Artificial Intelligence

By Dr. Naglaa fathy
Lecturer, Computer Science Department
Faculty of Computers and Artificial Intelligence
Benha University

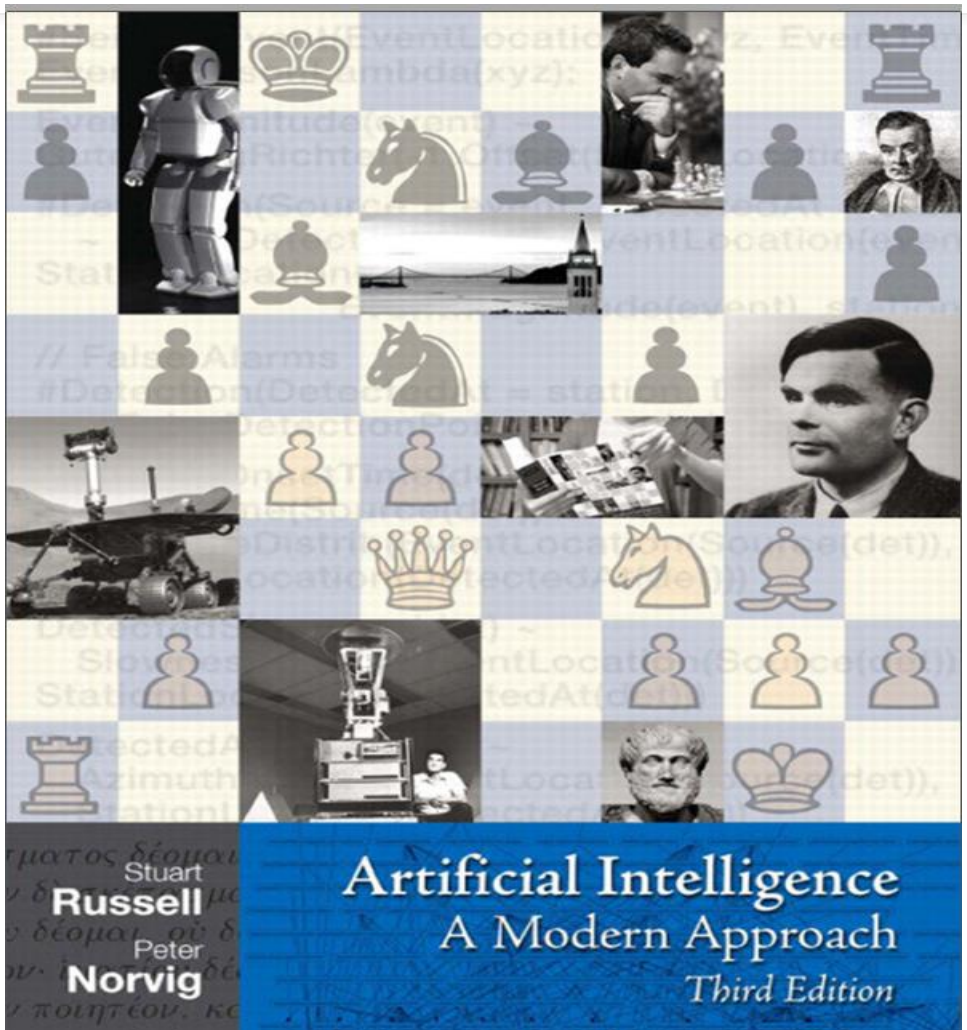
Lecture 1
Introduction of AI

Lectures References

Artificial Intelligence
A Modern Approach

Third Edition

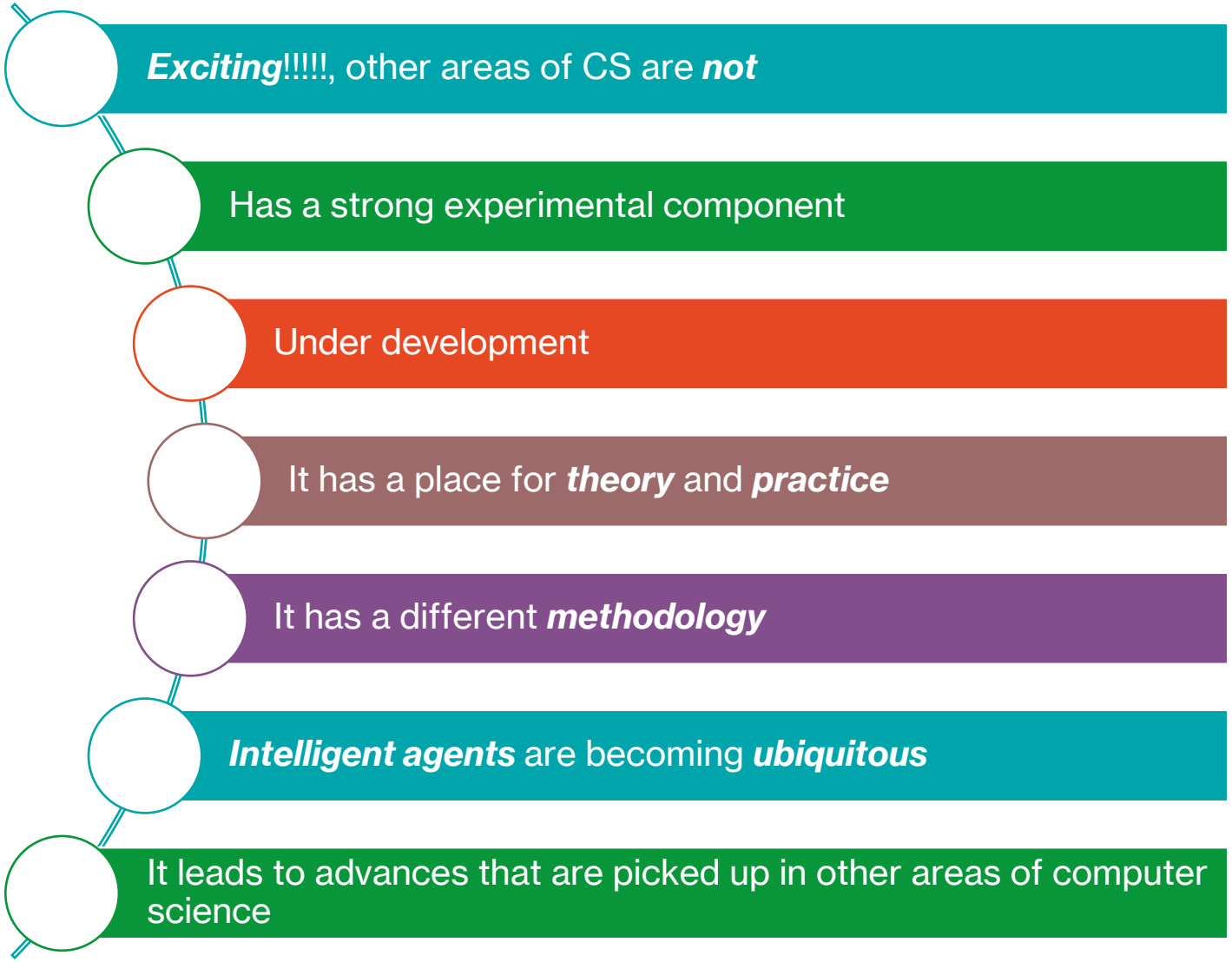
Stuart J. Russell and Peter Norvig



Course content

1. **Introduction of Artificial Intelligence (AI)**
2. **Intelligent Agents**
   - Agents and Environments
   - Rationality
   - PEAS (Performance, Environment, Actuators, Sensors)
3. **Problem Solving and Search**
   - Problem-Solving Agents
   - Problem Formulation
   - Uninformed Search Algorithms (*BFS, DFS, Uniform-cost, Iterative deepening*)
   - Informed Search Algorithms (*Best-first, Greedy Best-first, A*)*
4. **Constraint Satisfaction Problems**

Why study AI?


Exciting!!!!!, other areas of CS are ***not***
Has a strong experimental component
Under development
It has a place for ***theory*** and ***practice***
It has a different ***methodology***
Intelligent agents are becoming ***ubiquitous***
It leads to advances that are picked up in other areas of computer science

Goals of AI

It helps you reduce the amount of time needed to perform specific tasks

Making it easier for humans to interact with machines

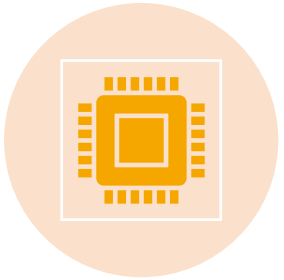
Improving the accuracy and speed of medical diagnoses.

Enhancing communication between humans and machines

Helping people learn new information more quickly

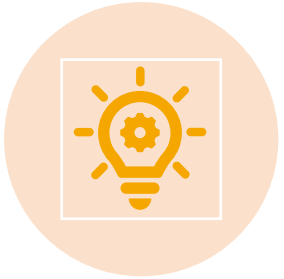
Artificial intelligence

A branch of computer science dealing with the simulation of intelligent behavior in computers.



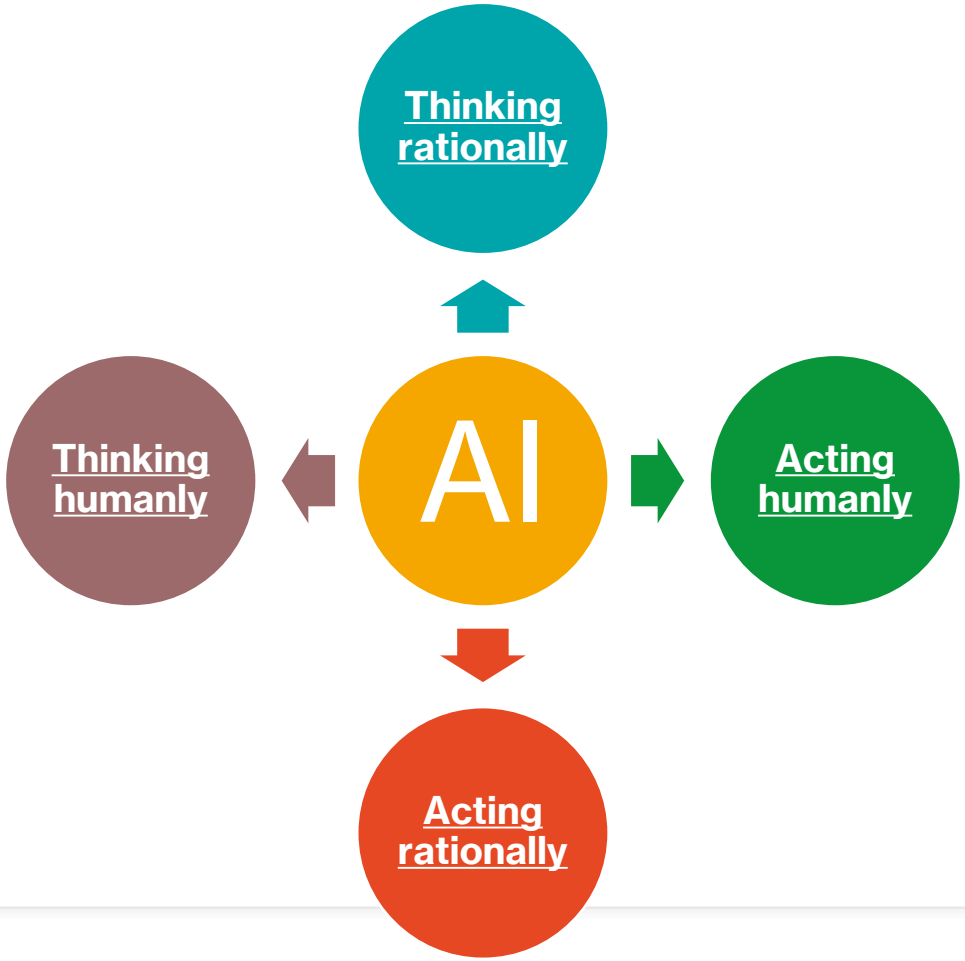
the study of how to make computers do things at which, at the moment, people are better."

The power of a machine to copy intelligent human behavior



refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions

Definitions of AI



Thinking humanly

- The exciting new effort to make computers think… machines with minds,in the full and literal sense.” (Haugeland, 1985)

- “[The automation of] activities that we associate with human thinking, activities such as decision-making, problem solving, learning…”

Thinking rationally

- The study of mental faculties through the use of computational models." (Charniak and McDermott, 1985)

- "The study of the computations that make it possible to perceive, reason, and act." (Winston, 1972)

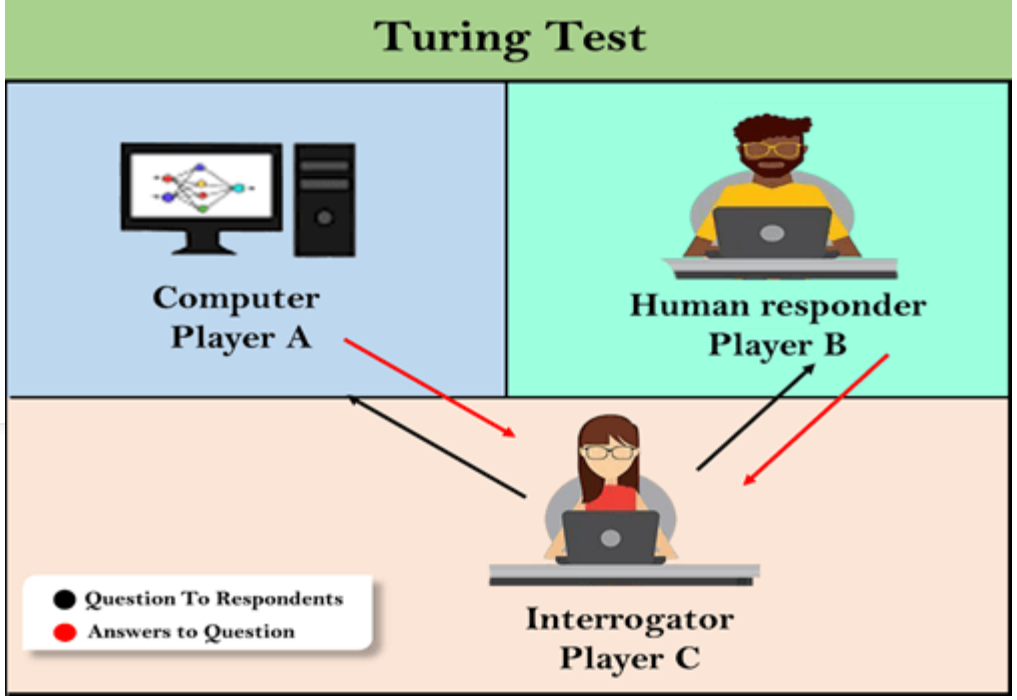
Acting humanly

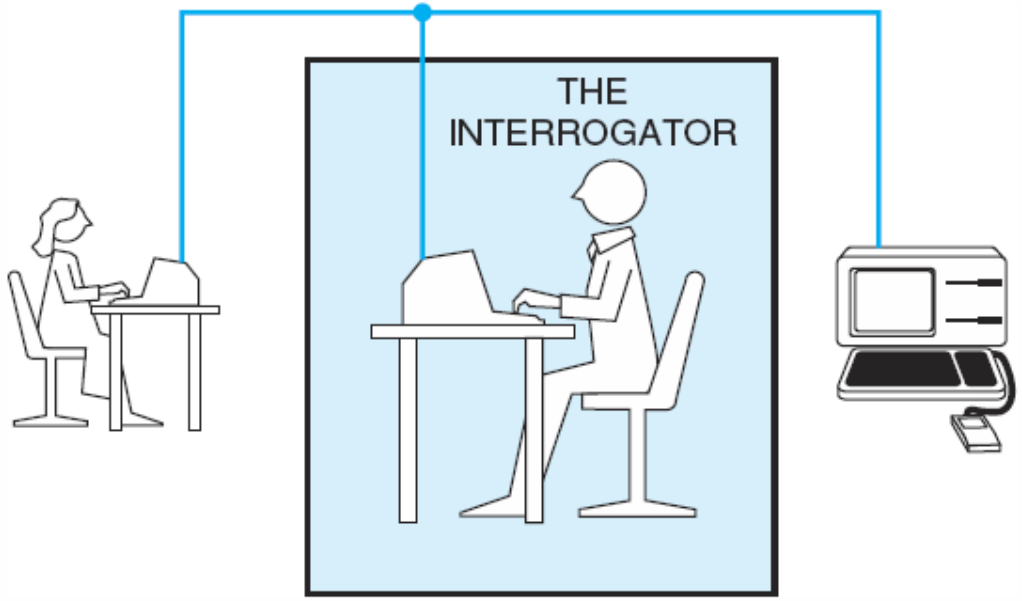
- The art of creating machines that perform functions that require intelligence when performed by people" (Kurzweil, 1990)

- "The study of how to make computers do things at which, at the moment, people are better (Rich and Knight, 1991)

Turing Test in AI

- In 1950, Alan Turing introduced a test to check whether a machine can think like a human or not
- In this test, Turing proposed that the computer can be said to be an intelligent if it can mimic human response under specific conditions.





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The computer would need to possess the following capabilities:

- *Natural language processing*
  - for communication with human
- *Knowledge representation*
  - to store information effectively & efficiently
- *Automated reasoning*
  - to retrieve & answer questions using the stored information
- *Machine learning*
  - to adapt to new circumstances

Acting rationally

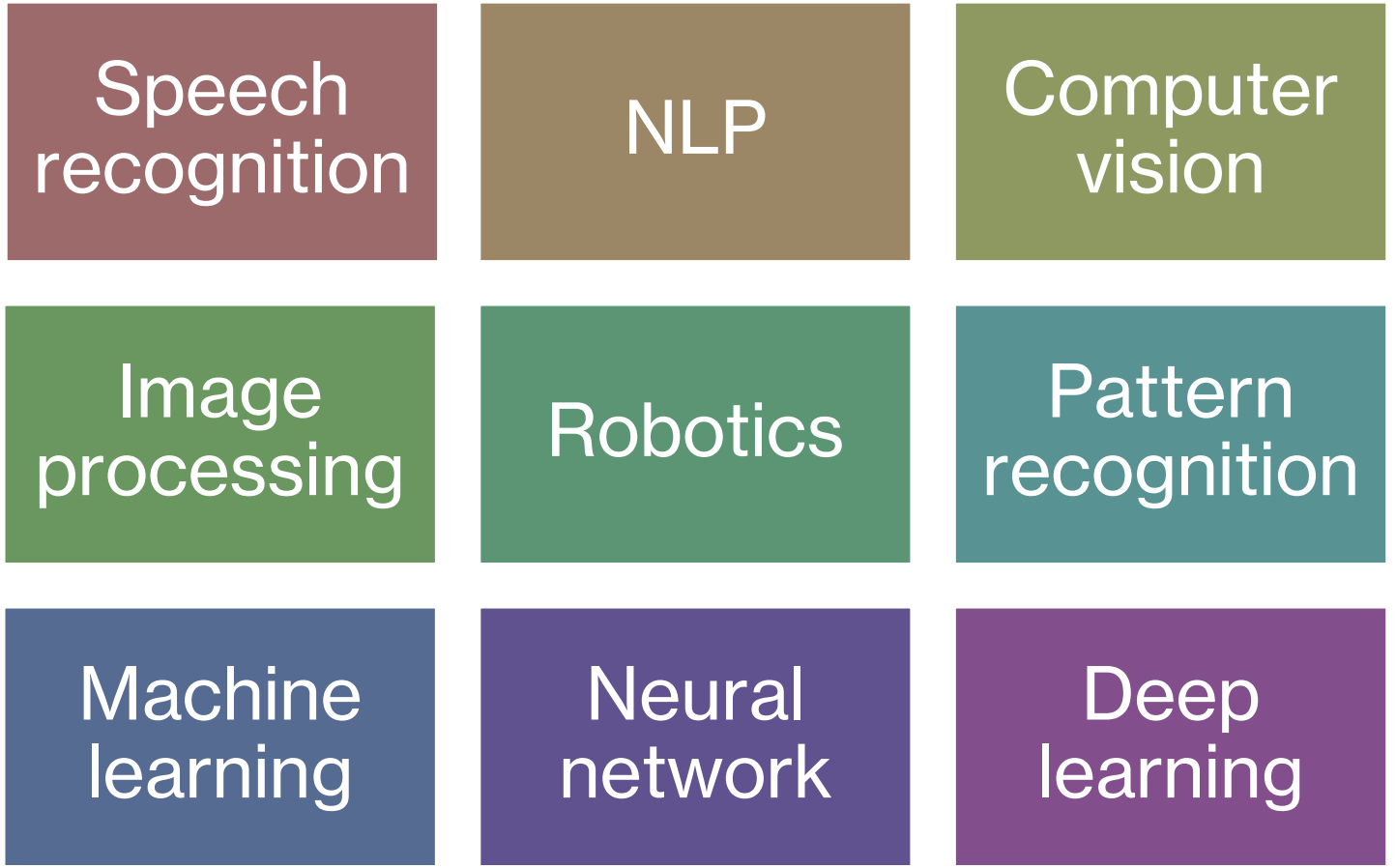
- The branch of computer science that is concerned with the automation of intelligent behavior." (Luger and Stubblefield, 1993)

- "Computational intelligence is the study of the design of intelligent agents."

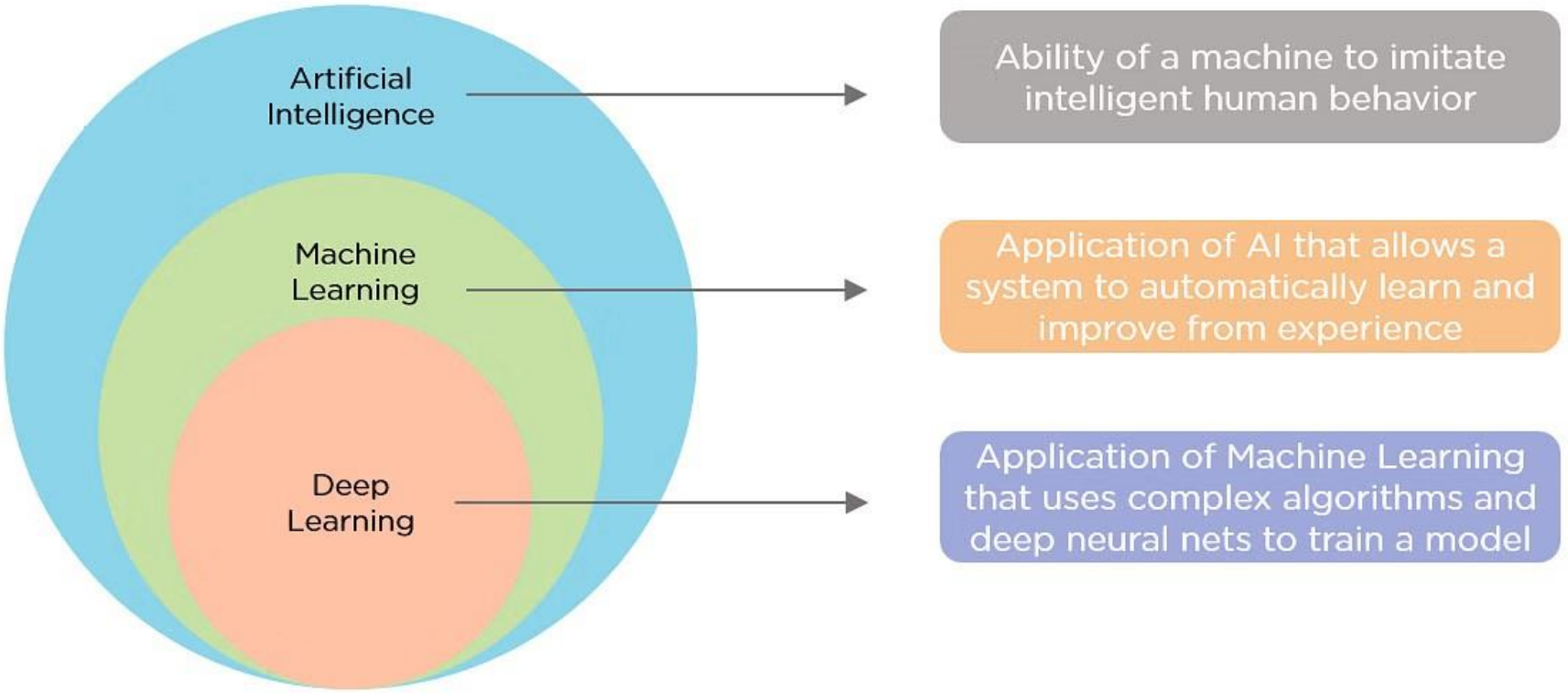
(Poole et al., 1998)

"AI… is concerned with intelligent behavior in artifacts." (Nilsson, 1998)

Areas of AI


Speech recognition
NLP
Computer vision
Image processing
Robotics
Pattern recognition
Machine learning
Neural network
Deep learning

AI&ML&DL

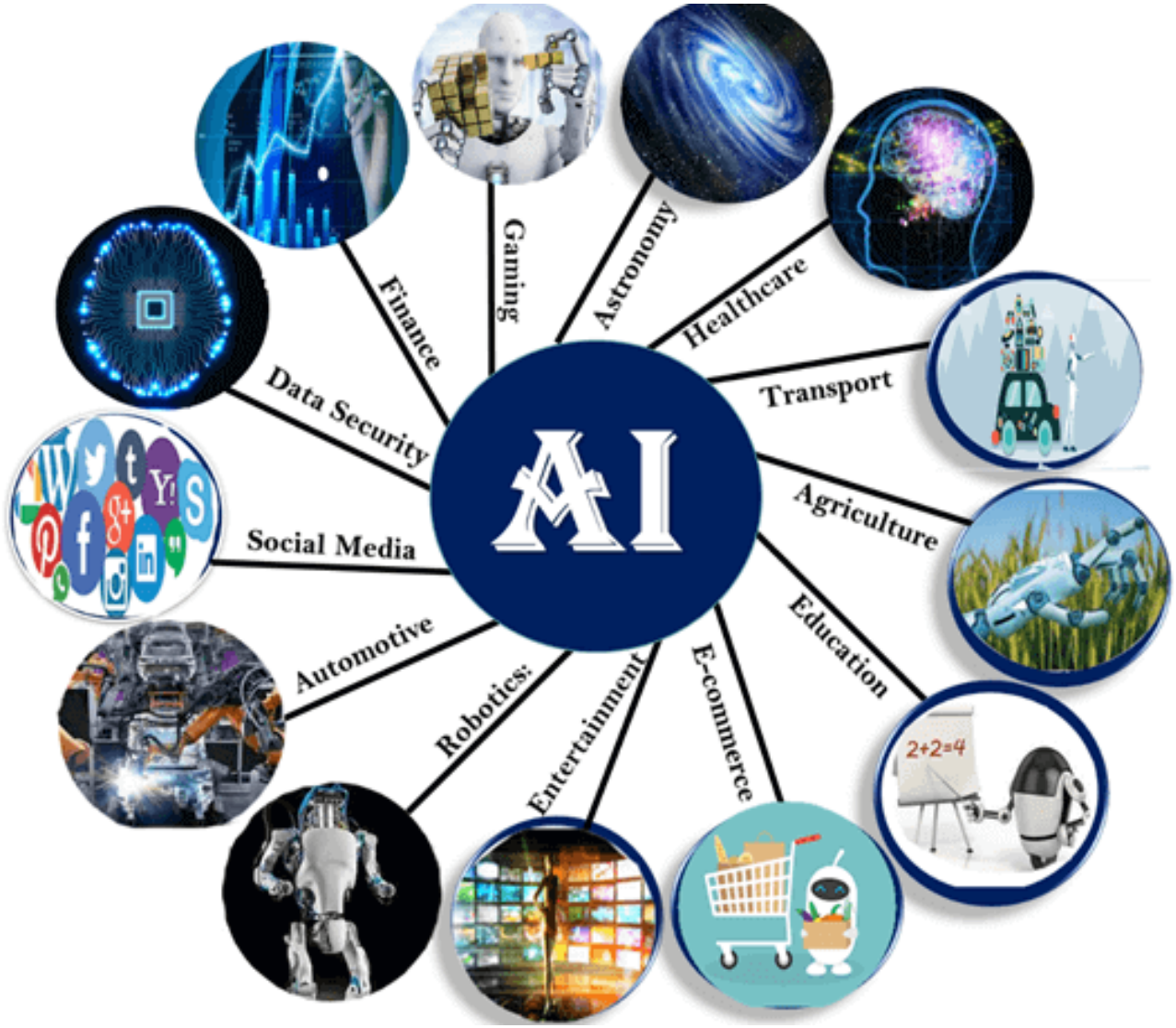

Artificial Intelligence
Machine Learning
Deep Learning
Ability of a machine to imitate intelligent human behavior
Application of AI that allows a system to automatically learn and improve from experience
Application of Machine Learning that uses complex algorithms and deep neural nets to train a model

Application of AI

Smartphones
Smart Home
Security and Surveillance
Smart Cars
E-commerce
Education
Health care
Cyber –security
Social media
Marketing

Smart home

Applications of AI



Advantage of AI

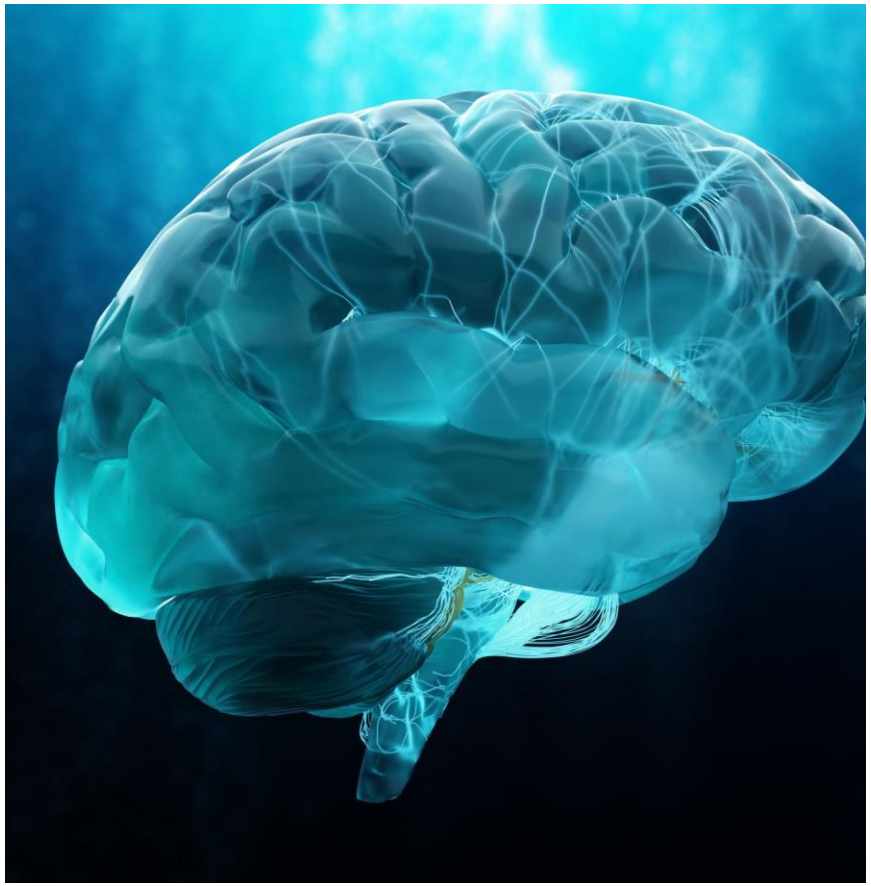
- More powerful and more useful computers
- Reduction of human error
- Speed and Accuracy
- Perform repetitive jobs
- Decision making
- Daily Application
- Risk Mitigation

Disadvantage of AI

- High cost of creation
- Algorithmic Complexity
- Loss of Human Connection
- few experienced programmers
- Emotionless

The Foundations Of Artificial Intelligence

- **Philosophy**
  - Can formal rules be used to draw valid conclusions?
  - Where does knowledge come from?
  - How does knowledge lead to action?
- **Mathematics**
  - What are the formal rules to draw valid conclusions?
  - What can be computed?
  - How do we reason with uncertain information?
- **Economics**
  - How should we make decisions so as to maximize payoff?
  - How should we do this when others may not go along?
  - How should we do this when the payoff may be far in the future?



CONT.

- **Neuroscience**
  - How do brains process information?
- **Psychology**
  - How do humans and animals think and act?
- **Computer engineering**
  - How can we build an efficient computer?
- **Control theory and cybernetics**
  - How can artifacts operate under their own control?
- **Linguistics**
  - How does language relate to thought?


AI
THANKYOU