



SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
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 ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

19AMB303-FULL STACK AI

FOUNDATION OF AI

M.POORNIMA DEVI,AP/AIML



FOUNDATIONS 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.
- **Economics:** utility, decision theory, rational economic agents.
- **Neuroscience:** neurons as information processing units. physical substrate for mental activity



FOUNDATIONS of AI



- **Psychology:** how do people behave, perceive, process information, represent knowledge. phenomena of perception and motor control, experimental techniques.
- **Computer engineering** :building fast computers
- **Control theory Cybernetics** : design systems that maximize an function over time
- **Linguistics:** knowledge representation, grammar



Philosophy (428 B.C.-present)

- Can formal rules be used to draw valid conclusions?
- How does the mind arise from a physical brain?
- Where does knowledge come from?
- How does knowledge lead to action?

Can formal rules be used to draw valid conclusions?



- **Aristotle**(384-322 B.C.): informal **system of syllogisms** for proper reasoning.

Try to formulate laws of rational part of the mind. Believed in another part, intuitive reason.
- **Ramon Lull (d. 1315)** had the idea that useful reasoning could actually be carried out by a **mechanical artifact**
- **Thomas Hobbes (1588-1679)** proposed that reasoning was like **numerical computation**, that "we add and subtract in our silent thoughts." The automation of computation itself was already well under *way*



- **Leonardo (La Vinci (1452-1519))** designed but did not build a mechanical calculator

The first known calculating machine was constructed around 1623 by the German scientist Wilhelm Schickard (1592-1635).

- **Blaise Pascal (1623-1662)**, whereas the Pascaline could only add and sub-tract. Some speculated that machines might not just do calculations but actually be **able to think and act on their own** is more famous.



- Pascal wrote that "the arithmetical machine produces effects which appear nearer to thought than all the actions of animals."
- **Gottfried Wilhelm Leibniz (1646-1716)** built a mechanical device intended to carry out operations on concepts rather than numbers, but its scope was rather limited.



How does knowledge lead to action?

- Rene Descartes (1596-1650) gave the first clear discussion of the distinction between mind and matter and of the problems that arise.
- Descartes was a strong advocate of the **power of reasoning in understanding the world**, a philosophy now called **rationalism**.



Philosophy: Dualism vs. materialism

- Rene Descartes (1596-1650): *dualism* (part of mind that is outside of nature)
- An alternative to dualism is materialism, which holds that the brain's operation according to the laws of physics constitutes the mind.
- *Animals did not possess the dual quality.*
- *Materialism.* Wilhelm Leibniz (1646-1716) built a mechanical device to carry out mental operations; could not produce interesting results.



Philosophy: Source of knowledge

- *Empiricism* (Francis Bacon 1561-1626)
 - John Locke (1632-1704): “Nothing is in the understanding which was not first in the senses”
 - David Hume (1711-1776): Principle of induction: General rules from repeated associations between their elements
 - Bertrand Russell (1872-1970): *Logical positivism*: All knowledge can be characterized by logical theories connected, ultimately, to observation sentences that correspond to sensory inputs.



- The famous Vienna Circle, led by Rudolf Carnap (1891-1970), developed the doctrine of logical positivism. This doctrine holds that all knowledge can be characterized by logical theories connected to observation sentences that correspond to sensory inputs.
- Carnap's book *The Logical Structure of the World* (1928) defined an explicit computational procedure for extracting knowledge from elementary experiences. It was probably the first theory of mind as a computational process.



THANKYOU