INTRODUCTION

INT404

There are three kinds of intelligence: one kind understands things for itself, the other appreciates what others can understand, the third understands neither for itself nor through others. This first kind is excellent, the second good, and the third kind useless.

—Niccolo Machiavelli
(1469–1527), Italian diplomat, political philosopher,
musician, poet and playwright

It is the study of Making computers to do things like human.

THE AI PROBLEMS

CHECKER BOARD GAME ; CHESS BOARD GAME ;

THEOREM PROVING ;

COMMON SENSE

Examples of AI problems (Application Areas)

1.Expert Consulting Systems

A key problem in the development of Expert Consulting System is how to represent and use the knowledge that human experts in these subjects obviously posses and use.

This problem is more difficult by the fact that the expert knowledge in any important field is imprecise and uncertain.

Examples of AI problems (contd.) (Application Areas)

2. Theorem Proving

Finding proof of a mathematical theorem requires following intelligence.

- Requires the ability to make deductions from hypothesis.
- It demands intuitive scales such as guessing which path should be proved first in order to help proving the theorem.
- It also requires judgments to guess accurately about which previously proven theorems in a subject area will be useful in the present proof.
- Also sometimes it is needed to break the main problem into sub-problems to work on independently.

Examples of AI problems(contd.)
(Application Areas)

3. Robotics

It deals with the problems of controlling the physical actions of a mobile Robot.

4. Automatic Programming

In automatic programming, a system takes in a high level description of what program is to accomplish and produce a program.

Examples of AI problems (contd.) (Application Areas)

5. Perceptional Problems

- Computers are made to see their surroundings by fitting input devices.
- Also they are made to hear speaking voices by providing with microphone inputs.
- But it requires processing of large base knowledge about the things being perceived.

6. Natural Language Processor

- This field concerned with the efforts of making computers to understand spoken and written languages.
- In order to understand sentences about a topic, it is necessary not only a lot about the vocabulary and grammar, but also a good deal about the topic so that unstated assumptions can be recognized.

Easy Problems in AI

- It's been easier to mechanize many of the high level cognitive tasks we usually associate with "intelligence" in people
  - e. g., symbolic integration, proving theorems, playing chess, some aspect of medical diagnosis, etc.

Hard Problems in AI

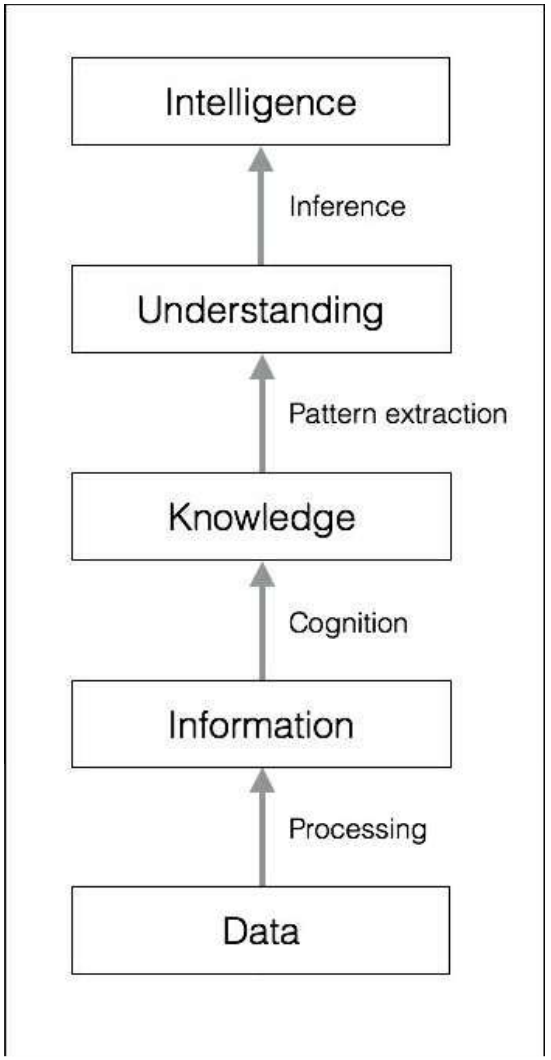
- It's been very hard to mechanize tasks that animals can do easily
  - catching prey and avoiding predators
  - interpreting complex sensory information (visual, aural, …)
  - modeling the internal states of other animals from their behavior
  - working as a team (ants, bees)

WHAT IS AN AI TECHNIQUE?

is a method that exploits knowledge

Intelligence Vs Knowledge

machines to sense, reason, think, and act.



- Handle large amounts of data in an efficient way. With the advent of Cloud Computing, we are now able to store huge amounts of data.
- Ingest data simultaneously from multiple sources without any lag.
- Index and organize data in a way that allows us to derive insights.
- Learn from new data and update constantly using the right learning algorithms.
- Think and respond to situations based on the conditions in real time.

Applications of AI

Branches of AI

Machine learning and pattern recognition:

Logic-based AI:

Search:

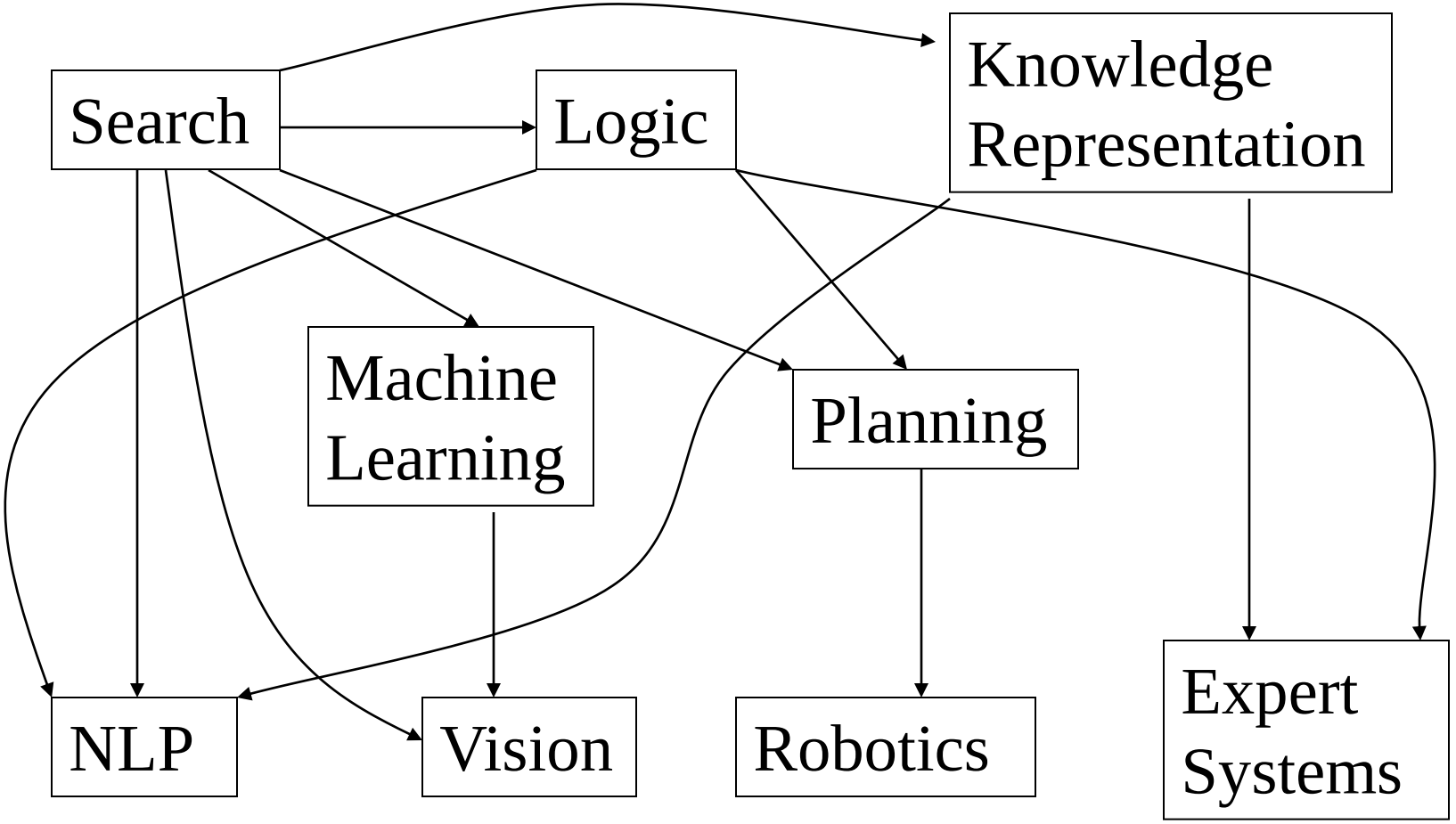
Knowledge representation:

Planning:

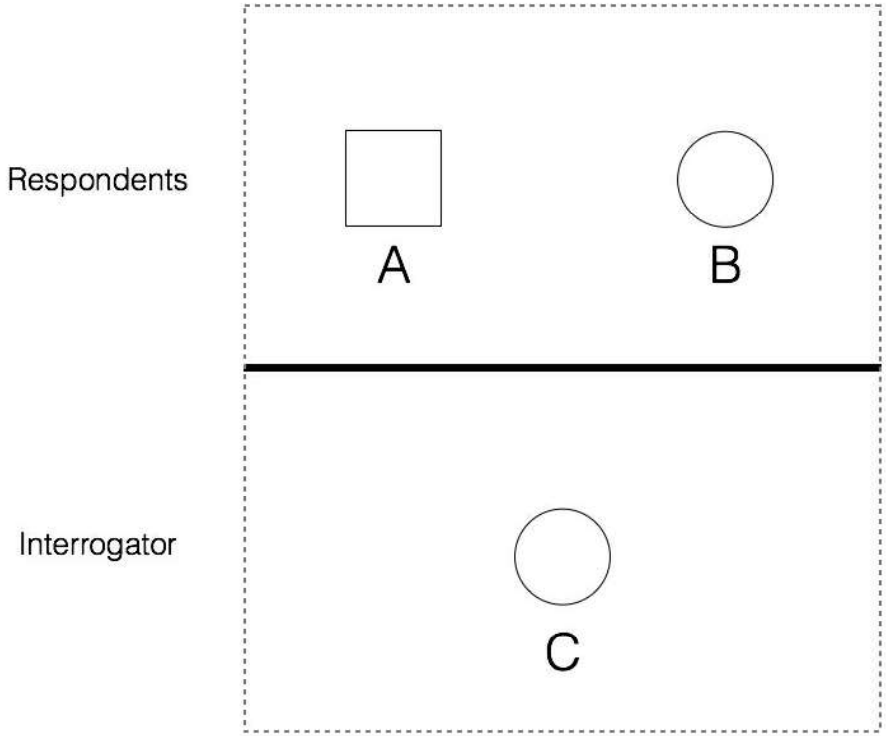
Heuristics:

Genetic programming:

Areas of AI and their inter-dependencies



Defining intelligence using Turing Test



Natural Language Processing:

Knowledge Representation:

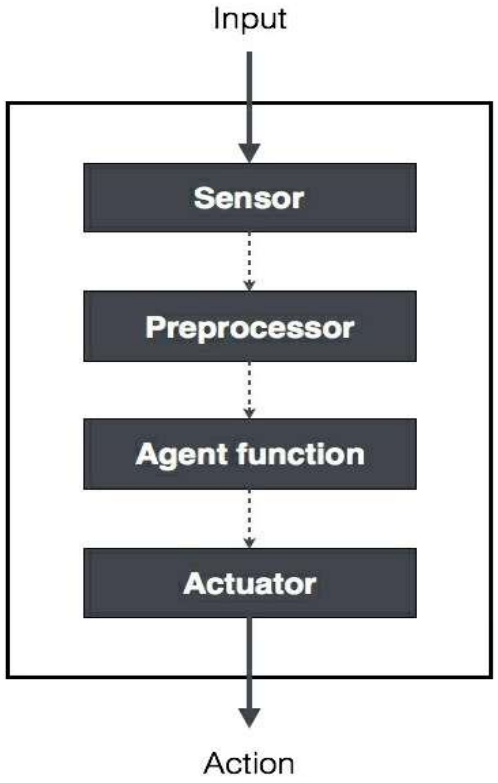
Reasoning:

Making machines think like humans

Building rational agents

The agent is supposed to be intelligent and independent.

How do we define the *right* thing?



General Problem Solver

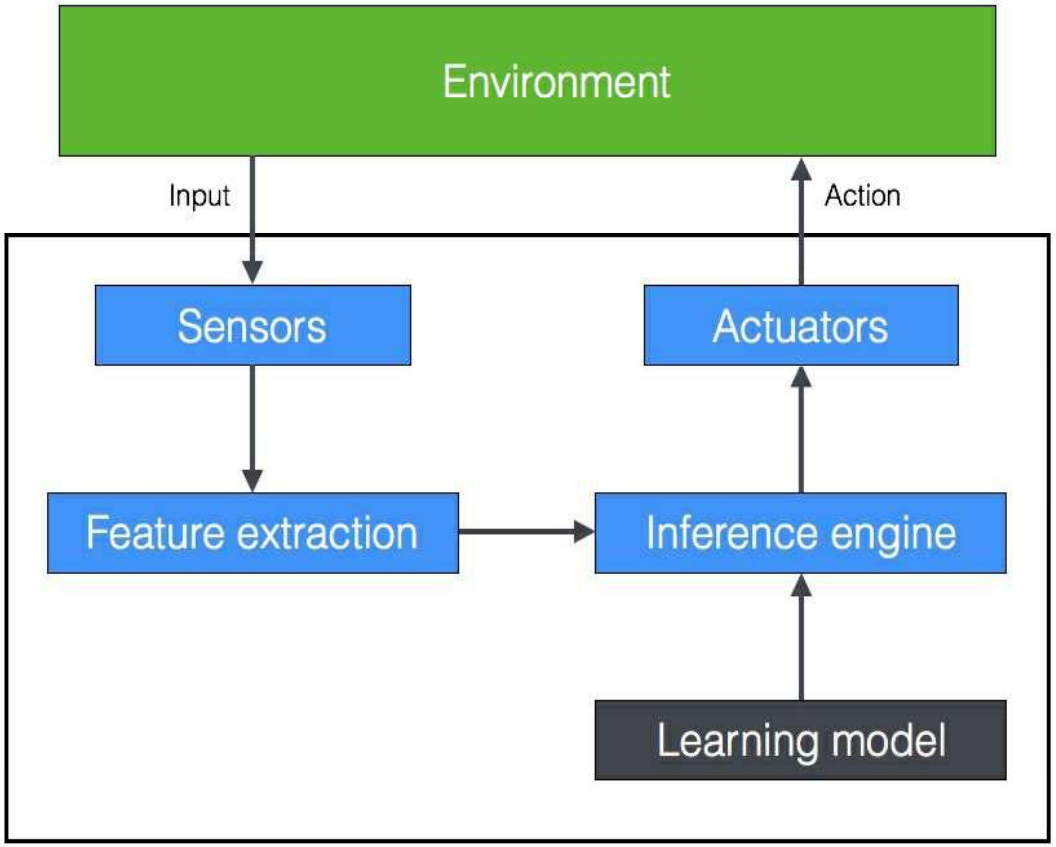
The goal was to make it work as a universal problem-solving machine.

Information Processing Language (IPL).

Let's see how to structure a given problem to solve it using GPS:

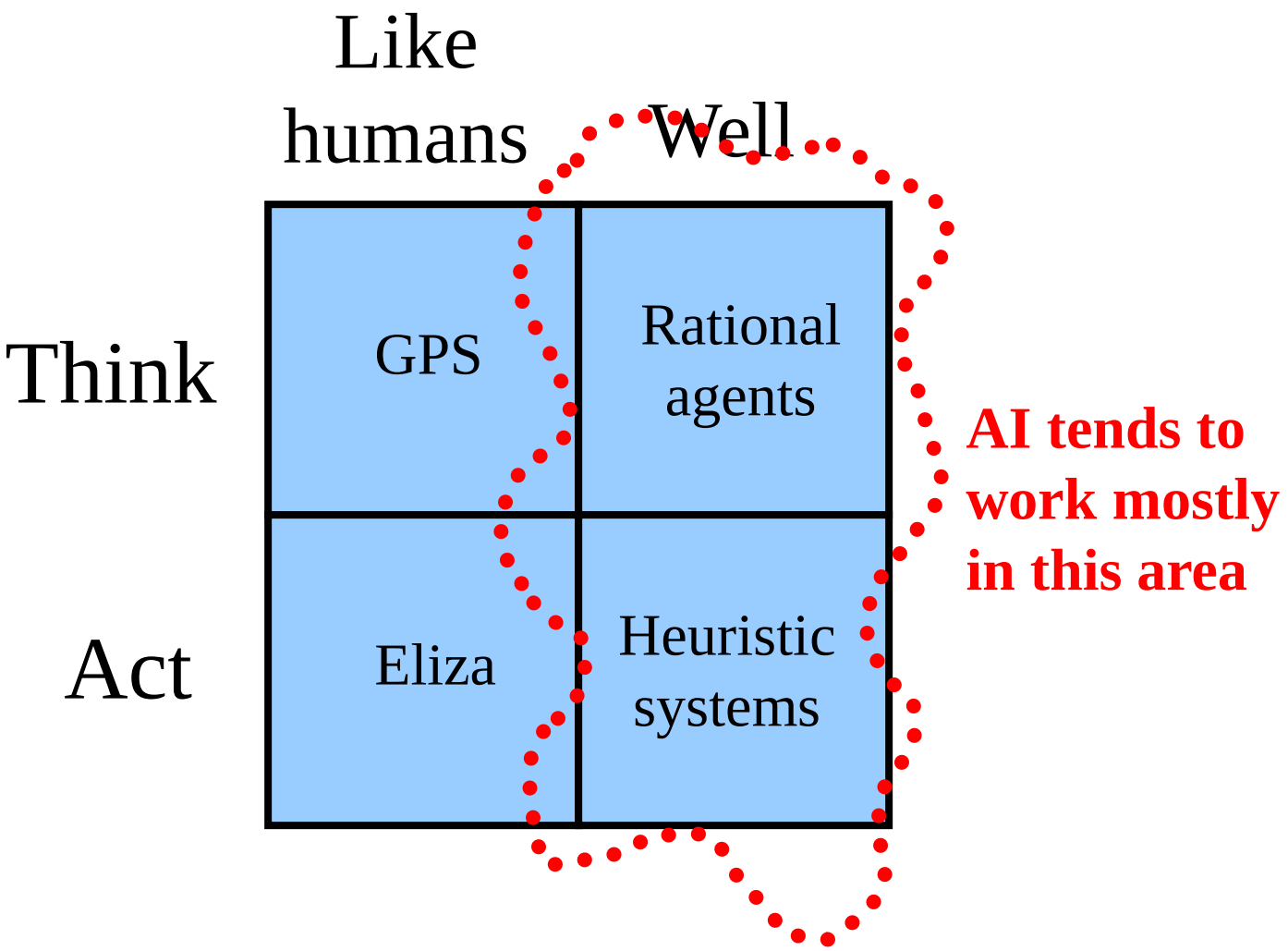
1. The first step is to define the goals. Let's say our goal is to get some milk from the grocery store.
2. The next step is to define the preconditions. These preconditions are in reference to the goals. To get milk from the grocery store, we need to have a mode of transportation and the grocery store should have milk available.
3. After this, we need to define the operators. If my mode of transportation is a car and if the car is low on fuel, then we need to ensure that we can pay the fueling station. We need to ensure that you can pay for the milk at the store.

Building an intelligent agent



Intelligent agent

Possible Approaches



Get me exactly 2 Litres.

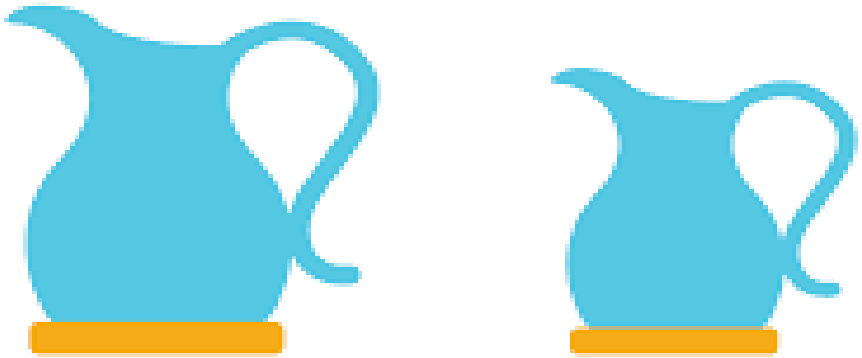
Water Jug Problem

4 L

3 L

Get me exactly 2 Litres.

Water Jug Problem



(0,0) →(0,3) → (3,0) → (3,3) → (4,2) → (0,2) → (2,0)

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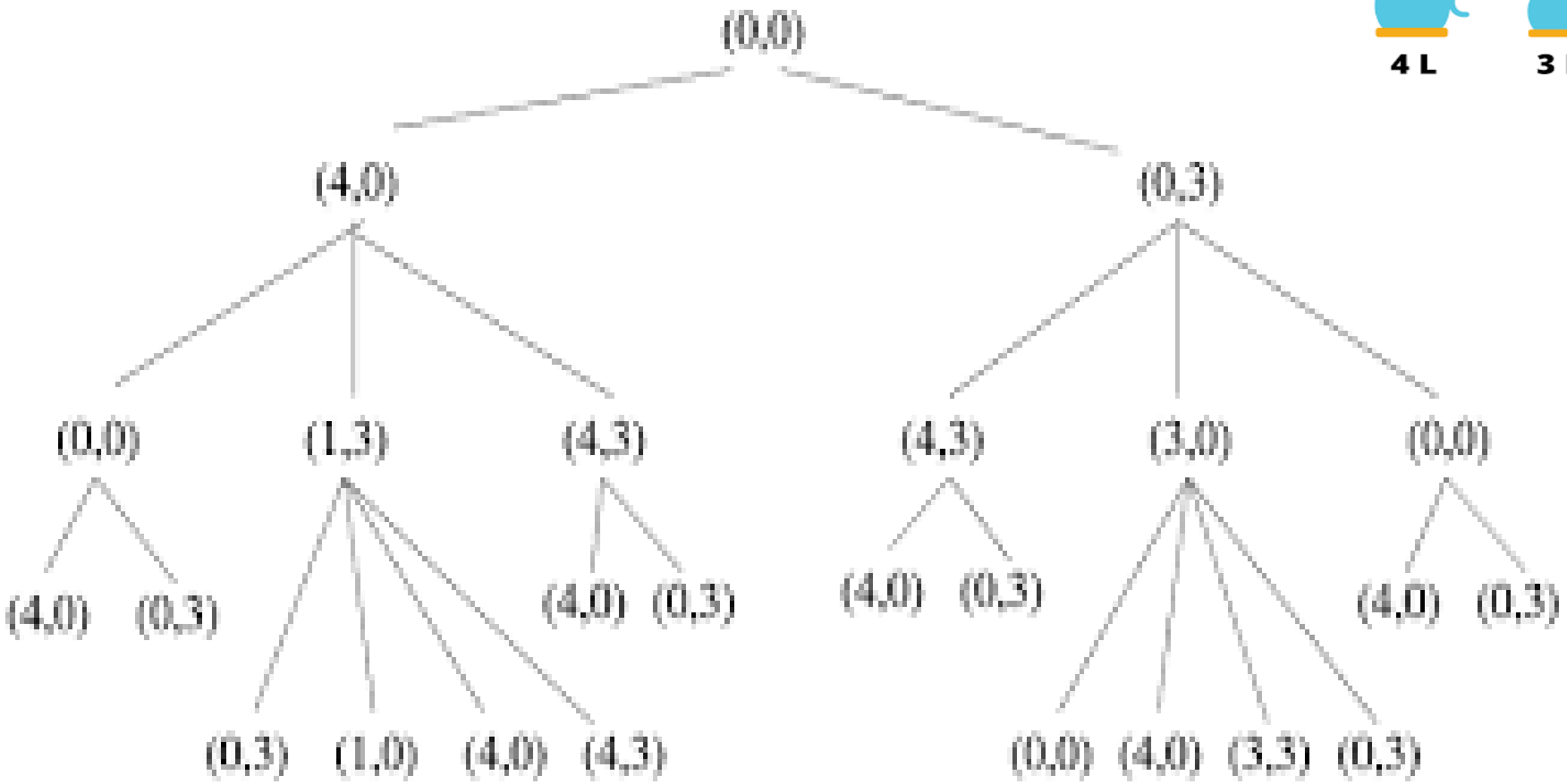
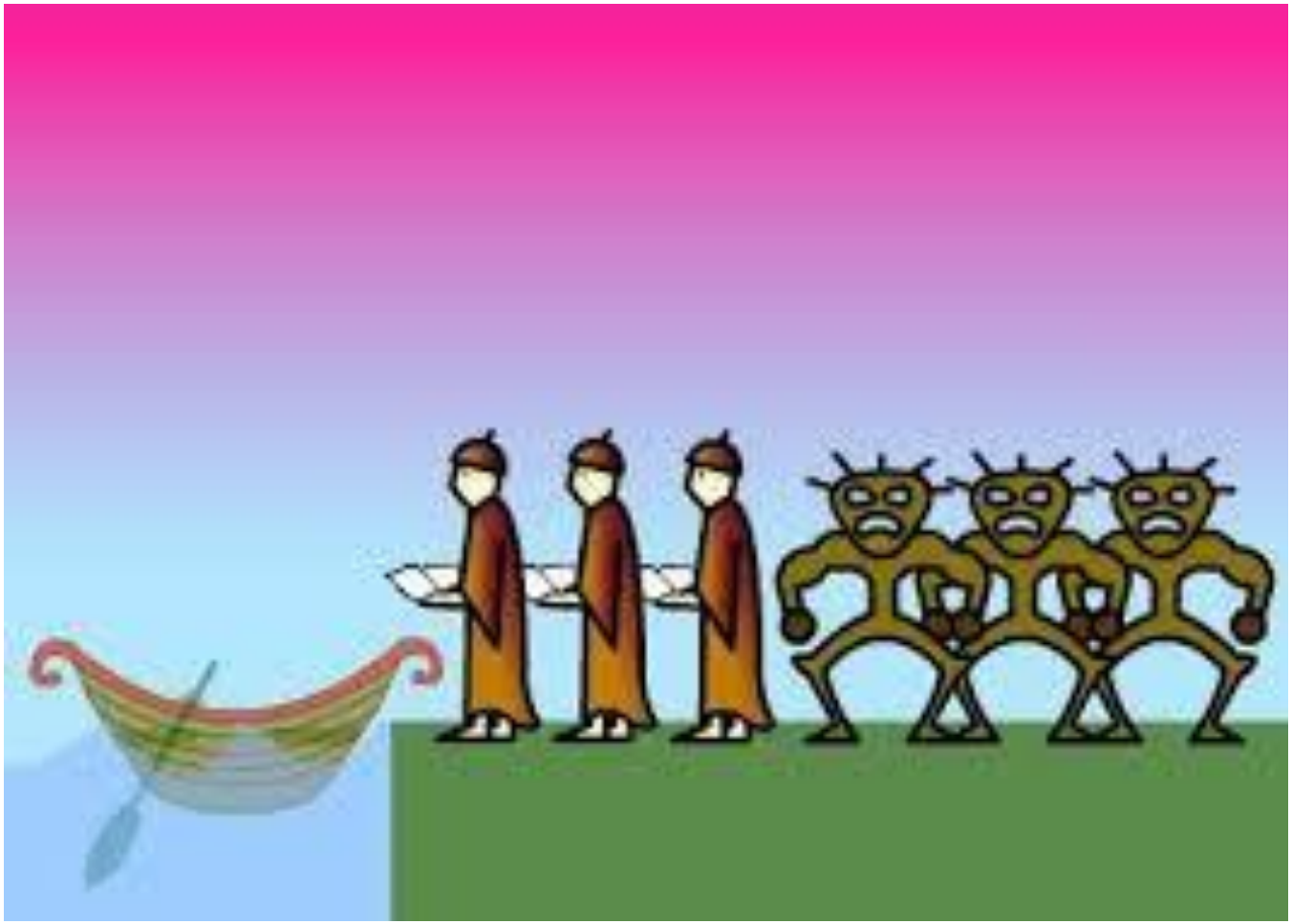
Water Jug Problem



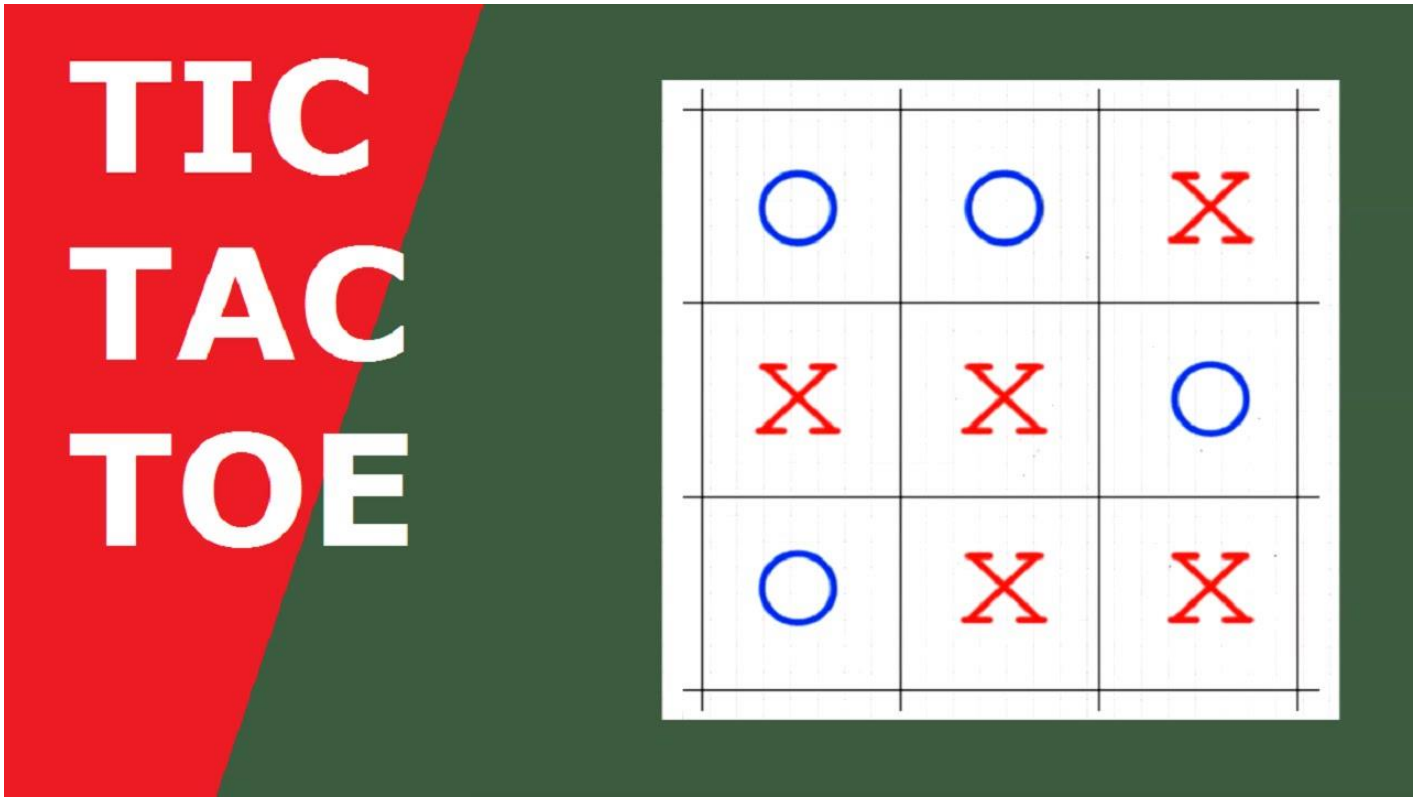
(0,0) →(0,3) → (3,0) → (3,3) → (4,2) → (0,2) → (2,0)

1	(x,y) is X<4 →(4,Y)	Fill the 4-gallon jug
2	(x,y) if Y<3 →(x,3)	Fill the 3-gallon jug
3	(x,y) if x>0→(x-d,Y)	Pour some water out of the 4-gallon jug.
4	(x,y) if Y>0 →(x,Y-d)	Pour some water out of 3-gallon jug.
5	(x,y) if x>0 → (0,y)	Empty the 4-gallon jug on the ground
6	(x,y) if y>0 →(x,0)	Empty the 3-gallon jug on the ground
7	(x,y) if X+Y >= 4 and y>0 →(4,y-(4-x))	Pour water from the 3-gallon jug into the 4-gallon jug until the 4-gallon jug is full
8	(x,y) if X+Y>=3 and x>0→(x-(3-y),3))	Pour water from the 4-gallon jug into the 3-gallon jug until the 3-gallon jug is full.
9	(x,y) if X+Y <=4 and y>0 → (x+y,0)	Pour all the water from the 3-gallon jug into the 4-gallon jug.
10	(x,y) if X+Y<=3 and x>0 →(0,x+y)	Pour all the water from the 4-gallon jug into the 3-gallon jug.
11	(0,2) →(2,0)	Pour the 2-gallon water from 3-gallon jug into the 4-gallon jug.
12	(2,Y)→(0,y)	Empty the 2-gallon in the 4-gallon jug on the ground.

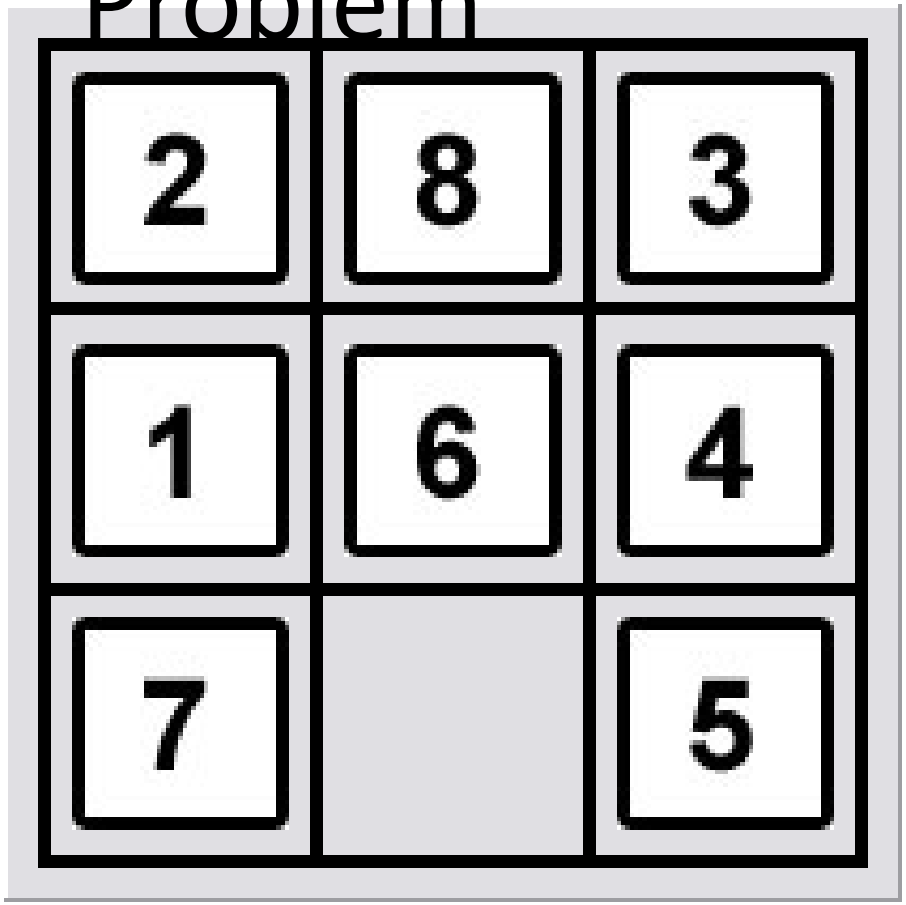
Missionaries and Cannibal Problem



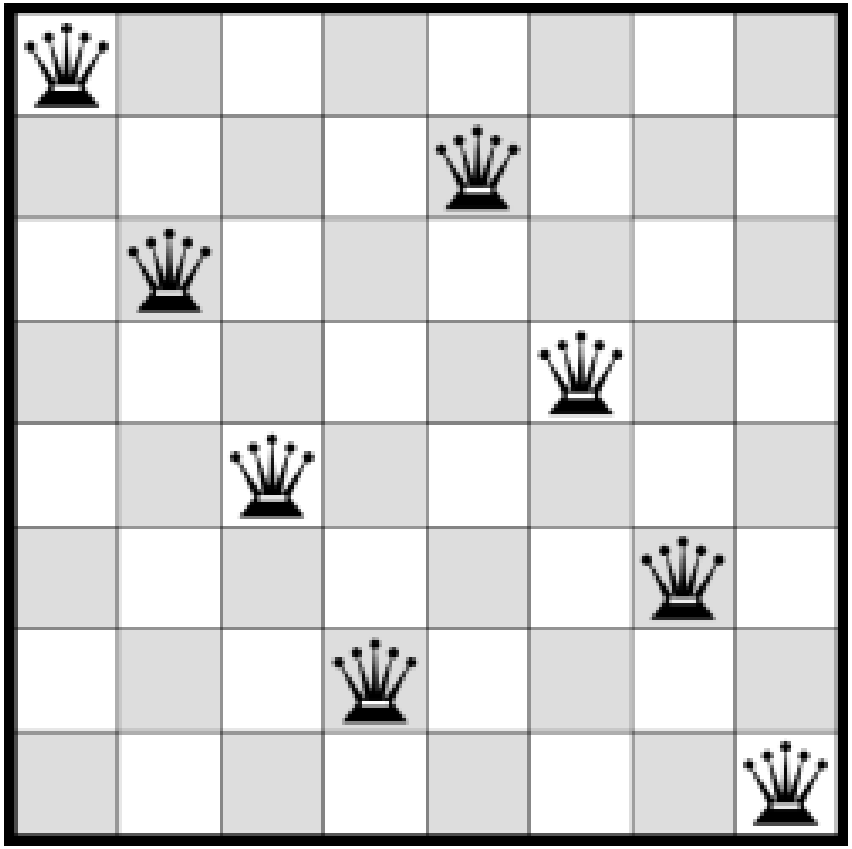
Other games…



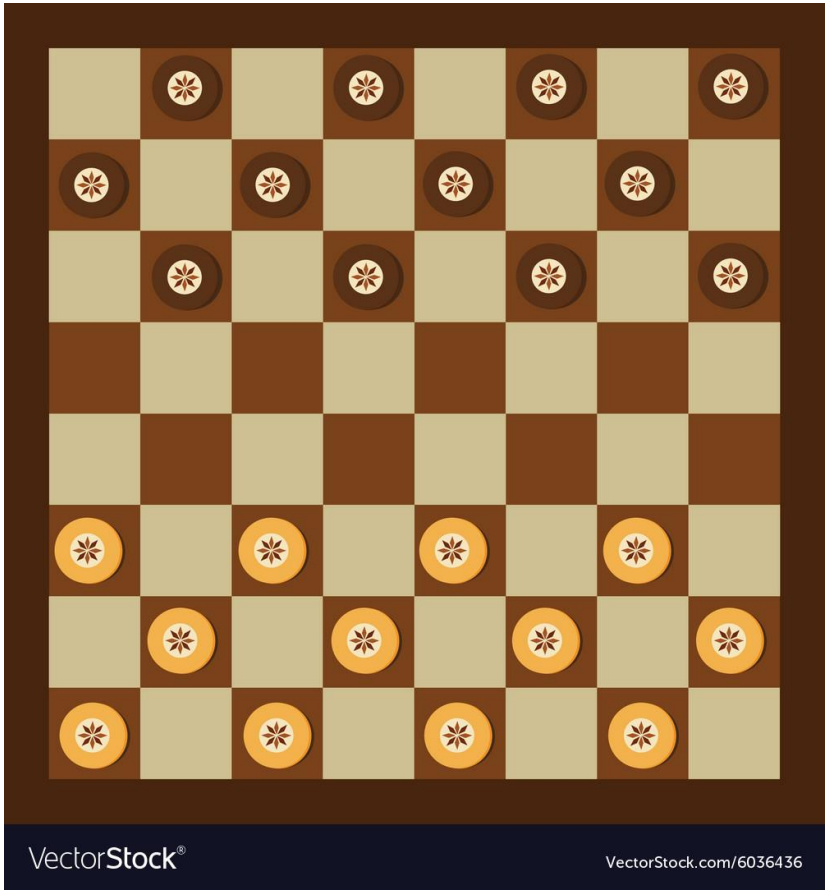
8 Puzzle Game Problem



8 Queen



CHECKER GAME



CHESS GAME

Thank You!!!