



SNS COLLEGE OF ENGINEERING



Kurumbapalayam (Po), Coimbatore - 641 107

An Autonomous Institution

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

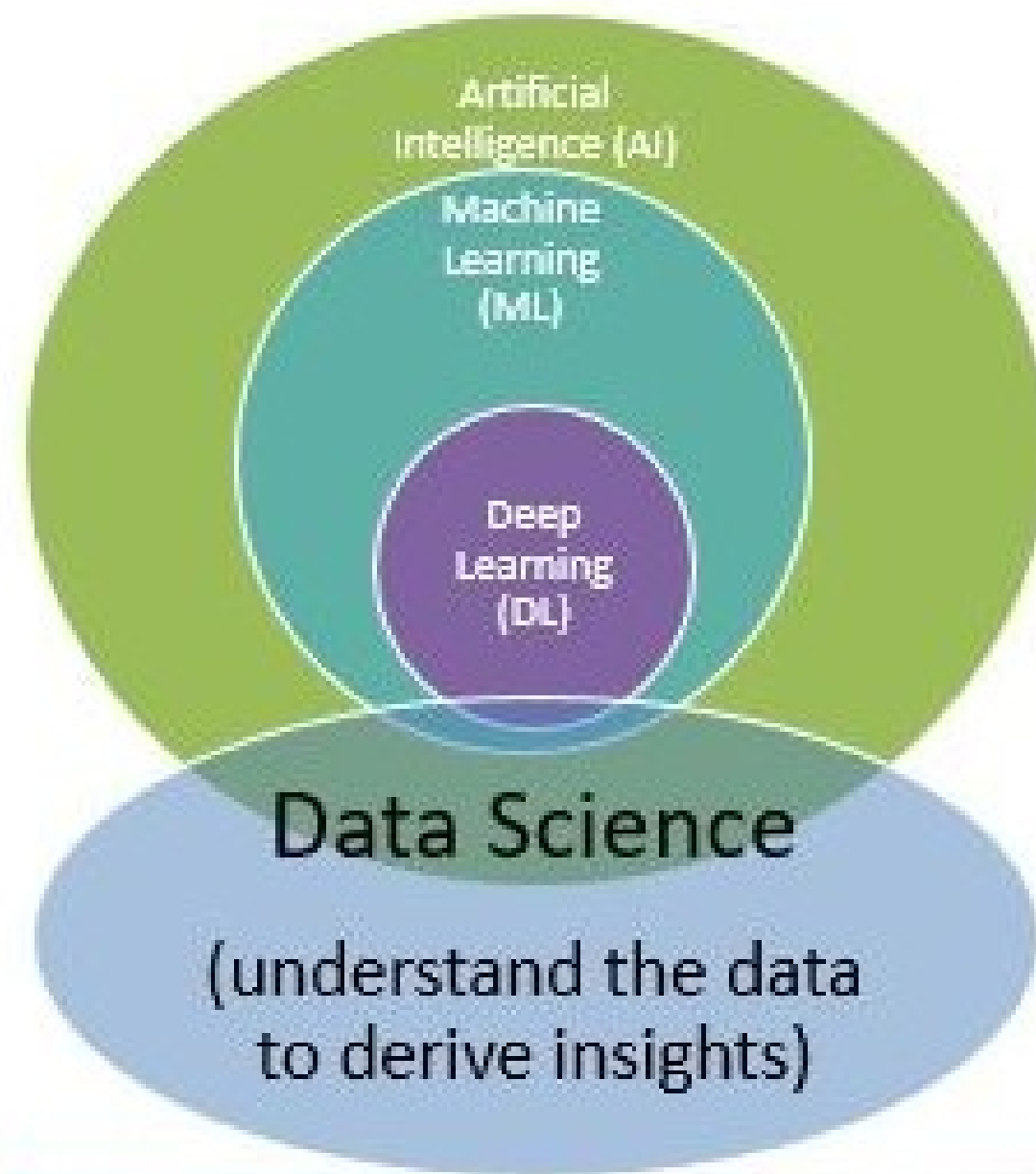
COURSE NAME : 19CS507- Artificial Intelligence

III YEAR /V SEMESTER

Unit 1- INTRODUCTION

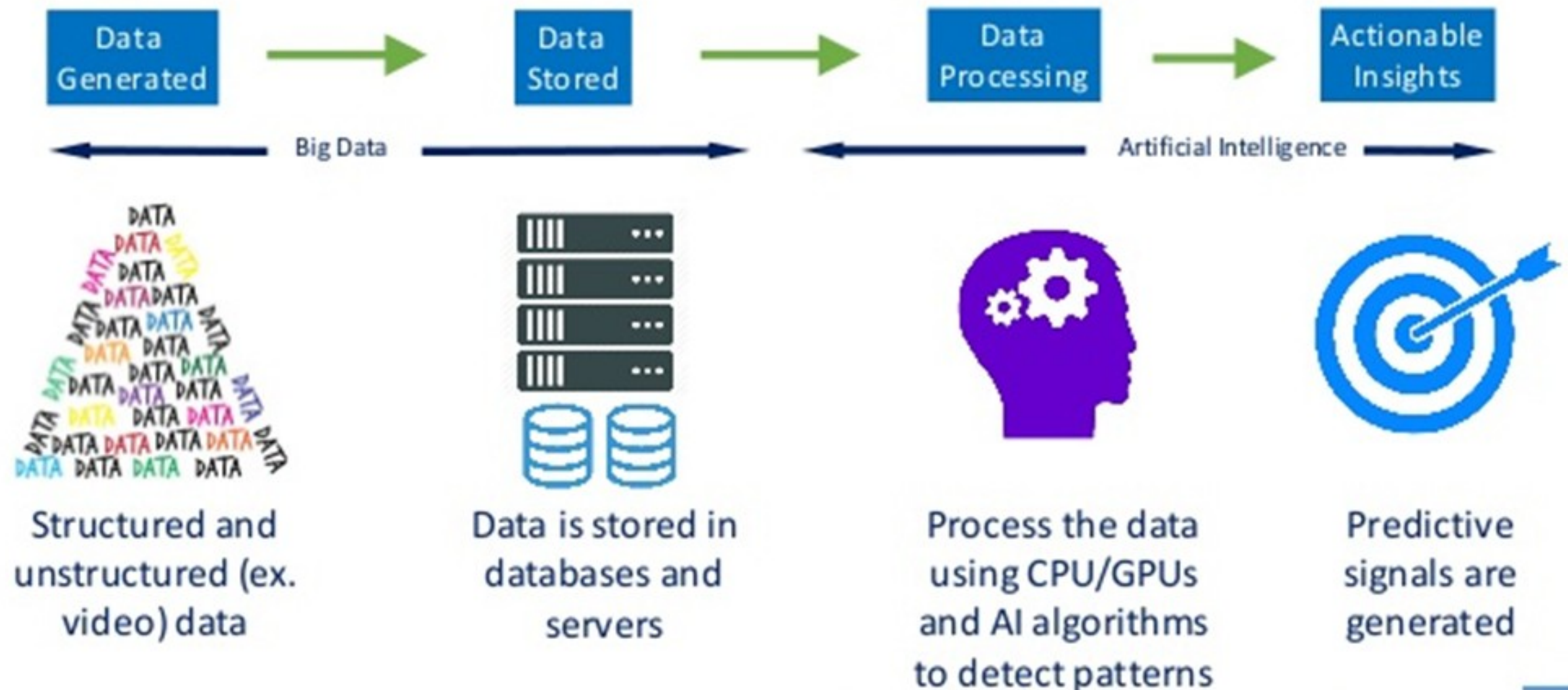
Topic 2 : Definition

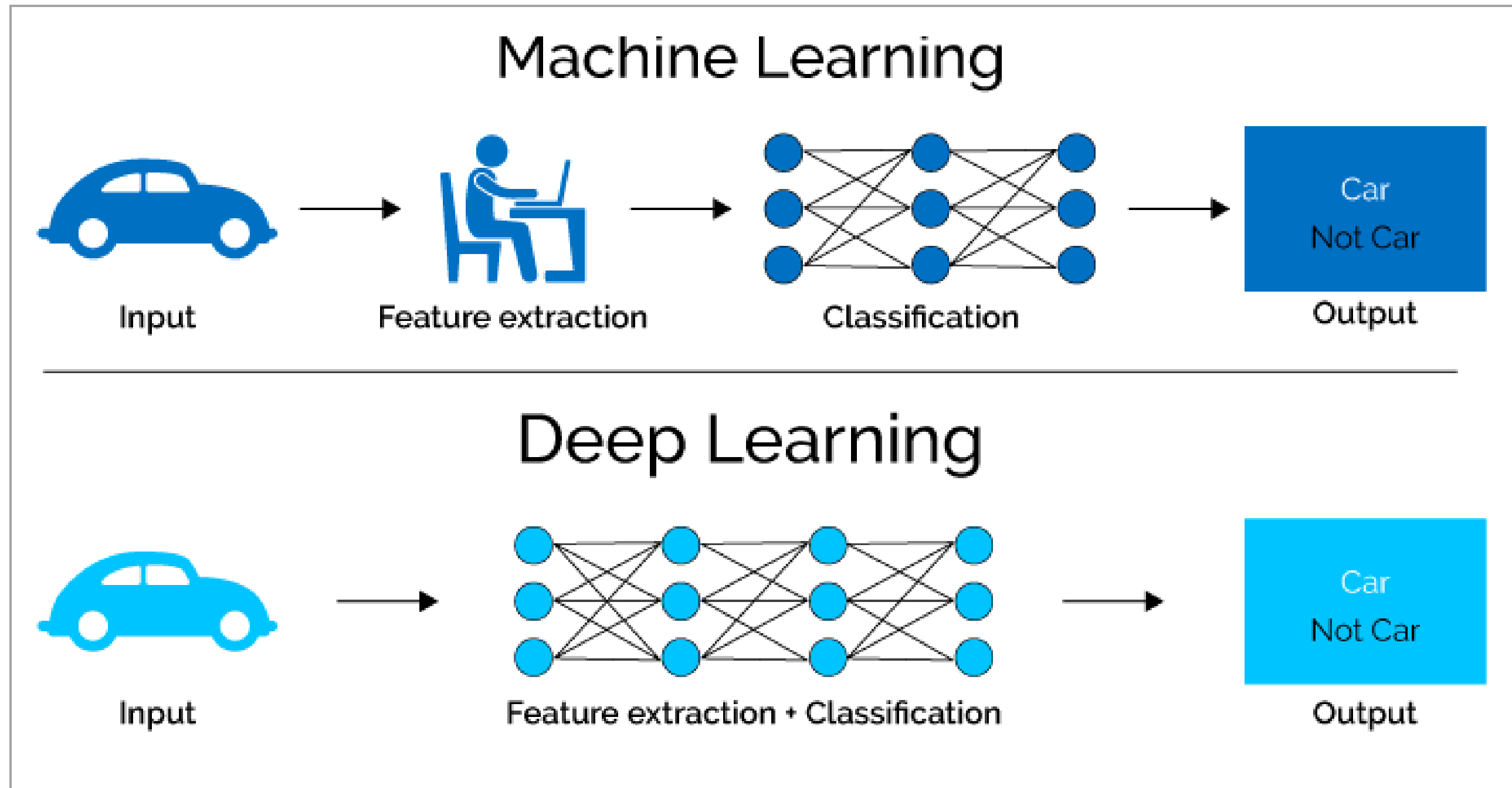
Artificial Intelligence (AI) vs Machine Learning vs Deep Learning vs Data Science



- Artificial Intelligence (AI):
 - Broad concept of machines being able to carry out “smart” tasks
- Machine Learning (ML):
 - The use of statistical tools that help computers “learn” from data
 - Relies heavily on hand-crafted features
- Deep Learning (DL):
 - Subset of Machine Learning (ML)
 - Driven primarily by Neural Networks

The Process





Components of AI



Applications

- Image recognition
- Speech recognition
- Chatbots
- Natural language generation
- Sentiment analysis

Types of models

- Deep learning
- Machine learning
- Neural networks

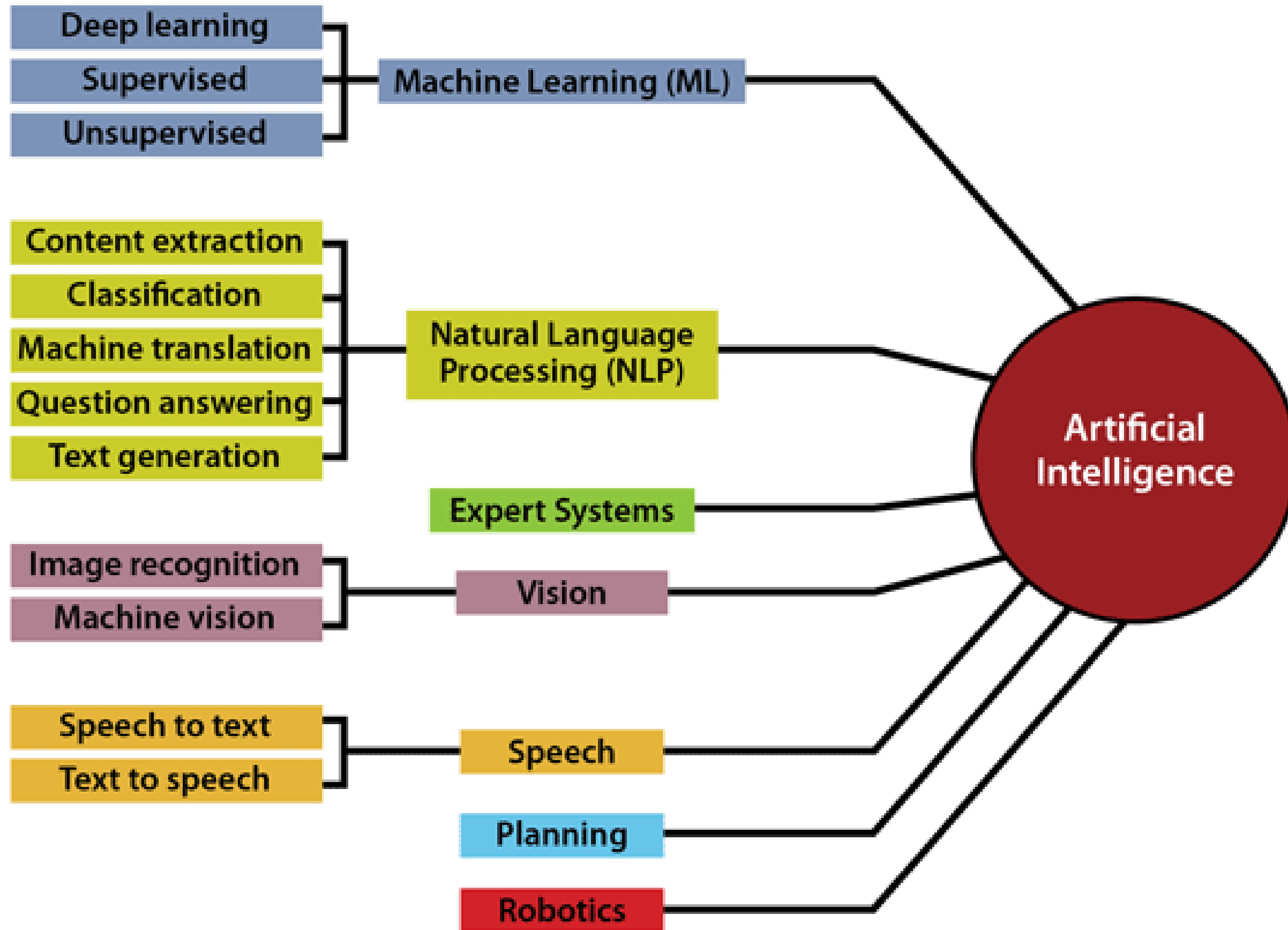
Software/hardware for training and running models

- GPUs
- Parallel processing tools (like Spark)
- Cloud data storage and compute platforms

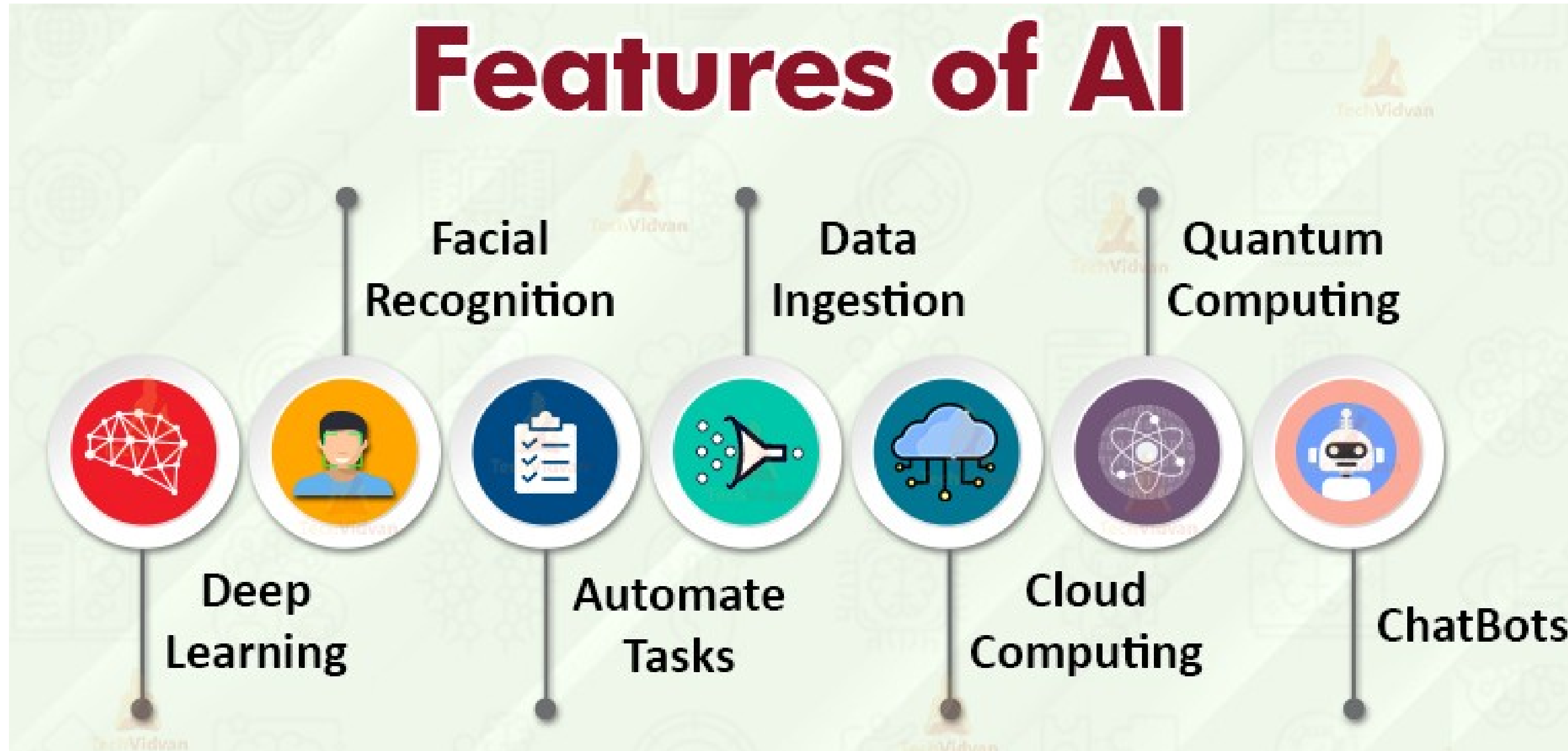
Programming languages for building models

- Python
- TensorFlow
- Java
- C

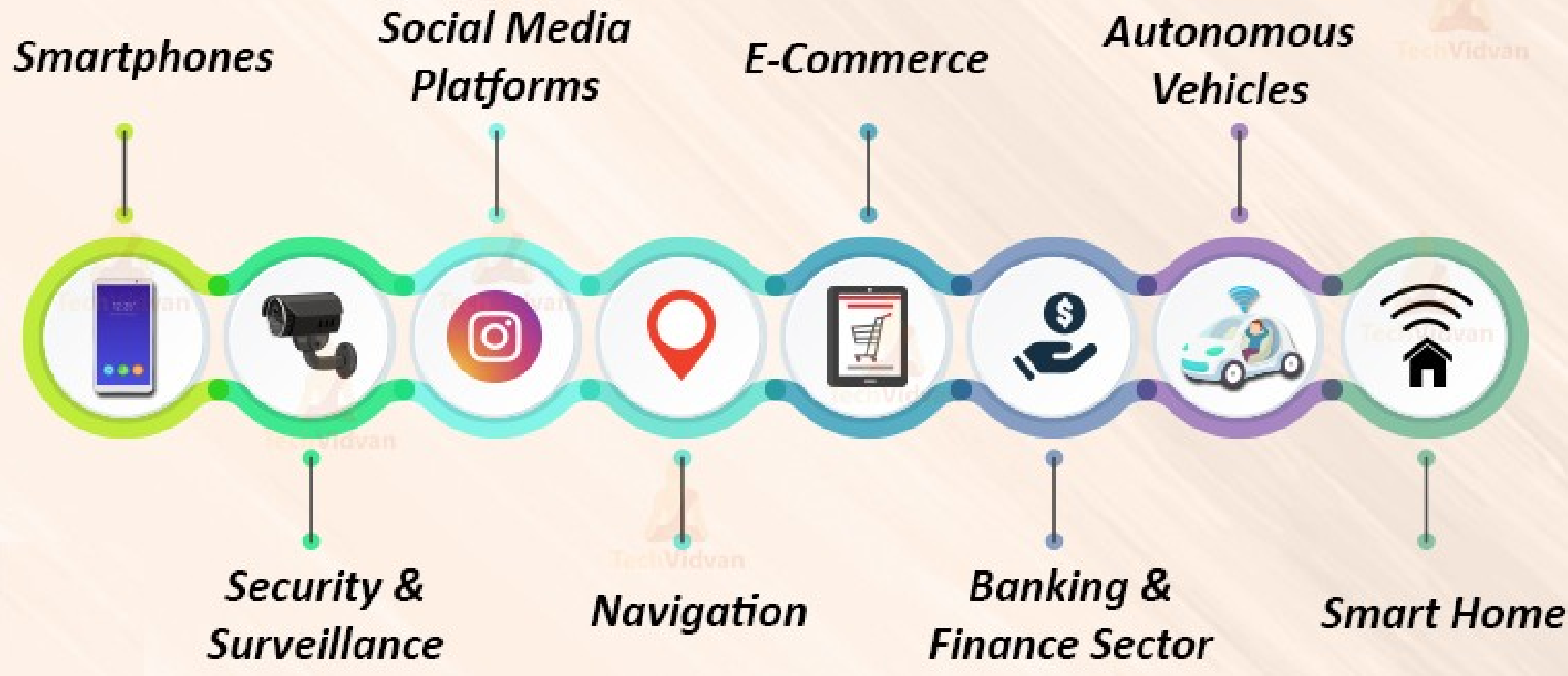




Features of AI



How AI is impacting our lives?



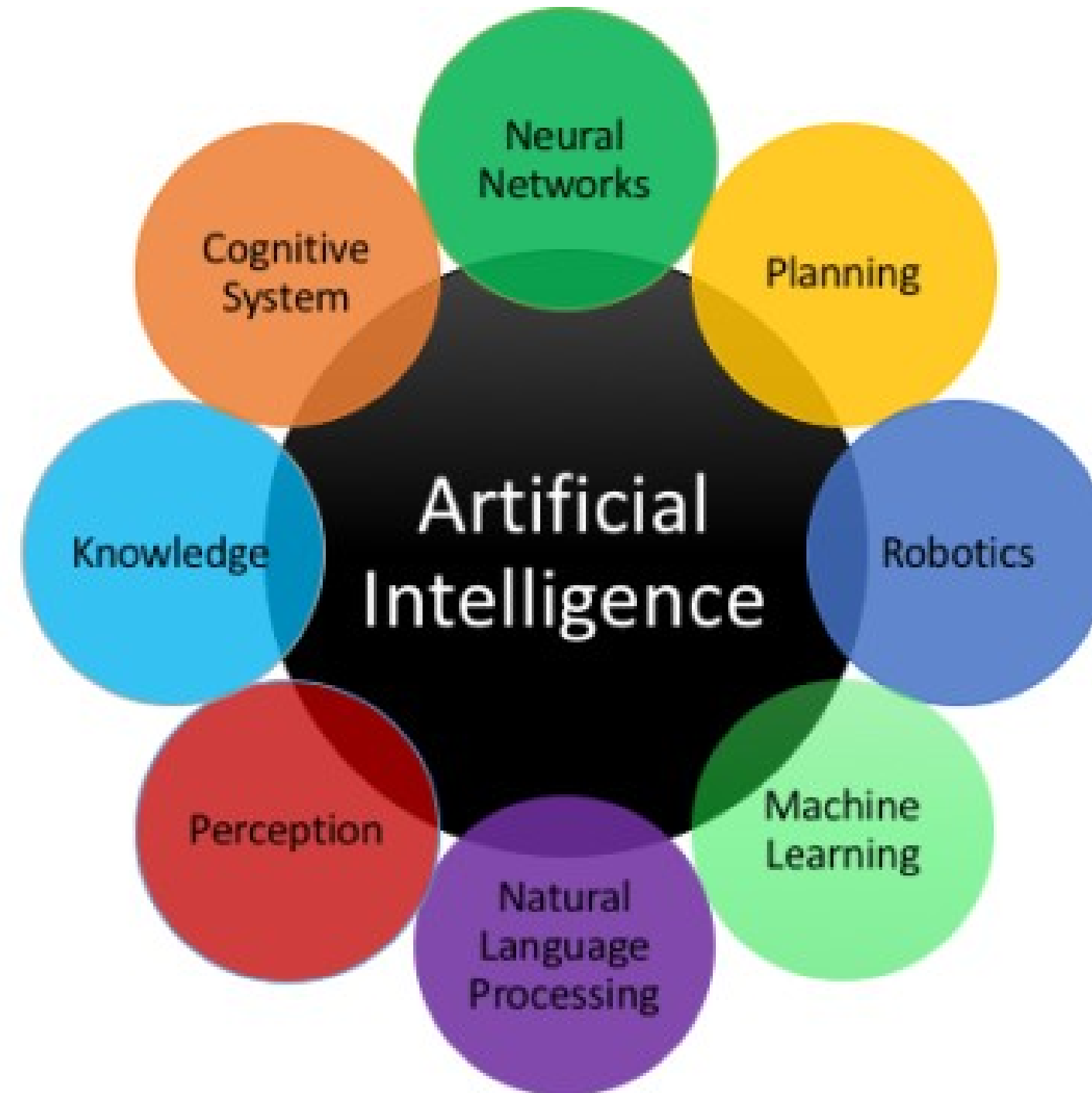


ARTIFICIAL INTELLIGENCE

- Artificial
 - Produced by human art or effort, rather than originating naturally.
- Intelligence
- is the ability to acquire knowledge and use it" [Pigford and Baur]
- **So AI was defined as:**
 - AI is the study of ideas that enable computers to be intelligent.
 - AI is the part of computer science concerned with design of computer systems that exhibit human intelligence(From the Concise Oxford Dictionary)



Goals of AI





The Foundation of Artificial Intelligence

Academic Disciplines of AI

- **Philosophy** Logic, methods of reasoning, mind as physical system, foundations of learning, language, rationality.
- **Mathematics** Formal representation and proof, algorithms, computation, (un)decidability, (in)tractability
- **Probability/Statistics** modeling uncertainty, learning from data
- **Economics** utility, decision theory, rational economic agents
- **Neuroscience** neurons as information processing units.
- **Psychology/** how do people behave, perceive, process cognitive
- **Cognitive Science** information, represent knowledge.
- **Computer engineering** building fast computers
- **Control theory** design systems that maximize an objective function over time
- **Linguistics** knowledge representation, grammars



Topics in AI

Artificial intelligence can be considered under a number of headings:

- Search (includes Game Playing).
- Representing Knowledge and Reasoning with it.
- Planning.
- Learning.
- Natural language processing.
- Expert Systems.
- Interacting with the Environment
(e.g. Vision, Speech recognition, Robotics)



Some Advantages of Artificial Intelligence

- more powerful and more useful computers
- new and improved interfaces
- solving new problems
- better handling of information
- relieves information overload
- conversion of information into knowledge



The Disadvantages

- increased costs
- difficulty with software development - slow and expensive
- few experienced programmers
- few practical products have reached the market as yet.



Search

- *Search* is the fundamental technique of AI.
- Possible answers, decisions or courses of action are structured into an abstract space, which we then search.
- Search is either "blind" or "uninformed":
 - blind
 - we move through the space without worrying about what is coming next, but recognising the answer if we see it
 - informed
 - we guess what is ahead, and use that information to decide where to look next.
- We may want to search for the first answer that satisfies our goal, or we may want to keep searching until we find the best answer.

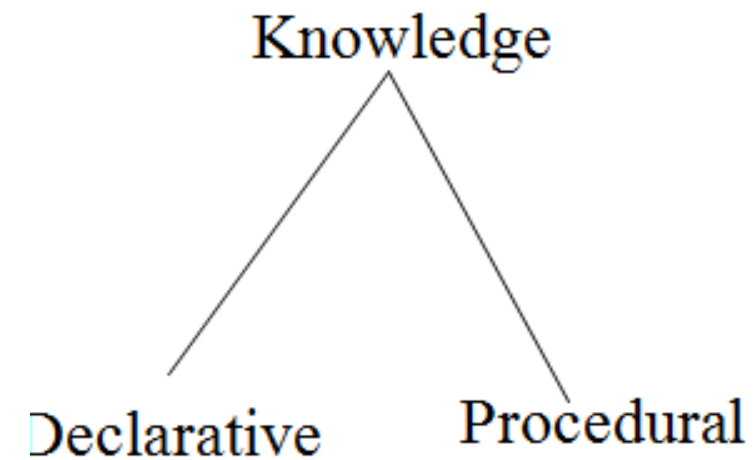


Knowledge Representation & Reasoning

- The second most important concept in AI
- If we are going to act rationally in our environment, then we must have some way of describing that environment and drawing inferences from that representation.
 - how do we describe what we know about the world ?
 - how do we describe it *concisely* ?
 - how do we describe it so that we can get hold of the right piece of knowledge when we need it ?
 - how do we generate new pieces of knowledge ?
 - how do we deal with *uncertain* knowledge ?



Knowledge Representation & Reasoning



- Declarative knowledge deals with factoid questions (what is the capital of India? Etc.)
- Procedural knowledge deals with “How”
- Procedural knowledge can be embedded in declarative knowledge



Planning

Given a set of goals, construct a sequence of actions that achieves those goals:

- often very large search space
- but most parts of the world are independent of most other parts
- often start with goals and connect them to actions
- no necessary connection between order of planning and order of execution
- what happens if the world changes as we execute the plan and/or our actions don't produce the expected results?



Learning

- If a system is going to act truly appropriately, then it must be able to change its actions in the light of experience:
 - how do we generate new facts from old ?
 - how do we generate new concepts ?
 - how do we learn to distinguish different situations in new environments ?



Interacting with the Environment

- In order to enable intelligent behaviour, we will have to interact with our environment.
- Properly intelligent systems may be expected to:
 - accept sensory input
 - vision, sound, ...
 - interact with humans
 - understand language, recognise speech, generate text, speech and graphics, ...
 - modify the environment
 - robotics



REFERENCES



1. S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall, Third Edition, 2009.

THANK YOU