Tishreen University
Information Engineering Faculty
Artificial Intelligence Department
Forth Year

Artificial Neural Networks

Lecture 1 : Introduction

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WHAT IS MACHINE LEARNING?

"Field of study that gives computers the ability to learn without being explicitly programmed”

“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”

The checkers example

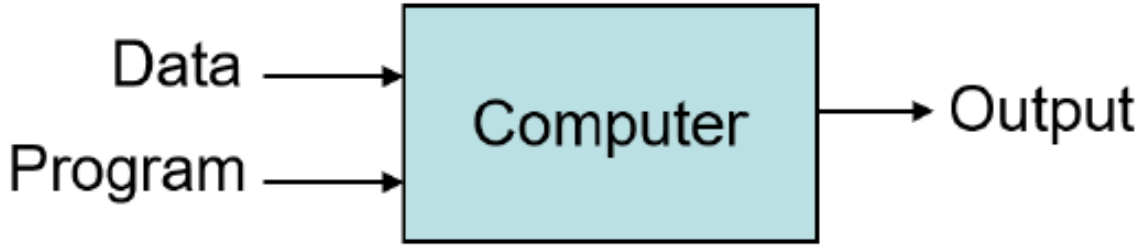
E = 10000s games

T is playing checkers

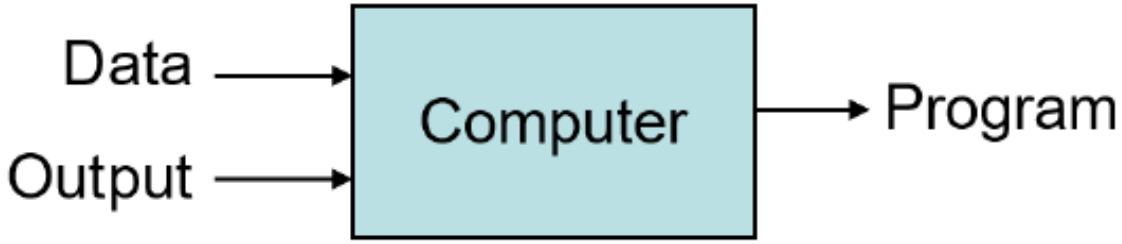
P if you win or not

WHAT IS MACHINE LEARNING?

Traditional Programming



VS. Machine Learning



APPLICATIONS

- Web search
- Computational biology
- Finance
- E-commerce
- Space exploration
- Robotics
- Information extraction
- Social networks

TYPES OF LEARNING

Several types of learning algorithms:

- **Supervised learning**

  Teach the computer how to do something, then let it use its new found knowledge to do it.

- **Unsupervised learning**

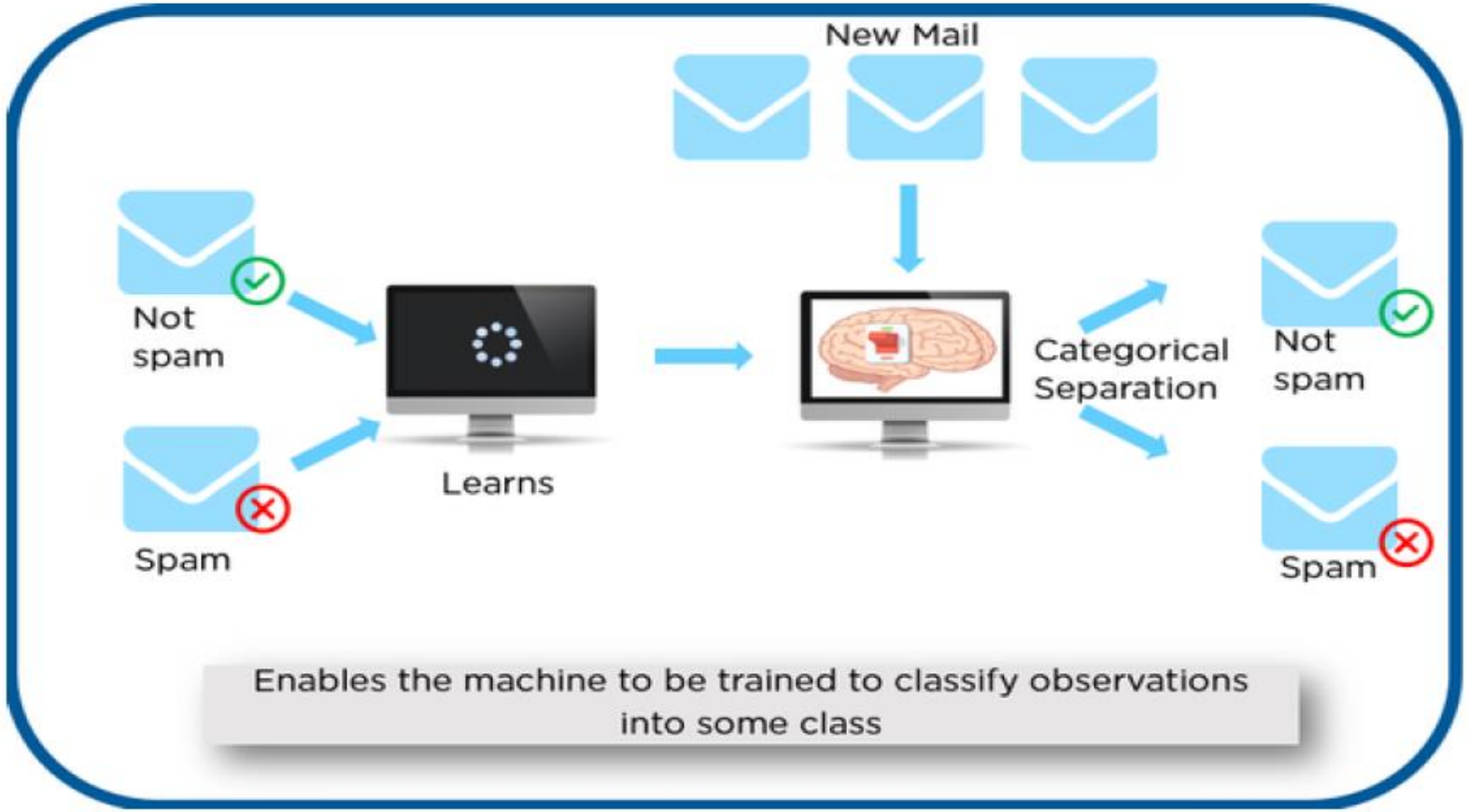
  Let the computer learn how to do something, and use this to determine structure and patterns in data.

- **Reinforcement learning**

  Rewards from sequence of actions**.**

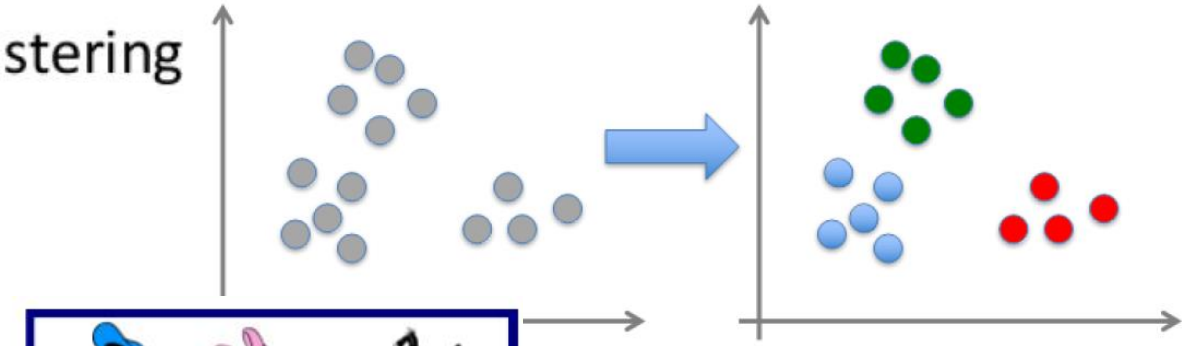
TYPES OF LEARNING

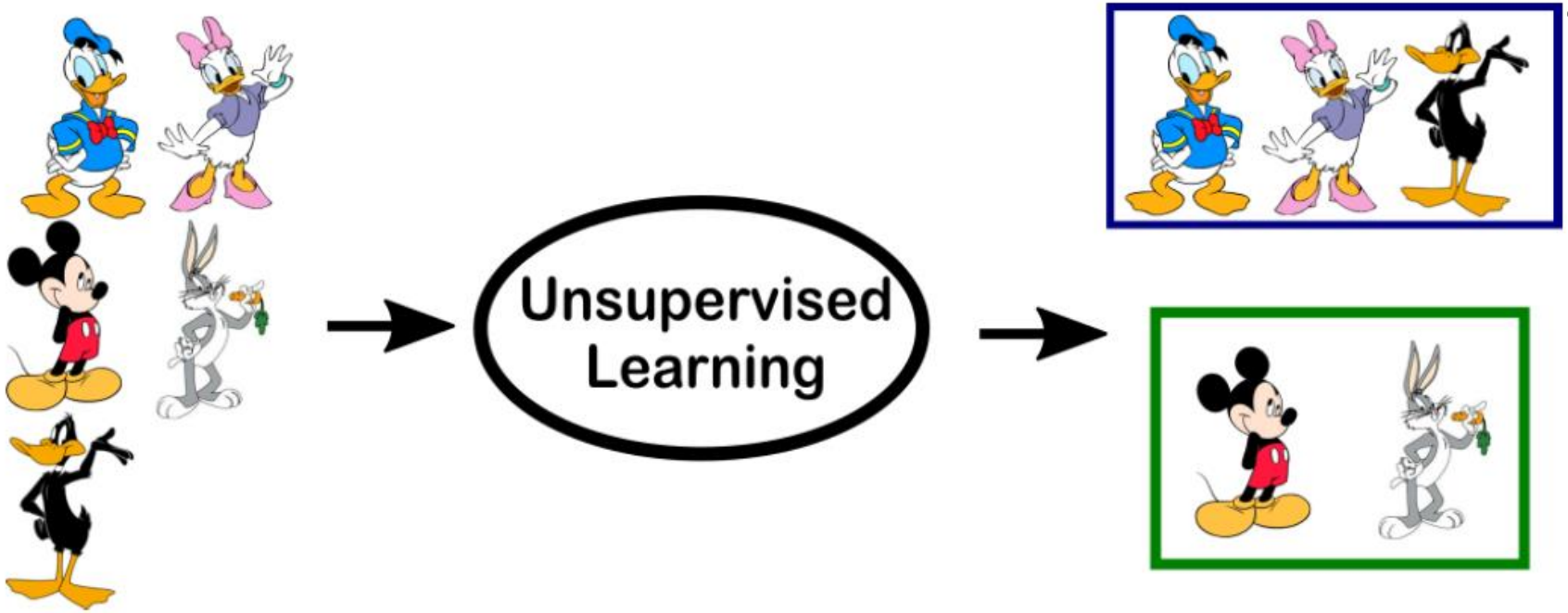
- **Supervised learning**
  - Given $(x_1, y_1), (x_2, y_2), \ldots, (x_n, y_n)$
  - Learn a function $f(x)$ to predict y given x
    - y is categorical == classification



TYPES OF LEARNING

- **Unsupervised learning**
  - Given $x_1, x_2, \ldots, x_n$ (without labels)
  - Output hidden structure behind the x's
    - E.g., clustering





TYPES OF LEARNING

- **Reinforcement learning**

Given a sequence of states and actions with rewards, output a policy.

Policy is a mapping from states → actions that tells you what to do in a given state.