



The Pakistan Academy of Engineering



27/06/2020

17th Symposium on "Emerging Technologies"

Artificial Intelligence

Invited Speakers

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Presentation Agenda

01 What is Artificial Intelligence?

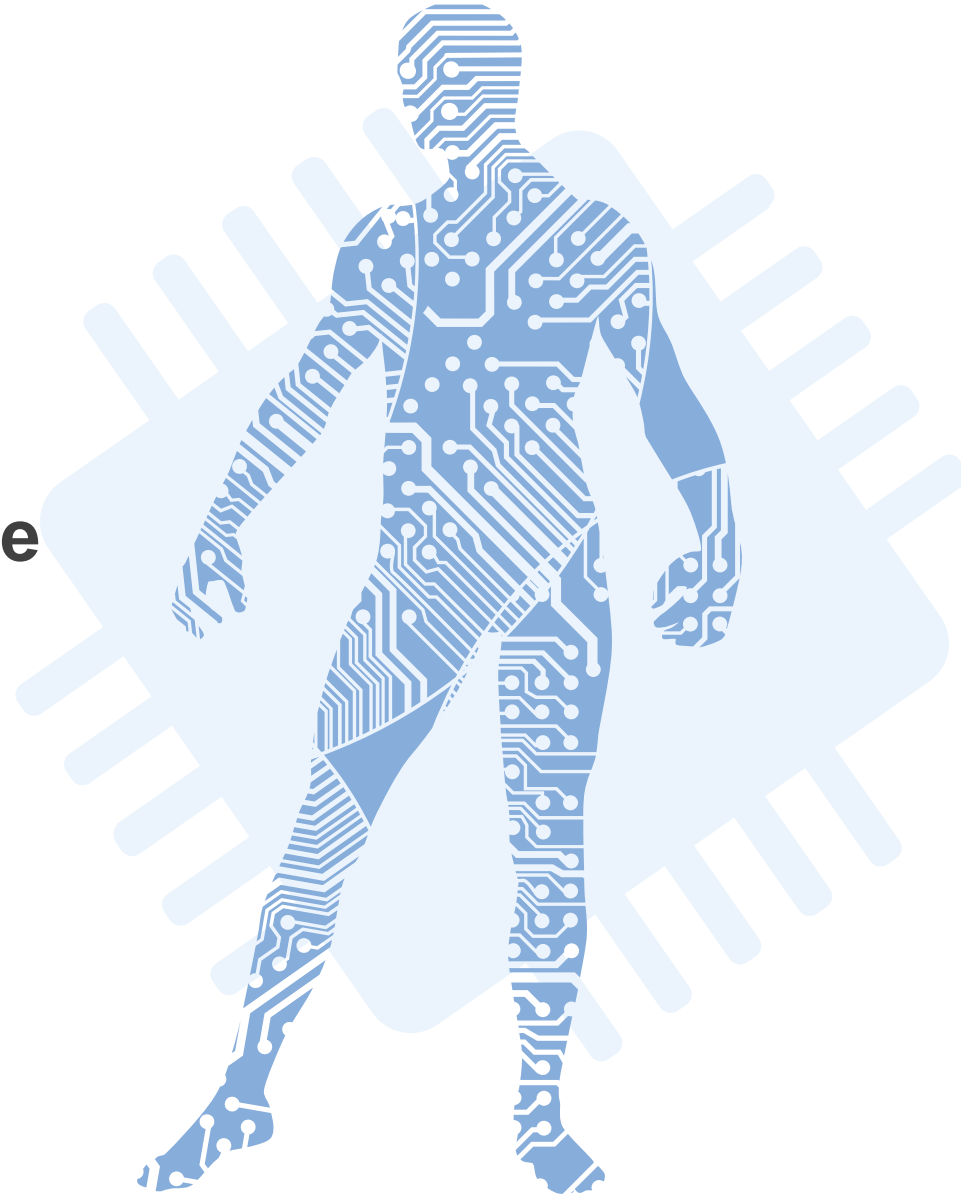
A brief introduction to the very concept of AI

02 Fundamentals of Artificial Intelligence

Discussion about the core concepts and basics of AI

03 Applications of Artificial Intelligence

Discussion about current and future applications of AI





What is Artificial Intelligence?

A brief introduction to the very concept of AI



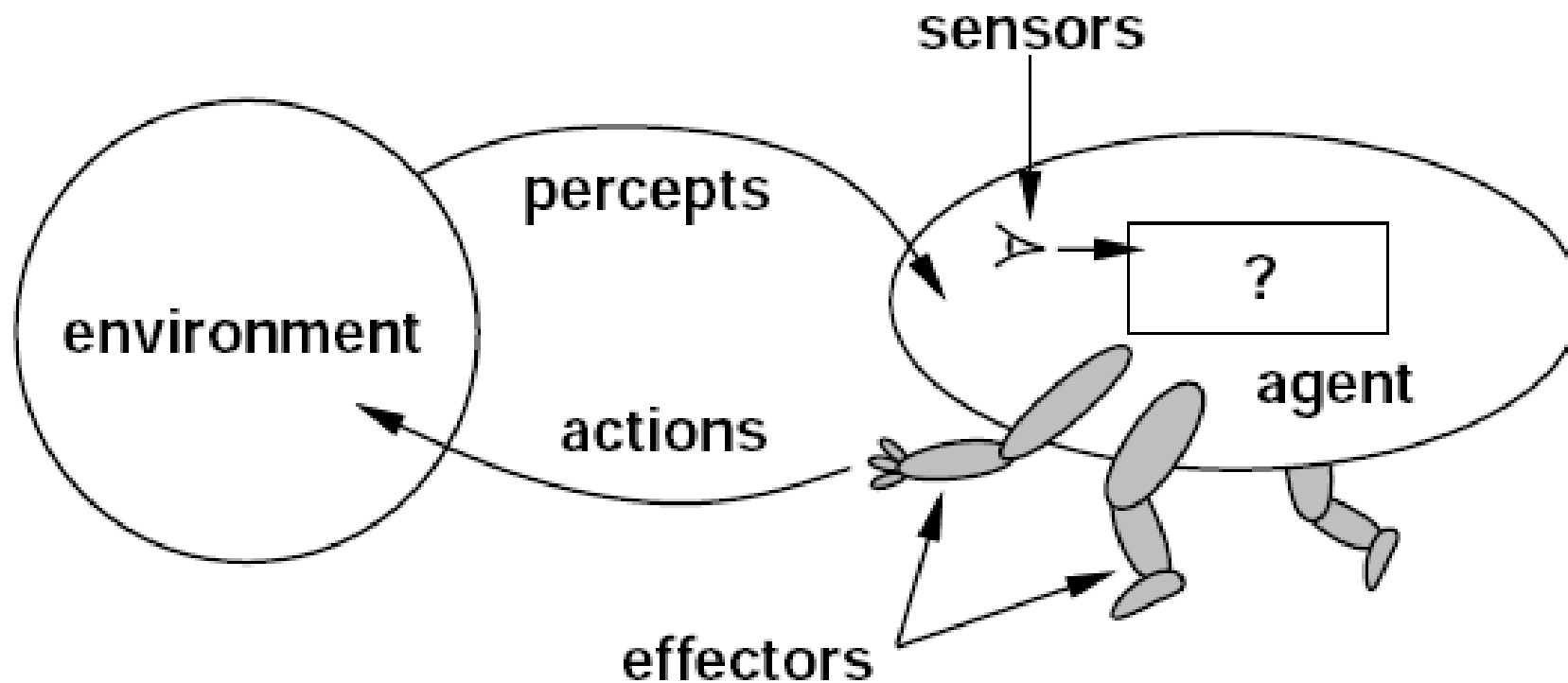
Definition of Artificial Intelligence

Most widely accepted definition of AI is:

“The designing and **building** of **intelligent agents** that **receive percepts** from the environment and **take actions** that affect that environment.”

(Russel & Norvig, 2016)

Agent and Environments



History of Artificial Intelligence

1950s

Artificial Intelligence

John McCarthy coined the term "Artificial Intelligence" in 1955

1990s

IBM Deep Blue

IBM Deep Blue, a computer program was able to beat world chess champion, Garry Kasparov

2020

Many possibilities

Today, AI is being employed in a wide range of applications

1980s

Expert Systems

Edward Feigenbaum created "Expert Systems" to emulate decisions of human experts.

2000s

Self-Driving Cars

Google built the first self-driving car to handle urban conditions

The AI Boom

- **Higher Computational Capacity**
- **Cheaper and Increased Storage Options**
- **Large Volumes of Data**





Fundamentals of Artificial Intelligence

Discussion about the core concepts and basics of AI

Goals of Artificial Intelligence

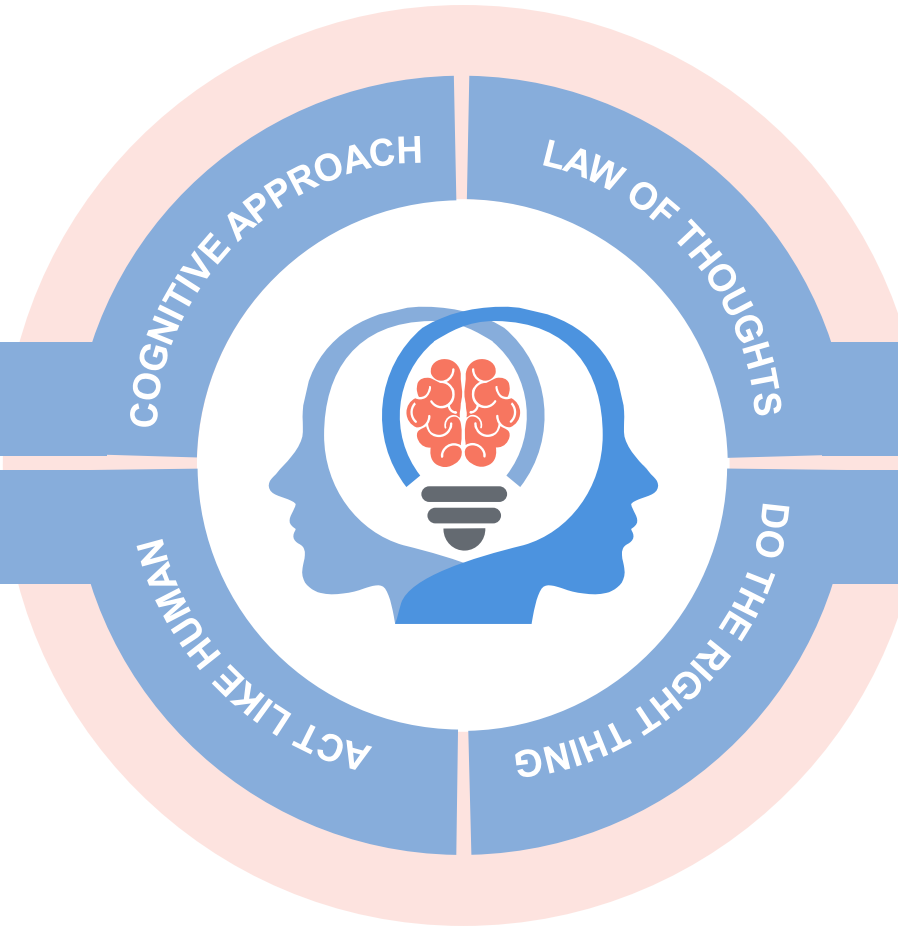
Four School of Thoughts

Thinking Humanly
Cognitive approach

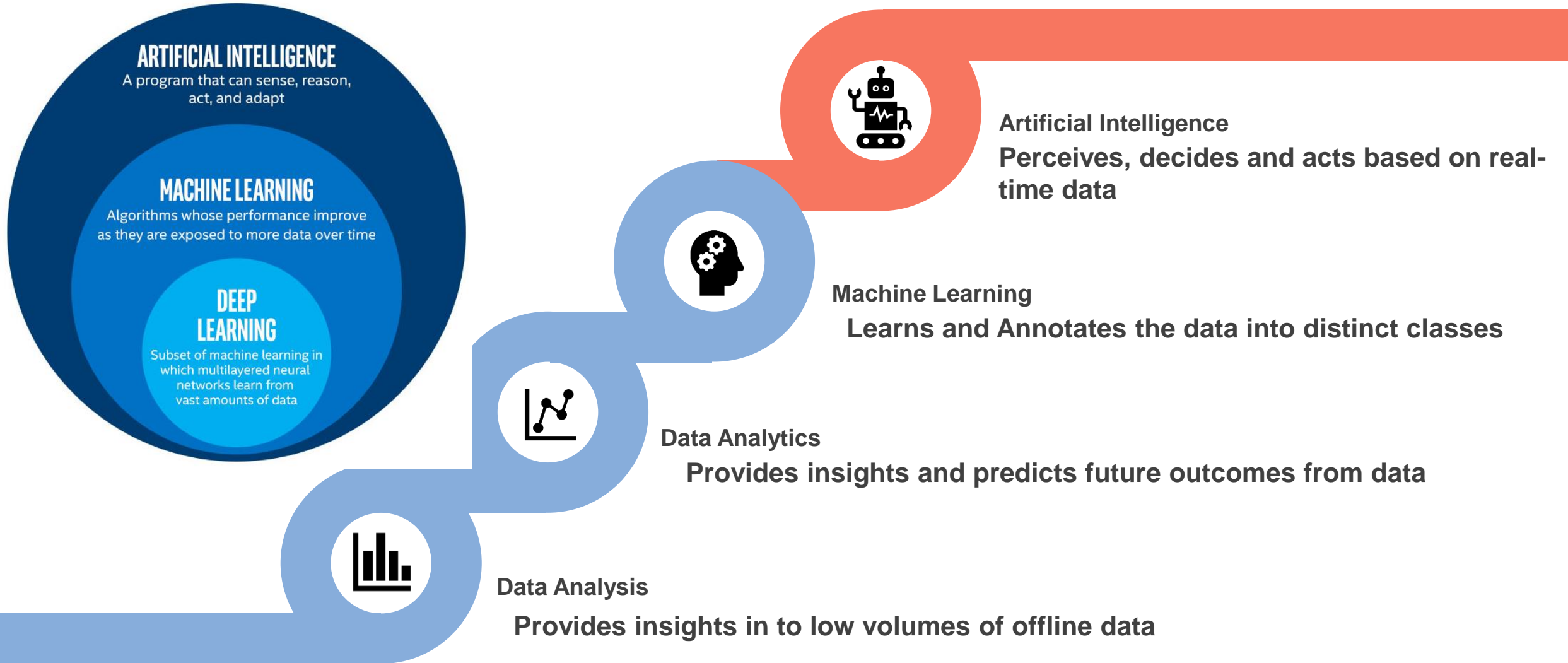
Thinking Rationally
Laws of thoughts

Acting Humanly
Act Human-Like

Acting Rationally
Do the Right Thing



AI in the context of Data Analysis

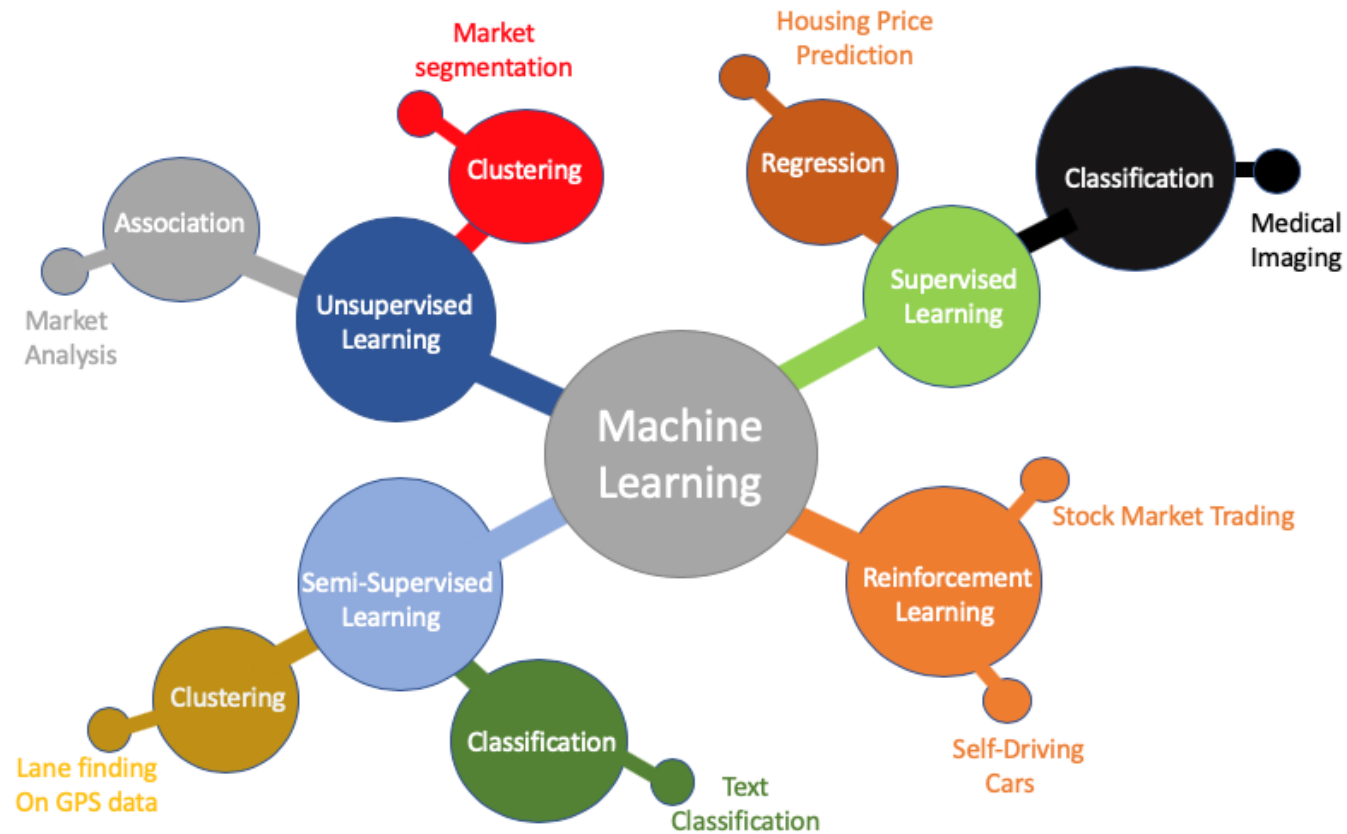


What is Machine Learning?

“Machine learning helps to transform Raw data in to knowledge”

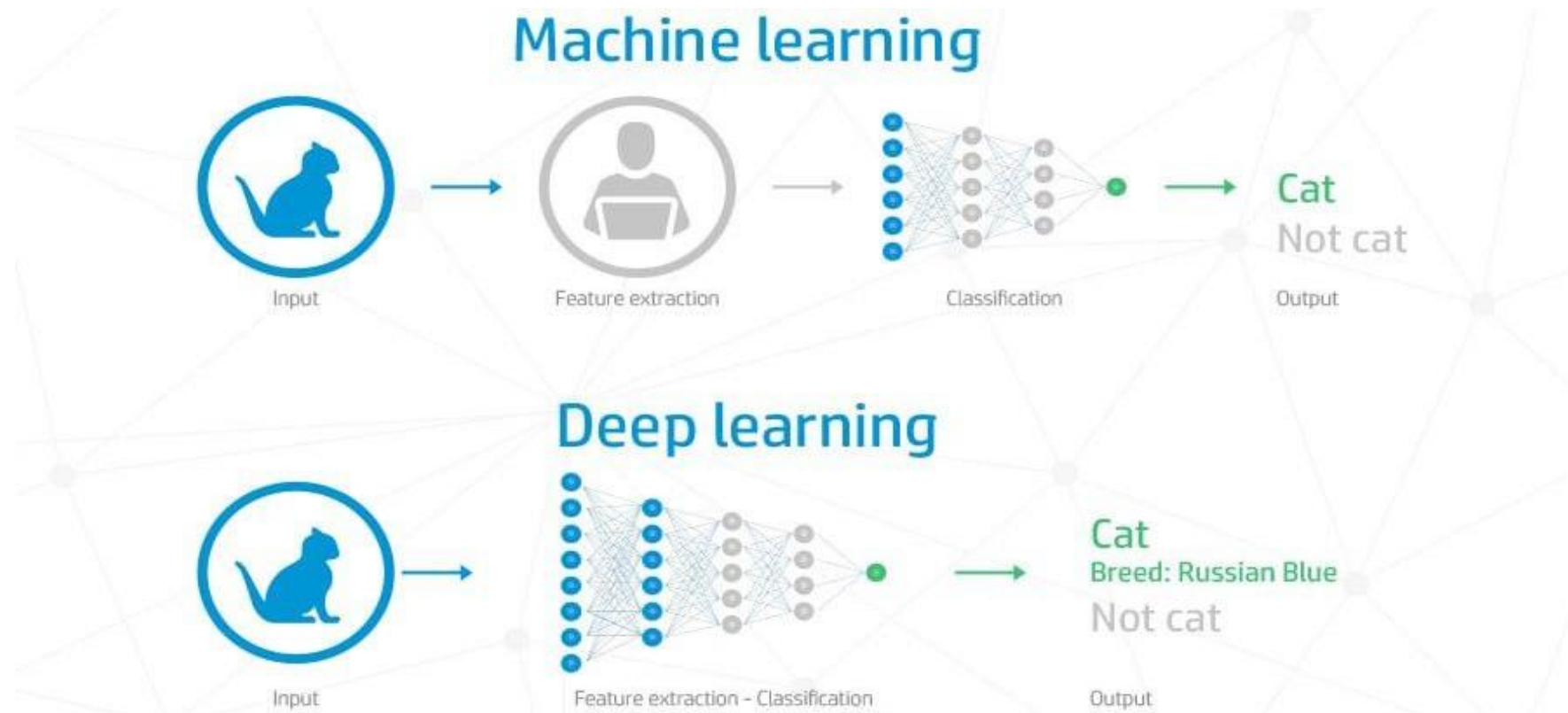
It can be divided in to two categories:

- **Classification**
- **Clustering**



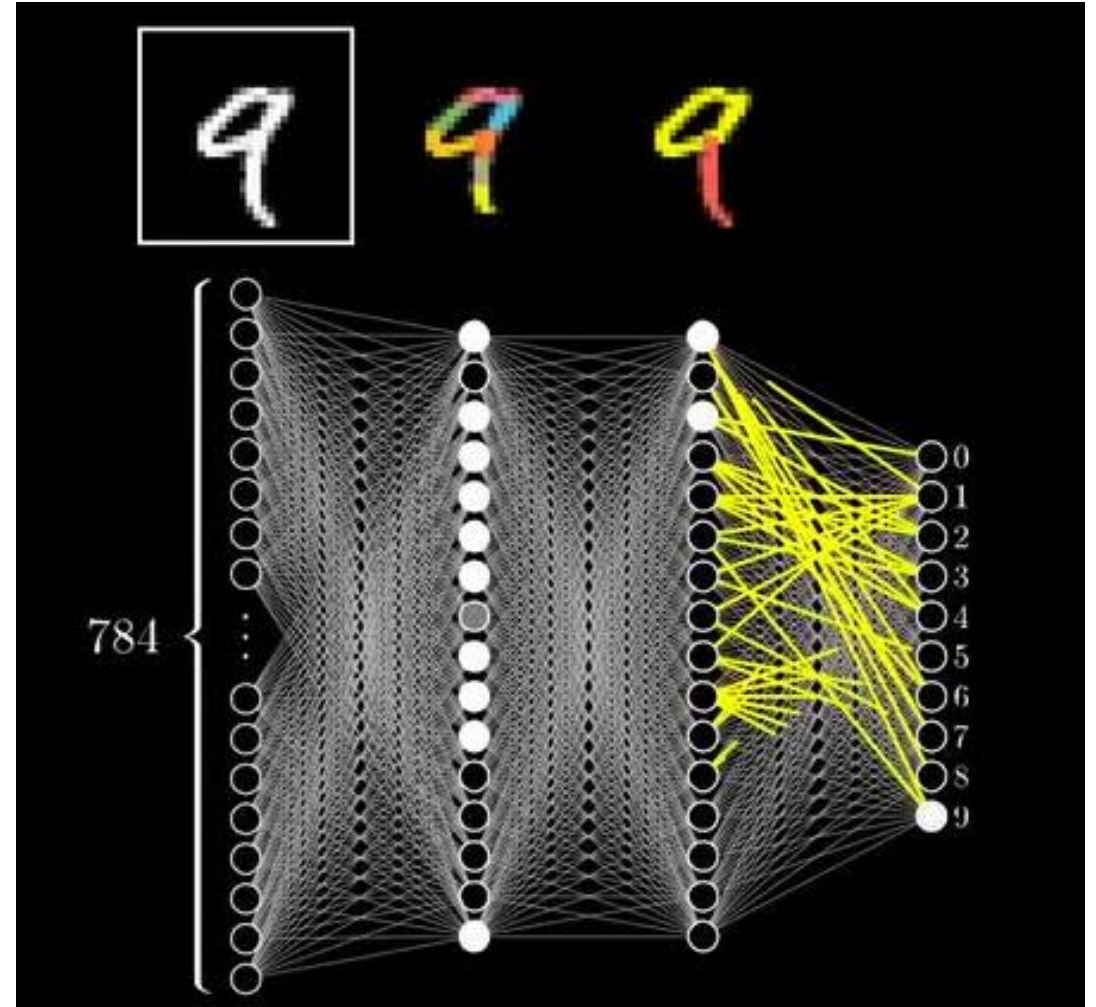
What is Deep Learning?

“Deep learning is a subset of machine learning that has **Artificial Neural Networks** capable of learning **unsupervised** from data that is **unstructured or unlabeled**”.



Artificial Neural Networks

- Inspired from Human Brain
- Neural networks are mathematical models
- Model the unknown relations between various parameters



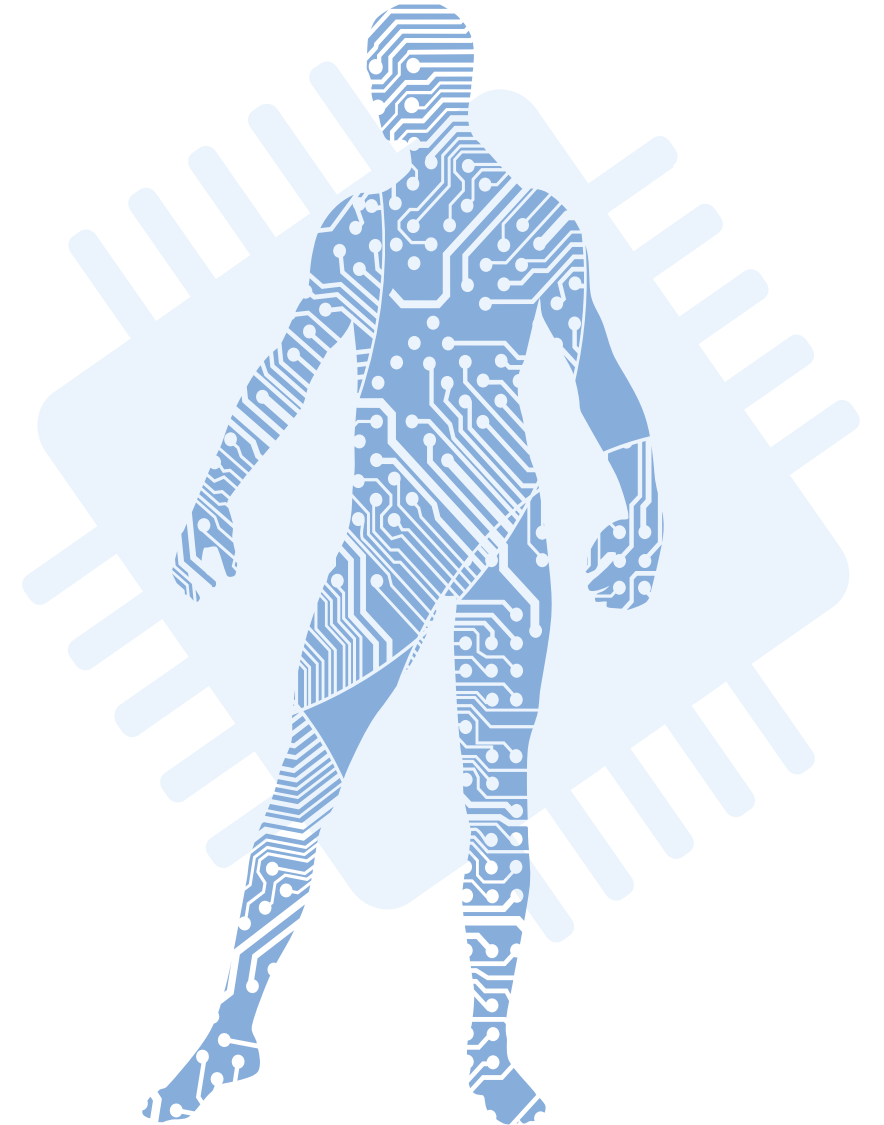


Applications of Artificial Intelligence

Discussion about current and future applications of AI

AI Applications

- **Health**
- **Agriculture**
- **Education**
- **City Services**
- **Industrialization**



A Challenges in Health Industry



Patient Monitoring

Patients require consistent monitoring. Elderly, Covid-19 etc



Drugs

New Drugs and Vaccines are needed to be discovered



Remote Treatment

Specialized Doctors are limited and not available everywhere



Disease Analysis

Diseases are needed to be analyzed for improved diagnosis and better cure

AI and Health

Health

AI can be beneficial for health. Many problems discussed here can be solved by incorporating AI based solutions

Avenues



Patient Monitoring

Patients can be monitored for better diagnosis



Drug Discovery

Deep Learning based drug discovery to identify potential compounds which can target the proteins.



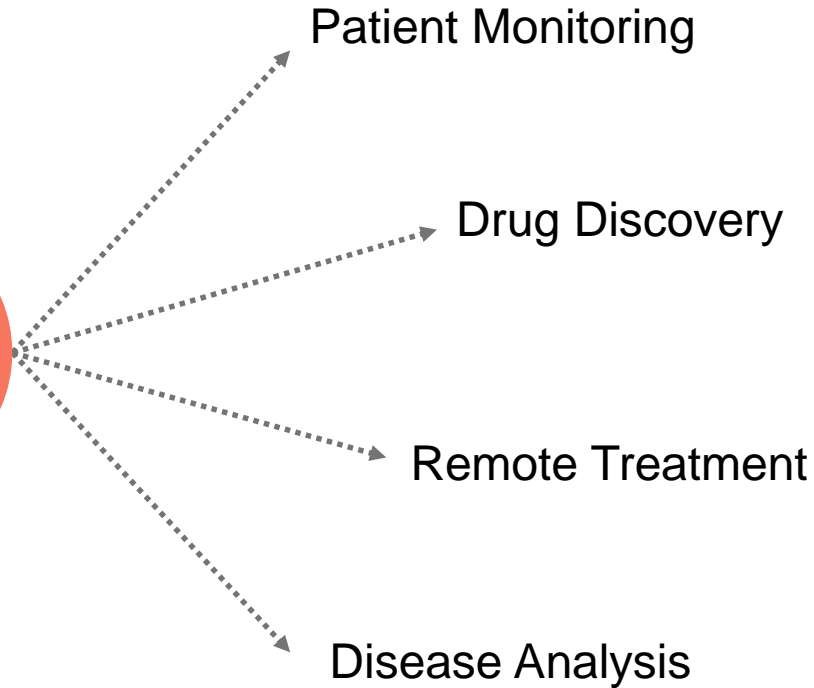
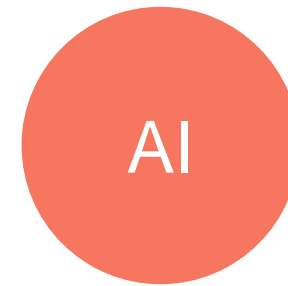
Remote Treatment

Telemedicine techniques can be utilized



Disease Analysis

AI can be employed for enhanced diagnosis and analysis of disease such as scanning X-rays and images





Challenges in Agriculture



Soil Monitoring

Quality of soil is needed to be monitored



Water level

Water level needs to be monitored. Excessive water can damage crops



Crop Monitoring

Crop Health and level of pesticide needs to be controlled.



Fertilizer

Quality and quantity of fertilizer is needed to be monitored

AI and Agriculture

Agriculture

AI can be greatly beneficial for various agriculture problems

Avenues



Monitor Soil Moisture



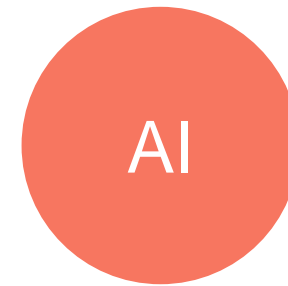
Smart Irrigation
Smartly control the water distribution



Crop Monitoring
Monitor crop quality



Fertilizer
Through AI, we can control fertilizer distribution through crop quality and environmental needs



Soil Monitoring

Water Monitoring

Soil Monitoring

Soil Monitoring

A



Challenges in Education



Lack of Schools

Large number of Students are unable to attend schools



Pandemic

Students who were going to school are stranded

AI and Education

Education

AI can help us built adaptive solutions such that needs of teachers can be reduced.

Avenues



Automatic grading

Answers can be automatically graded using AI based models



Virtual Instructors

Virtual instructor models can be developed



Adaptive Learning

Adaptive contents can be delivered to students based on their learning capabilities



Automatic grading

Adaptive Learning

Virtual Instructors



Challenges in City Services



Parking Problem

Big Cities have parking problems



Traffic Congestion

Efficient resources and time is wasted due to traffic congestion



Electricity Problem

Electric theft, power failures, load shedding



Queue Management

Queues for services needs to be better managed

AI and City Services

City Services

Many city services can be improved by adopting Ai based solutions

Avenues



Smart Parking
AI based parking notifications



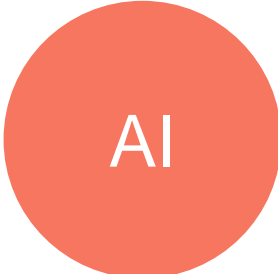
Smart grid
AI can be used to distribute electric power more effectively and electric theft



Smart Traffic
AI based traffic control systems



Smart Queues
AI based queue and worker management



Smart Parking

Smart grid

Smart Traffic

Smart Queues

A Challenges in Industry

QUALITY CONTROL



Quality Control



Automation



**Cost
Effectiveness**

AI and Industrial Automation

Industrial Automation

Industries can greatly benefit with the AI based solutions

Avenues



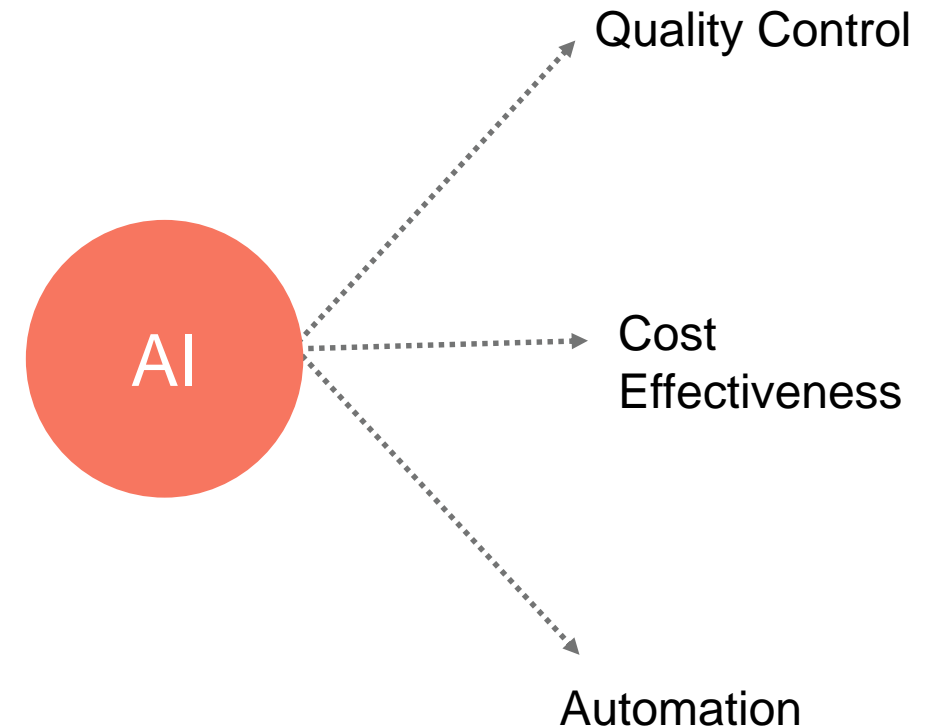
Quality Control
AI based quality control mechanisms can be incorporated enhance quality.



Cost Effectiveness
Cost effectiveness can be achieved using AI based mechanisms such as inventory control and business analytics.

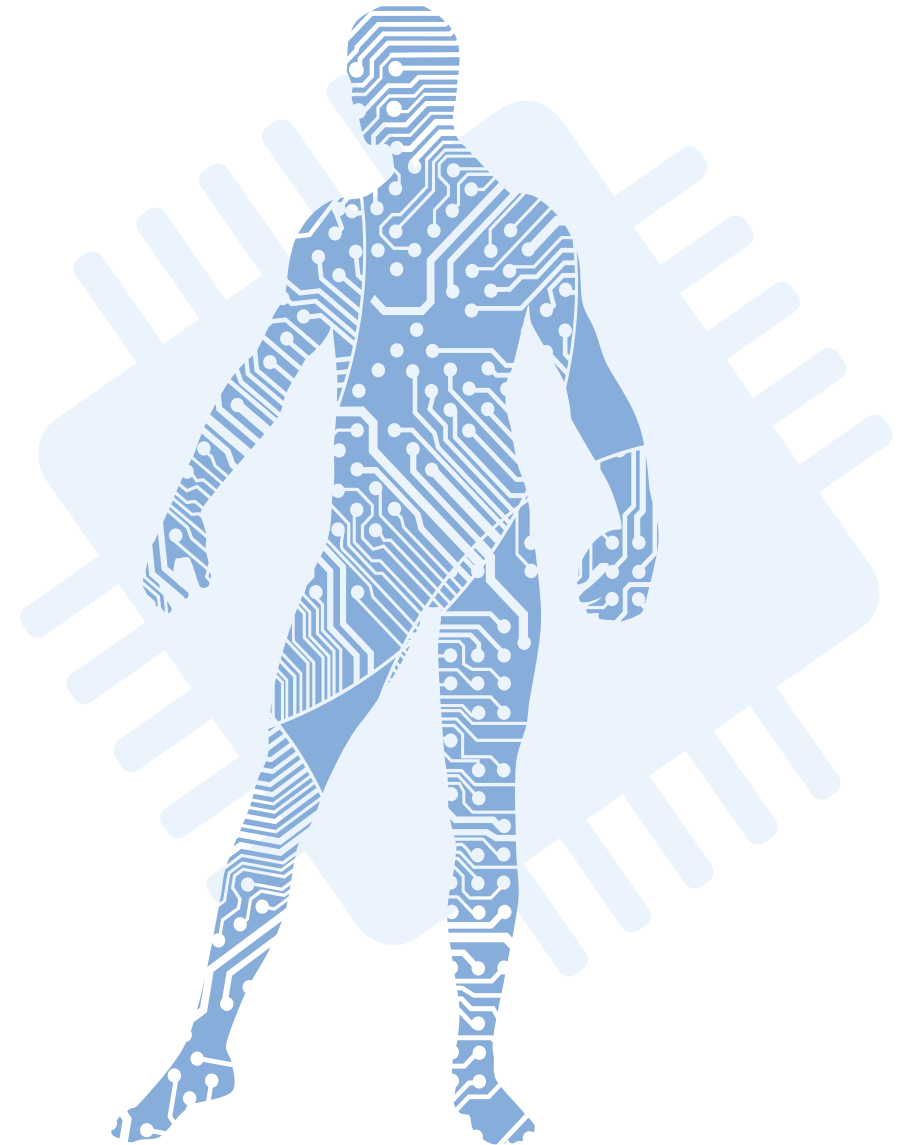


Automation
Robotics and Automation can be deployed to automate repetitive processes and achieve enhance accuracy.



Conclusion

- **Augmented AI**
- **Numerous possibilities**
- **IR 4.0**
- **Intelligent Automated Systems**
- **Research and Innovation**





Thank You

For Questions and Research
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