemented but we are very close to establish that too.

Example

- ✓ Sophia, the most advanced AI model present today.

## 10. Is computer identifying pictures on image like cat/dog?

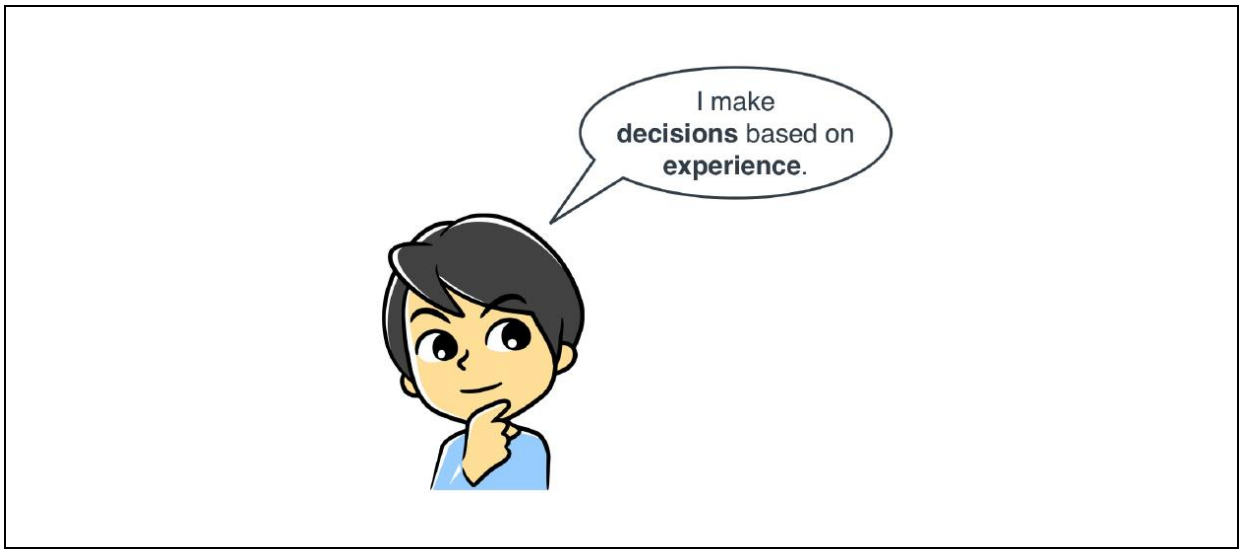
- ✓ Yes and it is really amazing task.
- ✓ If we giving lot of images to computer then computer can try to learn about the attributes to recognize images
- ✓ This is called as machine learning.
    - It is something like teaching to computer how to think like a human

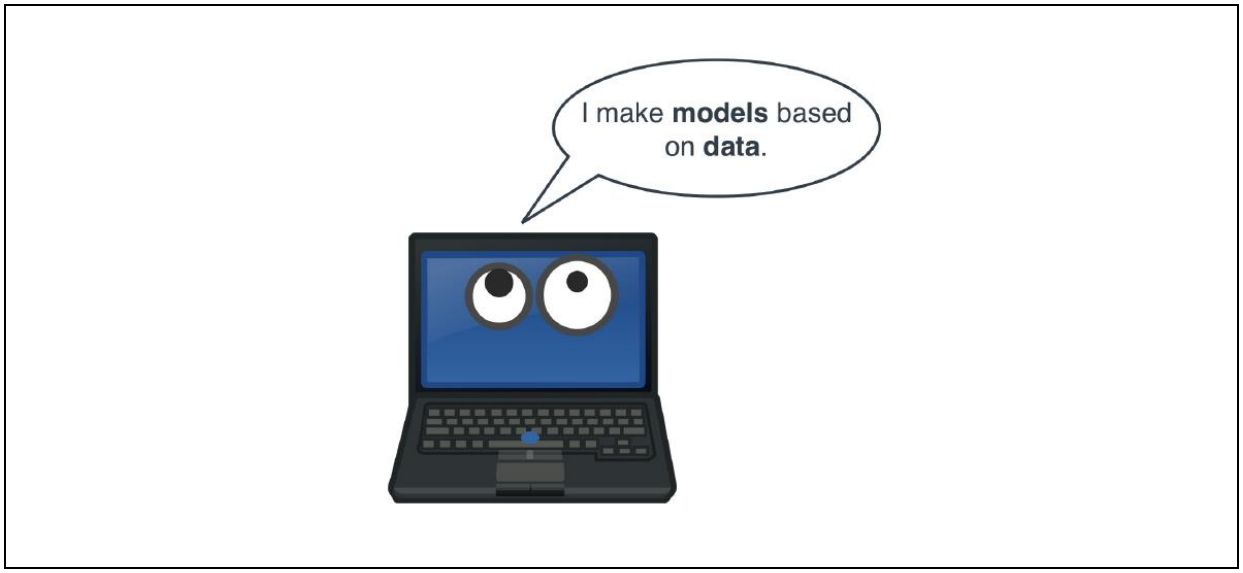
## 11. Is human identifying picture on image like cat/dog?

- ✓ Absolutely **YES** right.
- ✓ During my childhood parents/teachers taught like how to recognize a cat/dog/tiger/lion/etc
- ✓ So, in real life, if we see cat/dog/tiger/lion (sorry tiger/lion I have seen in Zoo but not directly) then we can easy to recognize without much effort.
- ✓ So, a human can take the decision based on experience.

## 12. Human vs computer

- ✓ Humans take the decisions based on the experience
- ✓ Machine learning algorithms takes the decision from trained data.



## 13. How a machine can take the decisions?

- ✓ First we need to understand human decision making process before understanding about how a computer takes the decision.

## 14. Human's follows this formula...

- ✓ All humans used to follow some patterns or formulas to take the next best action.

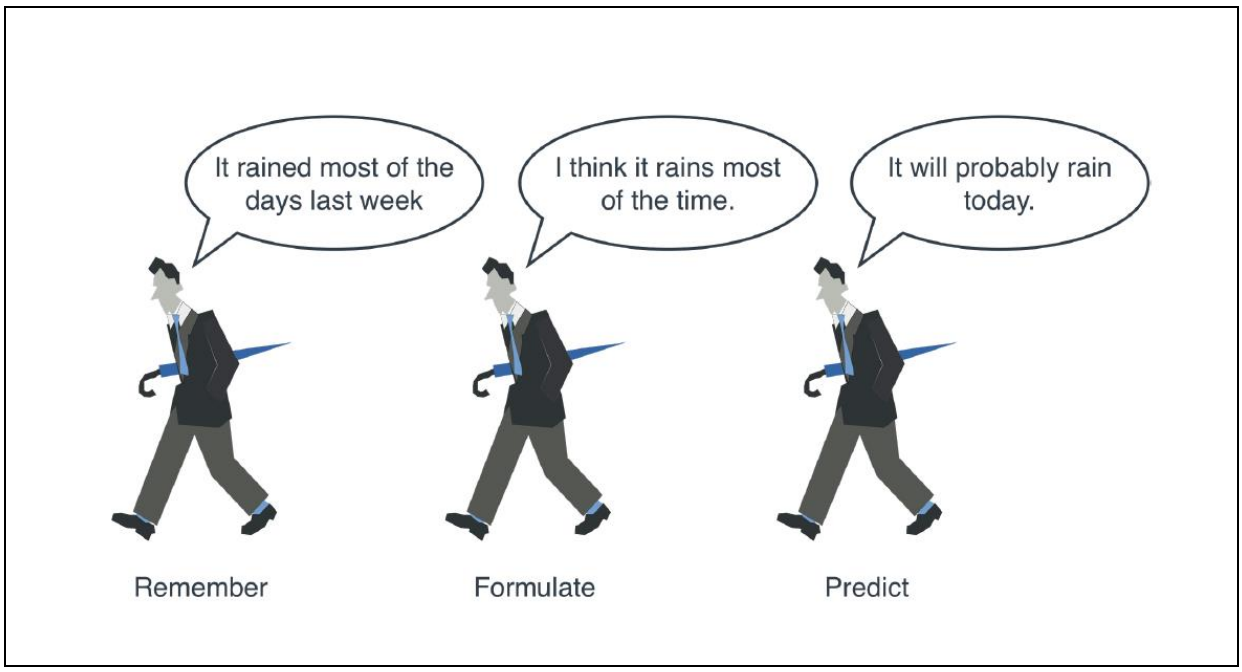
- Remember
- Formulate
- Predict

## 15. Generally

- ✓ We remember past situations that were similar.
- ✓ We formulate a general rule.
- ✓ We use this rule to predict what will happen if we take a certain decision.

## Example

- ✓ For supposed to answer for a question like, "Will it rain today? Or not", then we will follow one process to answer this question right.
- ✓ We may be right or wrong, but at least, we are trying to make an accurate prediction.



## 16. How do machines think?

- ✓ Here are the points what the computer(algorithms) can understand the points

## Steps

- ✓ Remember
  - Look at the given **HUGE** data.
- ✓ Formulate
  - Go through rules and formulas, and check which one fits for the data
- ✓ Predict
  - Use the rule to make predictions about future data.

## 17. Real time examples

- ✓ Gmail application
- ✓ Banking loan application or credit card eligibility & etc

## 18. Gmail application

- ✓ *Gmail* is the very well-known example.
- ✓ Hope we are all known about Spam folder too

- ✓ Spam
  - It is the common term used for junk or unwanted email, such as chain letters, promotions, and so on

- ✓ Ham
  - It is the common term used for non-spam mail means useful mail

- ✓ In this scenario machine learning algorithm is working to filter spam or not
- ✓ Machine learning algorithm,
  - Understand the previous mails(data)
  - Based on the previous mail creates some models.
  - These models applies on upcoming mails and predict whether it is spam or not

## 19. Banking loan application / credit card

- ✓ Banking loan application, this is the very common application hope everyone knows
- ✓ Once we applied for loan by submitting required documents(data) like pay slip, past 6 months banking statement and etc
- ✓ Then banking guys will run one application over the given data.
- ✓ This is Machine learning algorithm
- ✓ This algorithm passes through the data and predicts the weather the loan/credit card sanctioned or not.

## Note

- ✓ Many other applications are using machine learning
- ✓ I would like to say, Machine learning is everywhere ☺

## 20. Where machine learning helps?

- ✓ From past two decades most of the companies are digitalized.
- ✓ So, here data is generated more and more.
- ✓ So, in this case machine learning helps us to develop predictive models and automate several things.
- ✓ Assuming that we had past couple of year's amazon transactions data.
- ✓ Some questions:
    - Wanted to know how the business was in last couple of years
    - Wanted to take best decisions to improve the business and etc

- ✓ To answer above questions, we need to,
    - Gather the data
    - Process the data
    - Take the decisions.

## 21. Few of machine learning applications

- ✓ Text processing
- ✓ Speech Recognition
- ✓ Traffic prediction
- ✓ Product recommendations
- ✓ Self-driving cars
- ✓ Email spam and malware filtering
- ✓ Online fraud detection
- ✓ Weather forecasting and prediction & etc

## 22. Why machine learning required?

- ✓ As a human we cannot access huge amount of data manually to process.
- ✓ We can train machine learning algorithms by providing huge amount of data.
- ✓ Machine learning algorithm travel through this data in order to learn about data, it create the model and predict results automatically for new data

## 23. Technically speaking…

- ✓ Technically speaking,
  - WITH THE help of historical data
  - MACHINE LEANRING algorithms
  - BUILD a mathematical MODEL
  - that helps in making PREDICTIONS
  - Without being EXPLICITELY PROGRAMMER