SNS COLLEGE OF TECHNOLOGY

Coimbatore-35

An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A+' Grade

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF MCA

19CAT703 – MACHINE LEARNING

II YEAR III SEM

UNIT I – FOUNDATIONS OF LEARNING

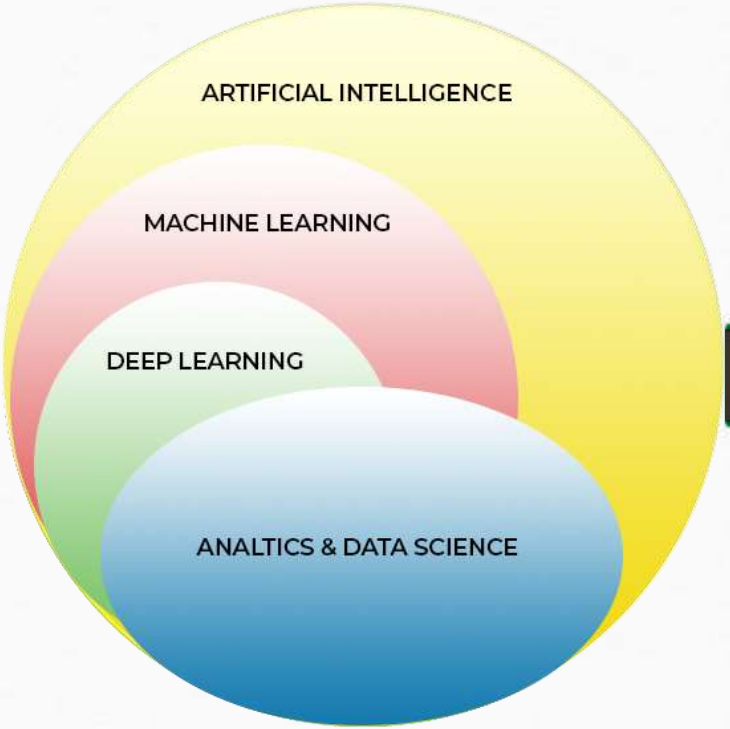
TOPIC 1 – Components of Learning


machine
digital
analyze
neural
cloud
network
programming
download
classification
intelligence
LEARNING
artificial
robotic arm
learning
solution
algorithm
automation
machine
server
data
research

Learning - Introduction

AI is a bigger concept to create intelligent machines that can simulate human thinking capability and behavior.

1. **Machine learning** is an application or subset of AI that allows machines to learn from data without being programmed explicitly.
2. **Deep Leaning** algorithms capable of copying the actions of the human brain thanks to neural networks
3. **Data science** tackles big data and includes data cleansing, preparation, and analysis.
4. **Data scientist** gathers data from multiple sources and applies machine learning



Learning - Introduction

"Learning is any process by which a system improves performance from experience."

- Herbert Simon

Why do we need to care about machine learning?

A breakthrough in machine learning would be worth ten Microsoft.

— Bill Gates, Former Chairman, Microsoft

Definition by Tom Mitchell (1998):

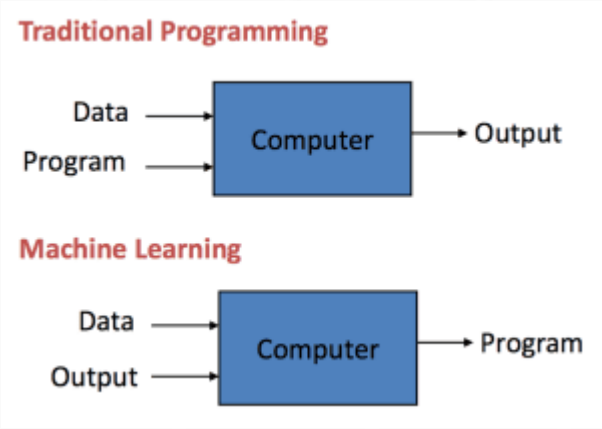
Machine Learning is the study of algorithms that

- improve their performance *P*
- at some task *T*
- with experience *E*.

A well-defined learning task is given by <*P*, *T*, *E*>.

Machine Learning is getting computers to program themselves. If programming is automation, then machine learning is automating the process of automation.

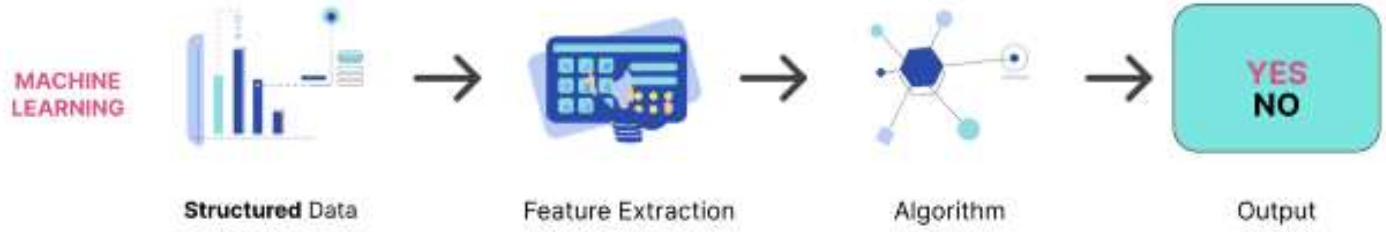
Difference between Traditional Programming and Machine Learning



Machine learning is like farming or gardening.

1. Seeds is the algorithms
2. Nutrients is the data
3. The gardener is you and
4. Plants is the programs

Machine Learning VS Deep Learning

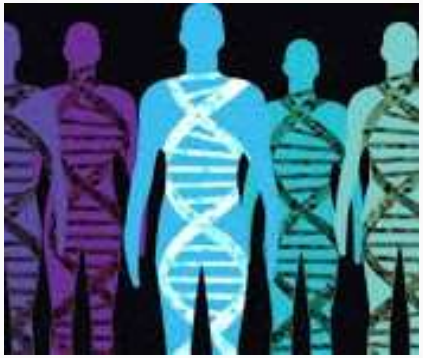
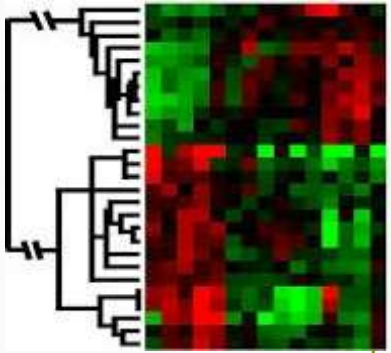


Why do we use Machine Learning?

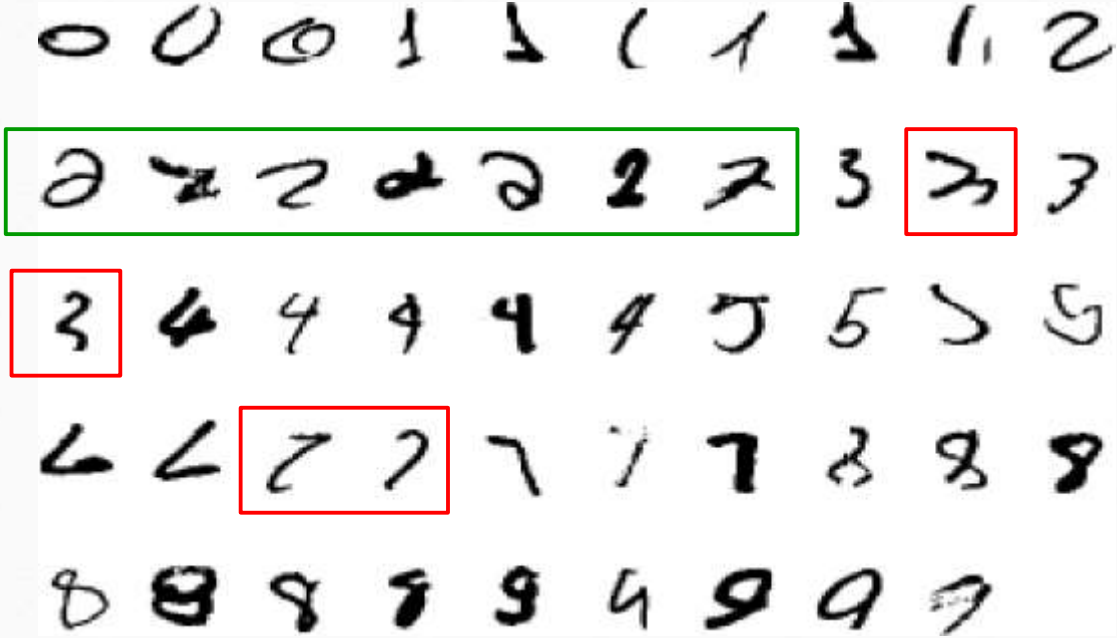
ML is used when:

- Human expertise does not exist (navigating on Mars)
- Humans can’t explain their expertise (speech recognition)
- Models must be customized (personalized medicine)
- Models are based on huge amounts of data (genomics)



A classic example of a task that requires machine learning: It is very hard to say what makes a 2



Applications of Machine Learning

Social networks

E-commerce

DuckDuckGo

Bing

Google

YAHOO!

Web search

Information Extraction

Computational biology

Finance

Space exploration

Robotics

- Debugging software

Key Elements of Machine Learning: Three components

Tens of thousands of machine learning algorithms and hundreds of new algorithms

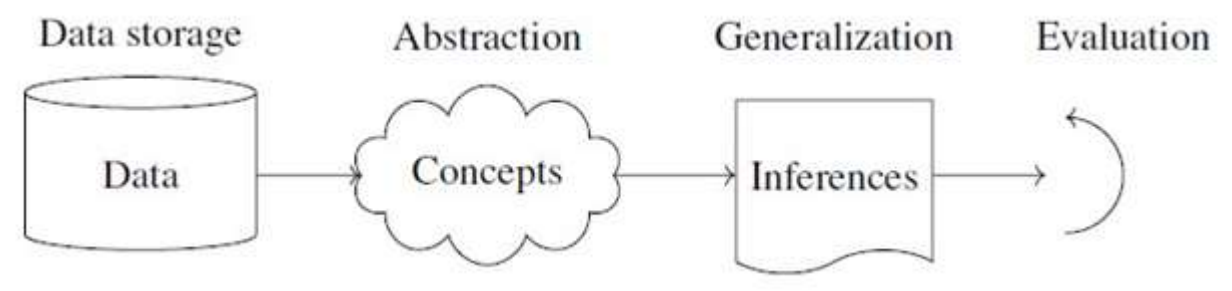
1. **Representation**: how to represent knowledge.
    1. Examples decision trees, sets of rules, instances, graphical models, neural networks, support vector machines, model ensembles and others.
2. **Evaluation**: the way to evaluate candidate programs (hypotheses).
    1. Examples accuracy, prediction and recall, squared error, likelihood.
3. **Optimization**: the way candidate programs are generated known as the search process.
    1. Example combinatorial optimization, convex optimization, constrained optimization.

1.Start Loop

1. **Understand the domain, prior knowledge and goals**.
2. **Data integration, selection, cleaning and pre-processing**.
3. **Learning models**.
4. **Interpreting results**.
5. **Consolidating and deploying discovered knowledge**.

2.End Loop

Components of Machine Learning



Assessment

- **If machine learning model output involves target variable then that model is called as**

1. Descriptive model
2. **predictive model**
3. all of the above

- **Identify the type of learning in which labeled training**

1. **Supervised**
2. Unsupervised
3. Reinforcement

- **Real-Time decisions, Game AI, Learning Tasks, Skill Acquisition, and Robot Navigation are applications of which of the following**

1. Supervised
2. Unsupervised
3. **Reinforcement**

Reference

- Y. S. Abu-Mostafa, M. Magdon-Ismail, and H.-T. Lin, ―Learning from Data, AML Book Publishers, 2012.
- P. Flach, ―Machine Learning: The art and science of algorithms that make sense of data‖, Cambridge University Press, 2012.
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Thank
you