

# Lecture 1

**Note:** Some slides and/or pictures are adapted from Lecture slides / Books of

- Dr Zafar Alvi.
- Text Book - *Artificial Intelligence Illuminated* by Ben Coppin, Narosa Publishers.
- Ref Books
  - *Artificial Intelligence- Structures & Strategies for Complex Problem Solving* by George F. Luger, 4<sup>th</sup> edition, Pearson Education.
  - *Artificial Intelligence A Modern Approach* by Stuart Russell & Peter Norvig.
  - *Artificial Intelligence, Third Edition* by Patrick Henry Winston

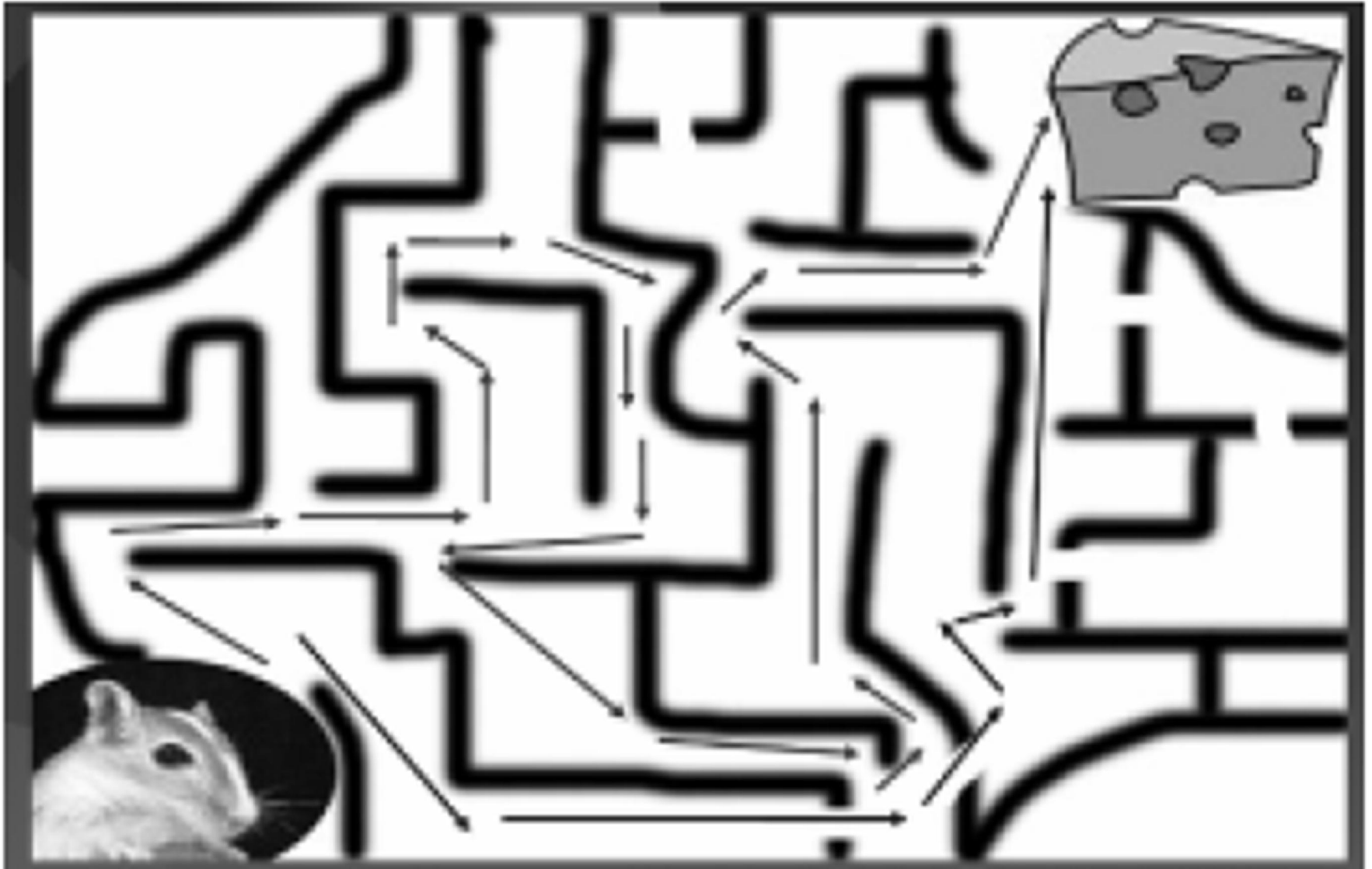
# Outline

- Course overview
- What is Intelligence?
- What is AI?
- Weak AI vs Strong AI
- Weak Methods vs Strong Methods
- History
- Application
- AI languages

# What is Intelligence?

- How can we define Intelligence?
- Is it something tangible?
- Consider the image on next slide where a mouse is trying to search a maze in order to find its way from the bottom left to the piece of cheese in the top right corner of the image.

# What is Intelligence?



# What is Intelligence?

- The mouse tries various paths as shown by arrows and can reach the cheese by more than one path.
- In other words the mouse can find more than one solutions to this problem.
- The mouse was intelligent enough to find a solution to the problem at hand.
- Hence the **ability of problem solving** demonstrates intelligence..

# What is Intelligence?

- Consider the sequence of numbers below:  
1, 3, 7, 13, 21, \_\_\_\_.
- Example of **Automated Timetable Generation**
  - **the ability to think, plan and schedule**  
demonstrate intelligence

# What is Intelligence?

- **Correct and efficient memory and information manipulation (doctor & patient)**
- **Ability to tackle ambiguous and fuzzy problems (height of person i.e tall)**
- **Ability to learn and recognize**
- **Ability to understand and perceive**

# What is Artificial Intelligence (AI)?

Views of AI fall into four categories:

Thinking humanly	Thinking rationally
Acting humanly	Acting rationally

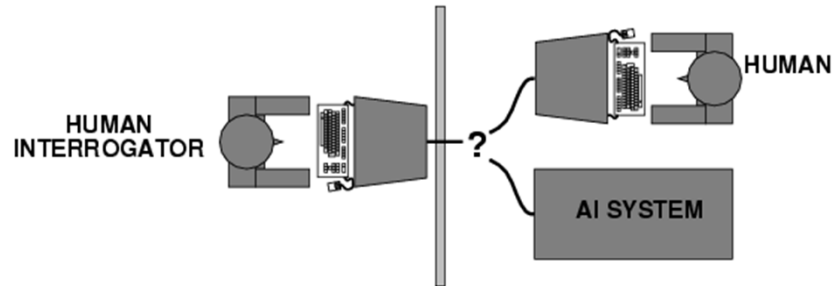
- A system is rational if it does the “right thing”, given what it knows.



# What is AI?

Thinking humanly	Thinking rationally
<ol style="list-style-type: none"><li data-bbox="19 449 888 606">1. “The exciting new effort to make computers think ... machines with minds, in the full and literal sense” (Haugeland, 1985)</li><li data-bbox="19 621 888 835">2. “[The automation of] activities that we associate with human thinking, activities such as decision making, problem solving, learning ...” (Bellman, 1978)</li></ol>	<ol style="list-style-type: none"><li data-bbox="931 449 1893 606">1. “The study of mental faculties through the use of computational models” (Charniak and McDermott)</li><li data-bbox="931 621 1893 835">2. “The study of computation that make it possible to perceive reason and act” (Winston 1992)</li></ol>
Acting humanly	Acting rationally
<ol style="list-style-type: none"><li data-bbox="19 978 888 1135">1. “The art of creating machines that perform functions that require intelligence when performed by people” (Kurzweil 1990)</li><li data-bbox="19 1149 888 1306">2. “The study of how to make computers do things at which, at the moment, people are better” (Rich and Knight, 1991)</li></ol>	<ol style="list-style-type: none"><li data-bbox="931 978 1893 1078">1. “Computational Intelligence is the study of the design of intelligent agents.” (Poole et al., 1998)</li><li data-bbox="931 1092 1893 1192">2. “AI . . . Is concerned with intelligent behaviour in artifacts.” (Nilsson, 1998)</li></ol>

# Acting humanly: Turing Test



- The computer would need to possess the following capabilities:
  - **Natural Language Processing** (to enable it to communicate successfully in english)
  - **Knowledge representation** (to store what it knows or hears)
  - **Automated reasoning** (to use the stored information to answer questions and to draw new conclusions)
  - **Machine learning** (to adapt to new circumstances and to detect and extrapolate patterns)
  - **Computer vision** (to perceive objects)
  - **Robotics** (to manipulate objects and move about)

# Thinking humanly: cognitive modeling

- If we are going to say that a given program thinks like a human, we must have some ways of determining how humans think.
- We need to get inside the actual working of human minds.
- Two ways to do this
  - Through introspection (trying to catch our own thoughts as they go by)
  - Through psychological experiments

# Schools of Thought

## Weak AI Versus Strong AI

- As discussed earlier, AI is considered to be an effort to try to simulate human behavior. But, the need is to define up to what extent the computer can demonstrate the simulation, raising the idea of strong AI and weak AI

# Weak AI Versus Strong AI

- **Strong AI:** The followers of strong AI believe that by giving a computer program sufficient processing power, and by providing it with enough intelligence, one can create a computer that can literally think and is conscious in the same way that a human is conscious.
- **Weak AI:** Weak AI, in contrast, is simply the view that intelligent behavior can be modeled and used by computers to solve complex problems.
- This point of view argues that just because a computer behaves intelligently does not prove that it is actually intelligent in the way that a human is

# Strong Methods vs Weak Methods

- **Weak methods** in Artificial Intelligence use systems such as logic, automated reasoning, and other general structures that can be applied to a wide range of problems but that do not necessarily incorporate any real knowledge about the world of the problem that is being solved.
- **Strong method** problem solving depends on a system being given a great deal of knowledge about its world and the problems that it might encounter.

# Strong Methods vs Weak Methods

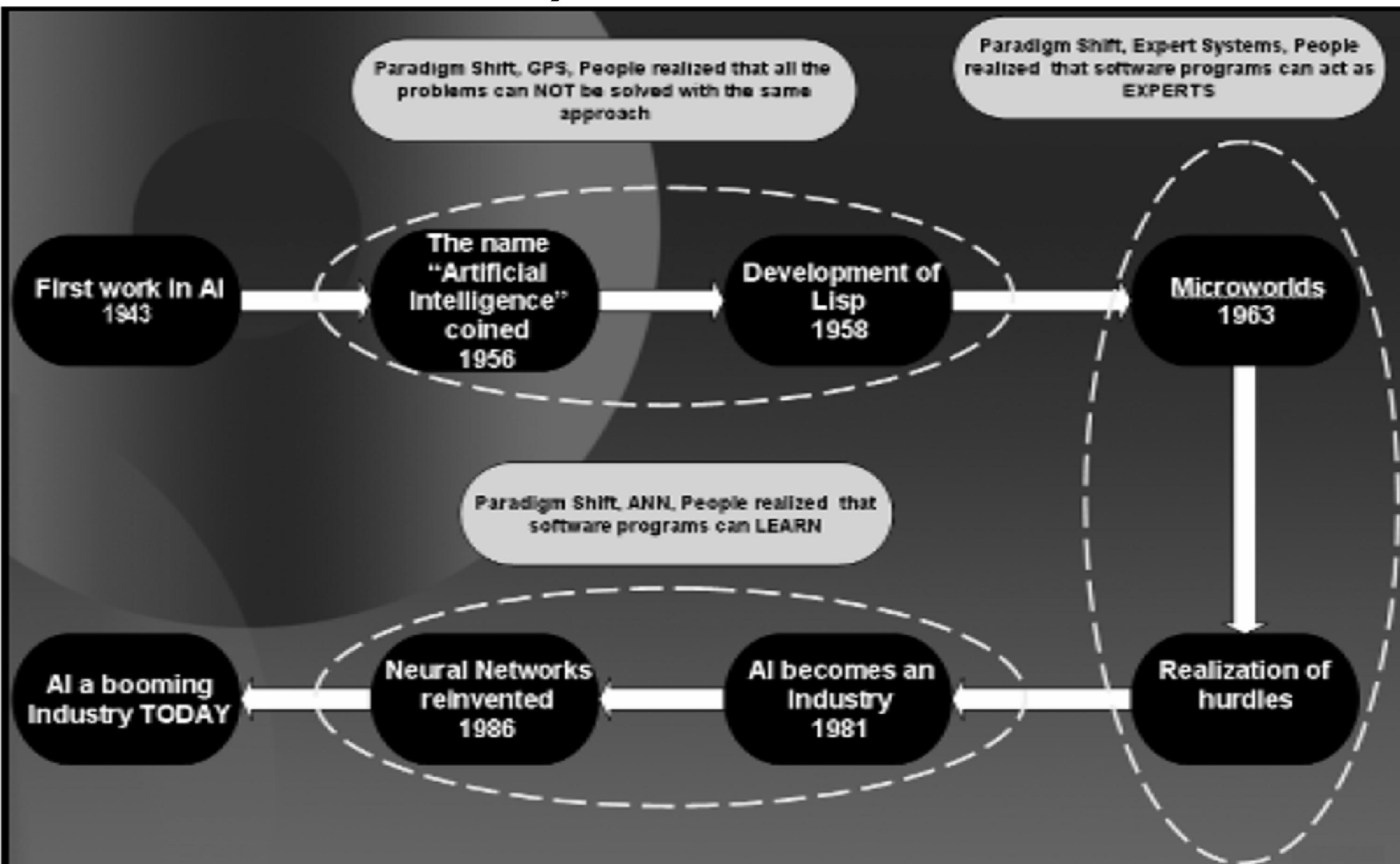
- Strong method problem solving depends on the weak methods because a system with knowledge is useless without some methodology for handling that knowledge.

# AI Programming Language

- Prolog
- LISP



# History and Evolution



# Applications

- Information Retrieval System
- Robotic
- Games
- NLP
- Computer Vision
- etc