



SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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 COMPUTER SCIENCE AND ENGINEERING

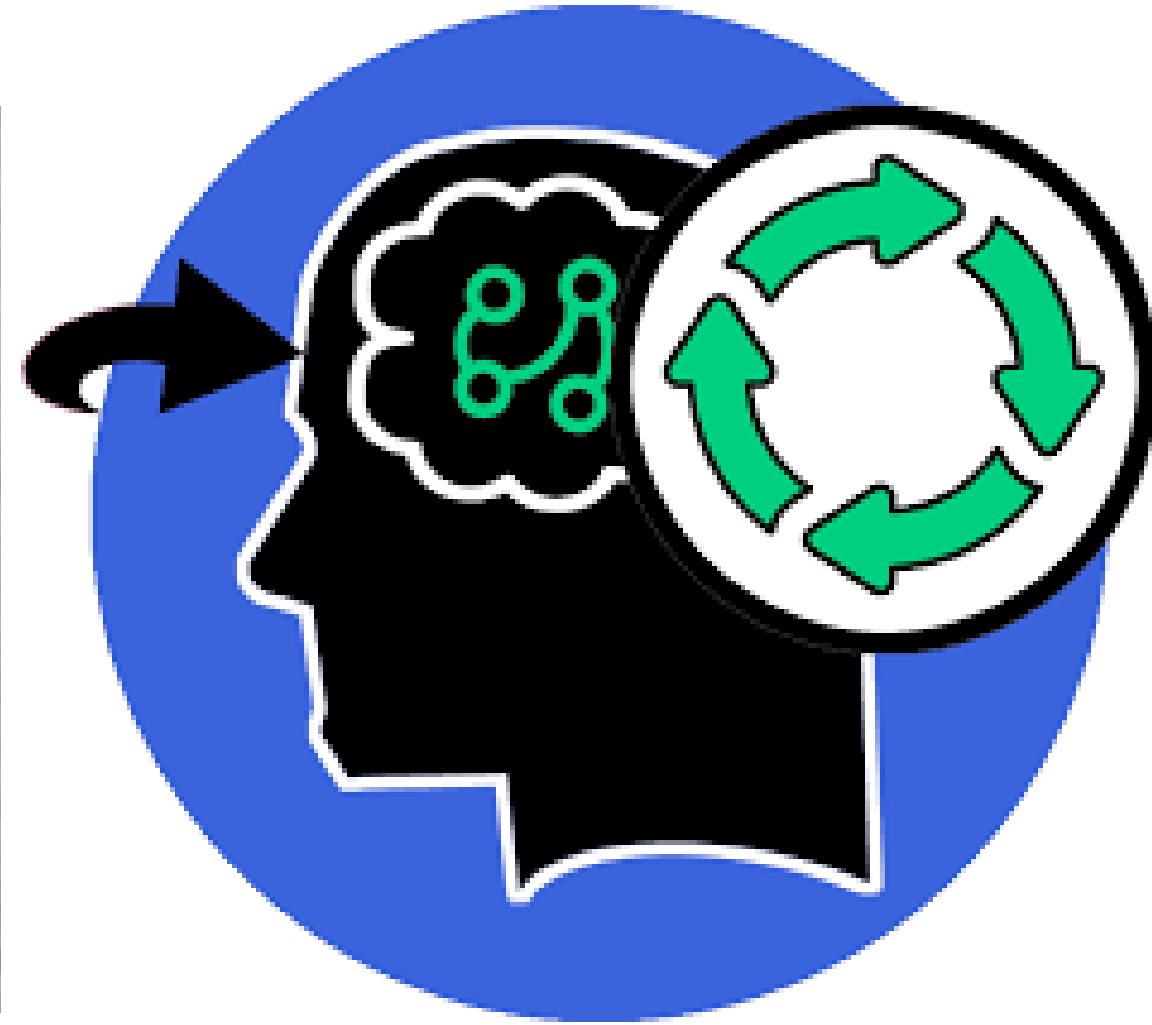
COURSE NAME : 19TS501- Artificial Intelligence

III YEAR /V SEMESTER

Unit 1- INTRODUCTION

Topic : AI Problem and AI Techniques

RECALL





Course Learning Outcomes



At the end of this course:

- Knowledge and understanding

You should have a knowledge and understanding of the basic concepts of Artificial Intelligence including Search, Game Playing, KBS (including Uncertainty), Planning and Machine Learning.

- Intellectual skills

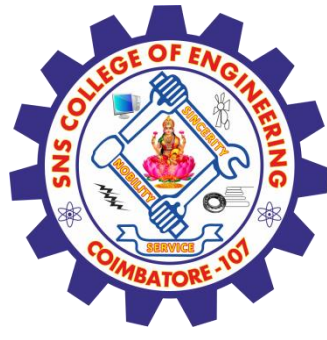
You should be able to use this knowledge and understanding of appropriate principles and guidelines to synthesise solutions to tasks in AI and to critically evaluate alternatives.

- Practical skills

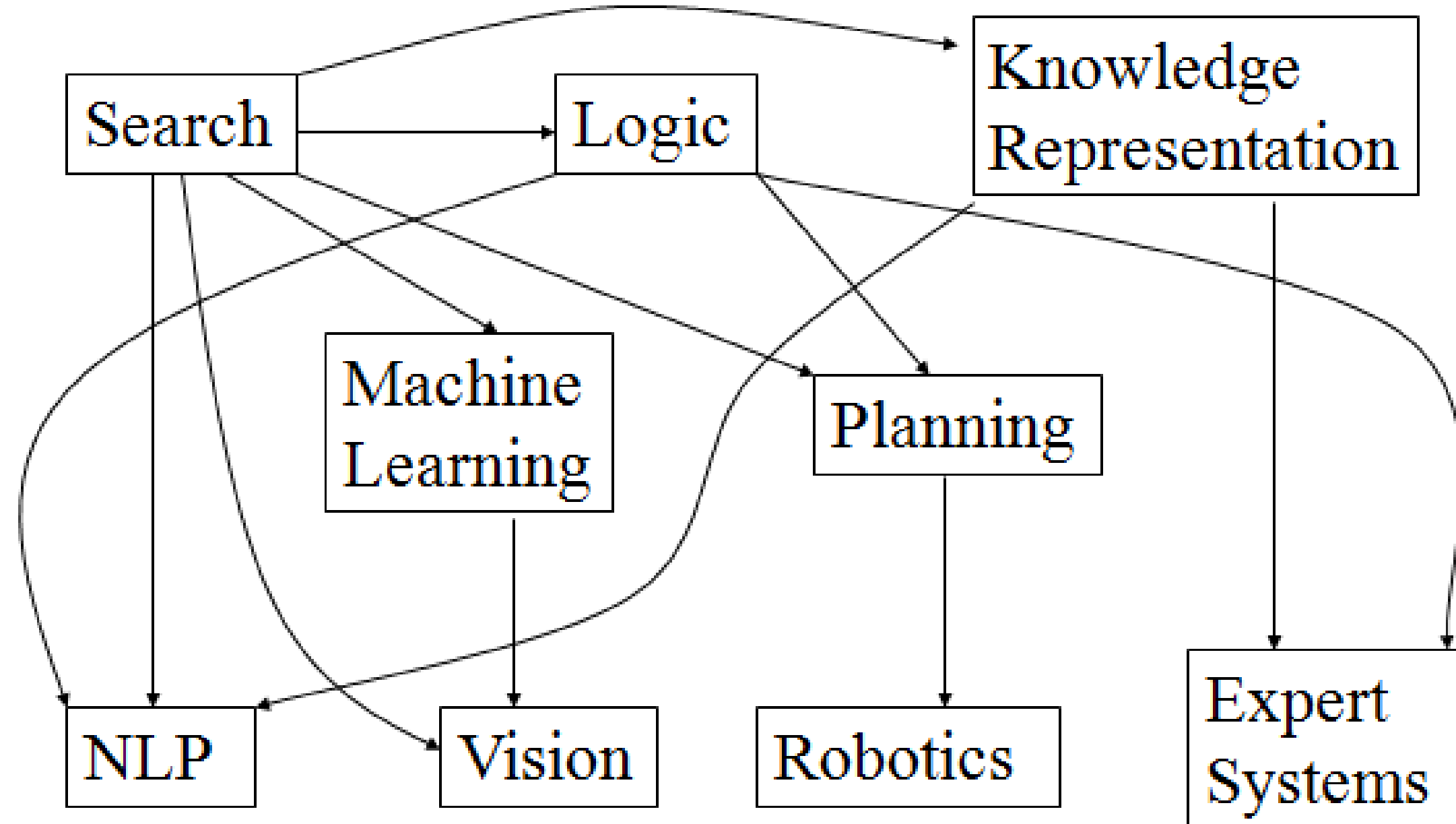
You should be able to use a well known declarative language (Prolog) and to construct simple AI systems.

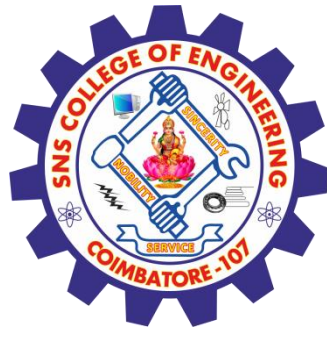
- Transferable Skills

You should be able to solve problems



Areas of AI and Some Dependencies





What is Artificial Intelligence ?

- making computers that think?
- the automation of activities we associate with human thinking, like decision making, learning ... ?
- the art of creating machines that perform functions that require intelligence when performed by people ?
- the study of mental faculties through the use of computational models ?



What is Artificial Intelligence ?

- the study of computations that make it possible to perceive, reason and act ?
- a field of study that seeks to explain and emulate intelligent behaviour in terms of computational processes ?
- a branch of computer science that is concerned with the automation of intelligent behaviour ?
- anything in Computing Science that we don't yet know how to do properly ? (!)



What is Artificial Intelligence ?

THOUGHT	Systems that think like humans	Systems that think rationally
BEHAVIOUR	Systems that act like humans	Systems that act rationally
	HUMAN	RATIONAL



Systems that act like humans: Turing Test



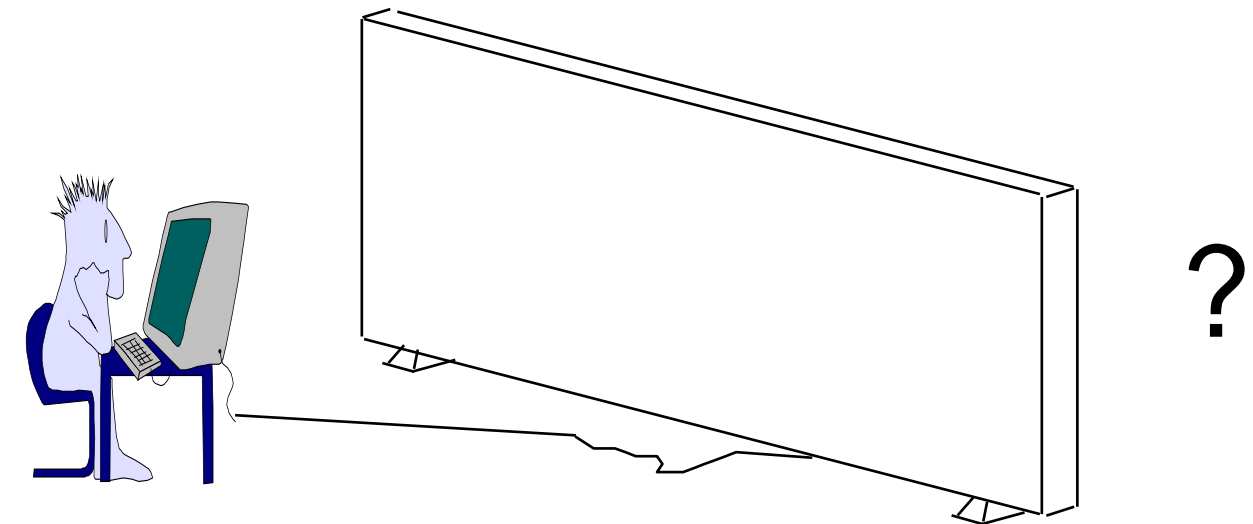
- The art of creating machines that perform functions that require intelligence when performed by people.” (Kurzweil)
- “The study of how to make computers do things at which, at the moment, people are better.” (Rich and Knight)



Systems that act like humans: Turing Test



- You enter a room which has a computer terminal. You have a fixed period of time to type what you want into the terminal, and study the replies. At the other end of the line is either a human being or a computer system.
- If it is a computer system, and at the end of the period you cannot reliably determine whether it is a system or a human, then the system is deemed to be intelligent

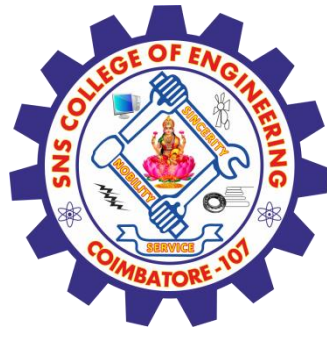




Systems that act like humans



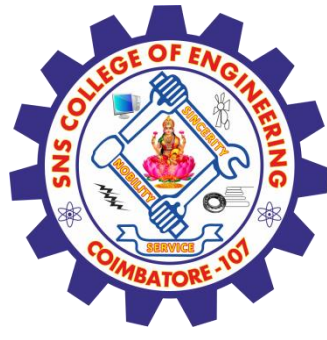
- The Turing Test approach
 - a human questioner cannot tell if
 - there is a computer or a human answering his question, via teletype (remote communication)
 - The computer must behave intelligently
- Intelligent behavior
 - to achieve human-level performance in all cognitive tasks



Systems that act like humans



- These cognitive tasks include:
 - *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



The total Turing Test



- Includes two more issues:
 - *Computer vision*
 - to perceive objects (seeing)
 - *Robotics*
 - to move objects (acting)



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Systems that think like humans: cognitive modelling



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Systems that think like humans: cognitive modelling

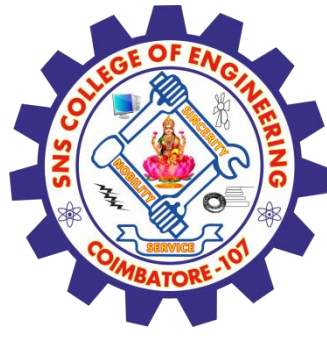


- Humans as observed from ‘inside’
- How do we know how humans think?
 - Introspection vs. psychological experiments
- Cognitive Science
- “The exciting new effort to make computers think ... machines with *minds* in the full and literal sense” (Haugeland)
- “[The automation of] activities that we associate with human thinking, activities such as decision-making, problem solving, learning ...” (Bellman)



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Systems that think 'rationally' "laws of thought"



- Humans are not always 'rational'
- Rational - defined in terms of logic?
- Logic can't express everything (e.g. uncertainty)
- Logical approach is often not feasible in terms of computation time (needs 'guidance')
- "The study of mental facilities through the use of computational models" (Charniak and McDermott)
- "The study of the computations that make it possible to perceive, reason, and act" (Winston)



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Systems that act rationally: “Rational agent”



Rational behavior: doing the right thing

- **Rational** behavior: doing the right thing
- **The right thing**: that which is expected to maximize goal achievement, given the available information
- Giving answers to questions is ‘acting’.
- I don't care whether a system:
 - replicates human thought processes
 - makes the same decisions as humans
 - uses purely logical reasoning



Systems that act rationally:



- Logic → only *part* of a rational agent, not *all* of rationality
 - Sometimes logic cannot reason a correct conclusion
 - At that time, some *specific (in domain) human knowledge* or information is used
- Thus, it covers more generally different situations of problems
 - Compensate the incorrectly reasoned conclusion



Systems that act rationally:



- Study AI as rational agent –
2 advantages:
 - It is more general than using logic only
 - Because: LOGIC + Domain knowledge
 - It allows extension of the approach with more scientific methodologies



Systems that act rationally

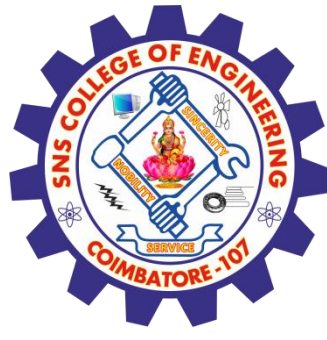


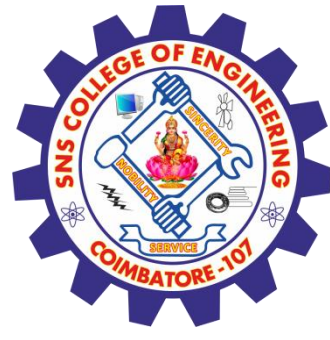
- An **agent** is an entity that perceives and acts
- This course is about designing rational agents
- Abstractly, an agent is a function from percept histories to actions:



$$[f: P^* \rightarrow A]$$

- For any given class of environments and tasks, we seek the agent (or class of agents) with the best performance
- Caveat: computational limitations make perfect rationality unachievable
 - → design best program for given machine resources

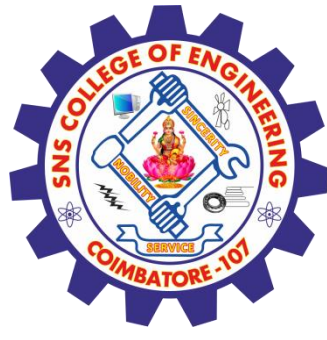




EVALUATION



- What is AI vs ML vs DL
- What is agent?



REFERENCES



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

THANK YOU