

INT404 ARTIFICIAL INTELLIGENCE

Lecture 0

L T P : 3 1 0

Text Book:

- “ARTIFICIAL INTELLIGENCE”, RICH, KNIGHT, Mc GRAW HILL , 3rd Edition (2009)

Reference books:

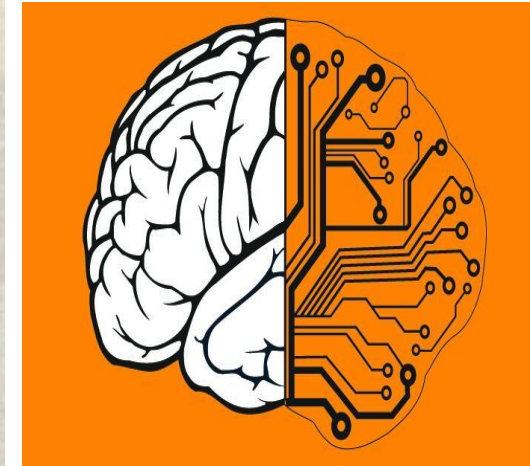
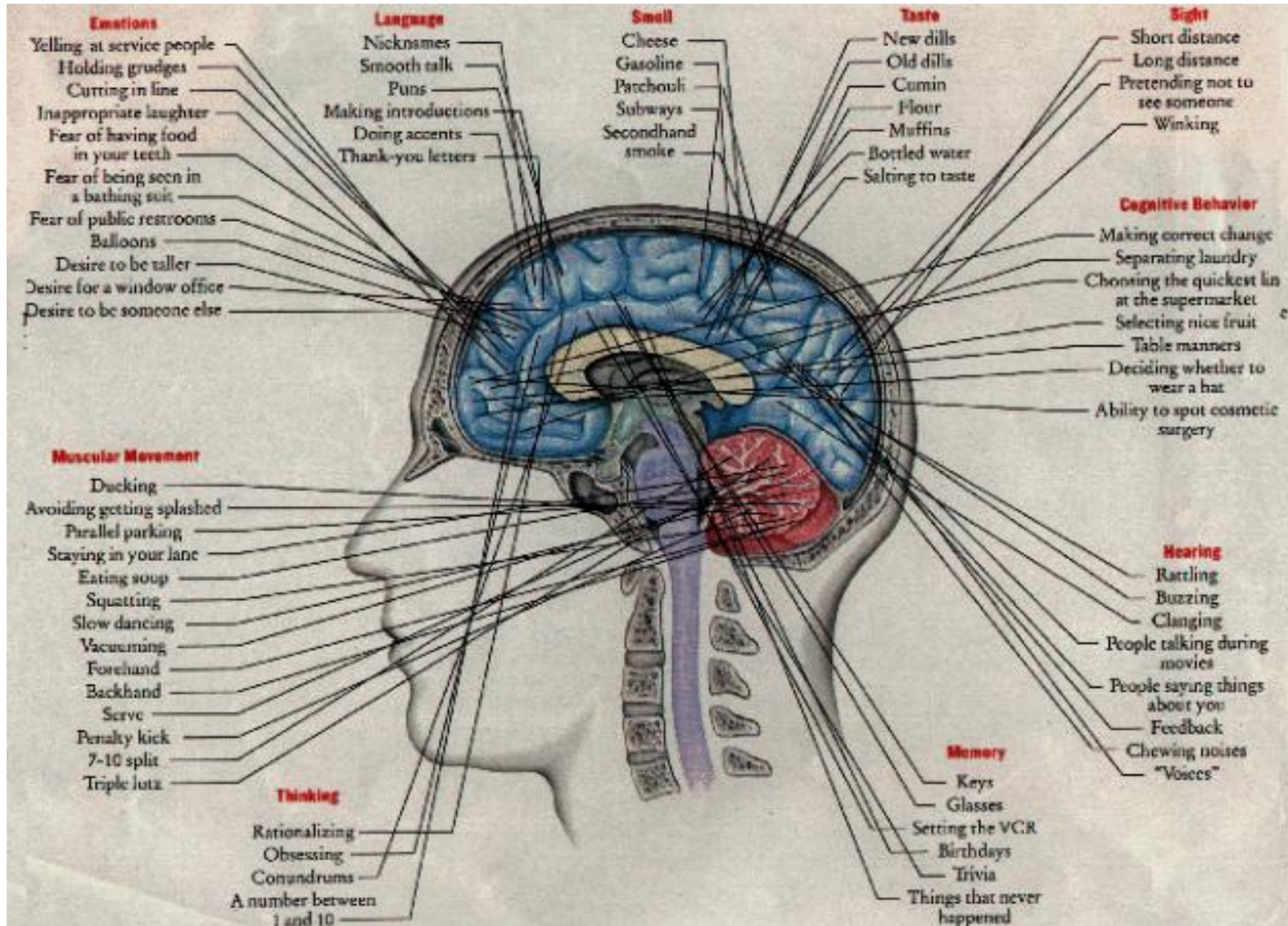
- “ARTIFICIAL INTELLIGENCE: A MODERN APPROACH” by STUART RUSSEL, PETER NORVIG, PEARSON, 2nd Edition, (2012)
- “Artificial Intelligence with Python “ by PRATEEK JOSHI, PACKT, 1st Edition,(2017)

Component	Weightage
Attendance	5
CA	30
MTT	25
ETE	40

Continuous Assignment(Best 2 out of 3)

	ALLOCATION	SUBMISSION
	WEEK	WEEK
CA1	4	5
CA2	8	9
CA3	10	11

* CA2 and CA3 dates can be changed in future

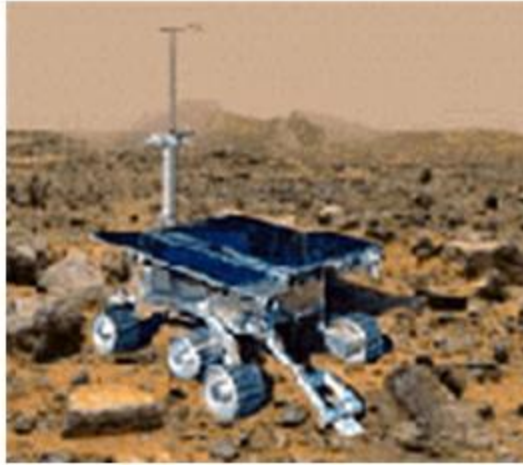


Mapping of Human brain into machine

Why study AI?



Labor



Science



Search engines



Medicine/
Diagnosis



Appliances

What else?

Python Packages Required for AI

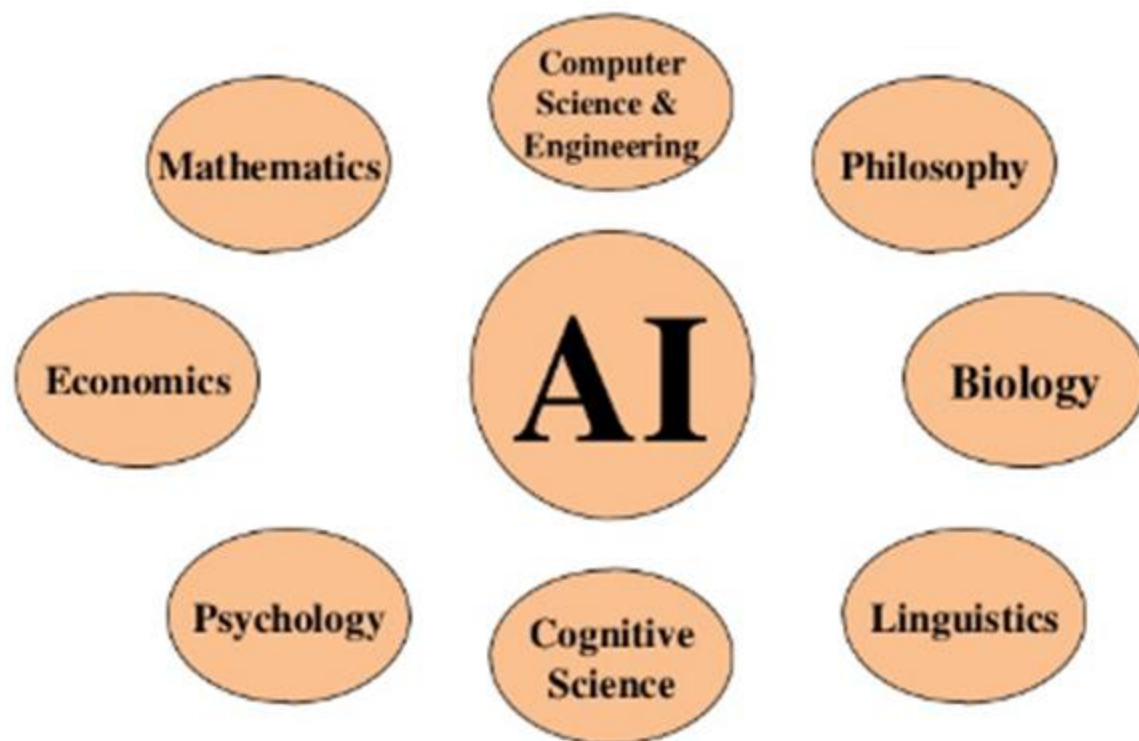
- numpy
- pandas
- simpleai
- logic
- sympy
- nltk
- easyAI
- sklearn
- skfuzzy

Unit 1

Introduction

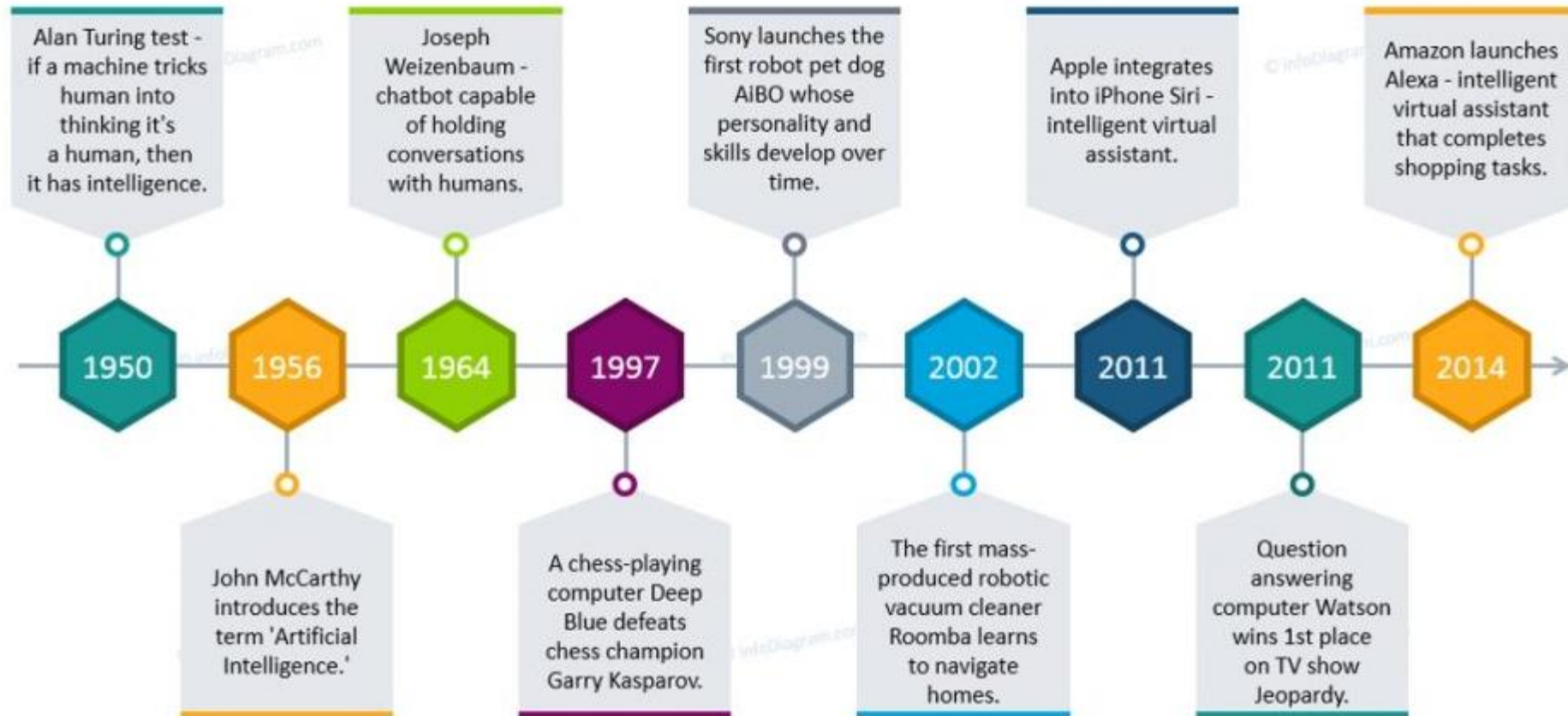
- What is Artificial Intelligence?
- History of AI
- Applications of AI
- Branches of AI
- defining intelligence using Turing Test
- Making Machine think like human
- Building rational agent
- general Problem solver
- Building an intelligent agent
- Problem Spaces and Search
- Problem characteristics
- Production system and its characteristics

Unit 1 Foundations of AI



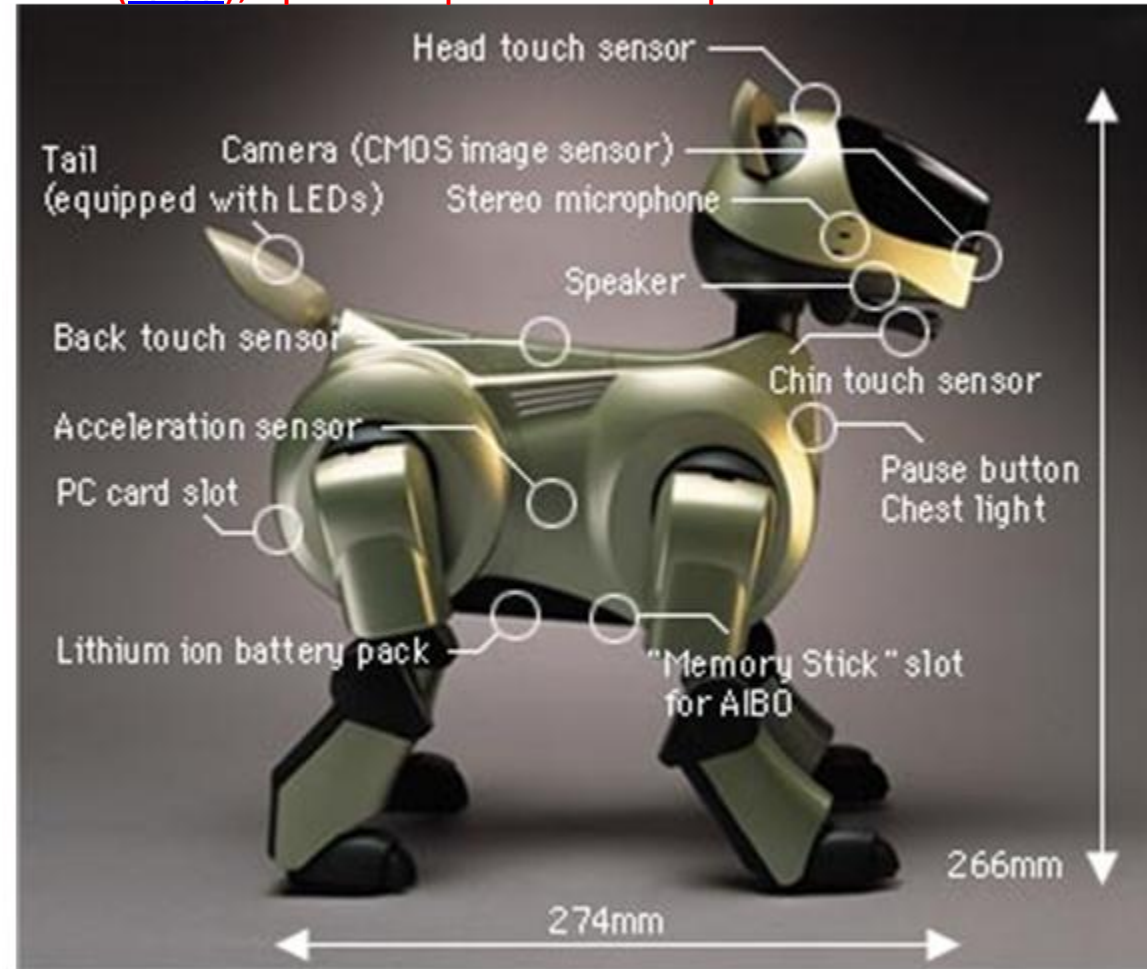
Unit 1

Artificial Intelligence Development History Timeline

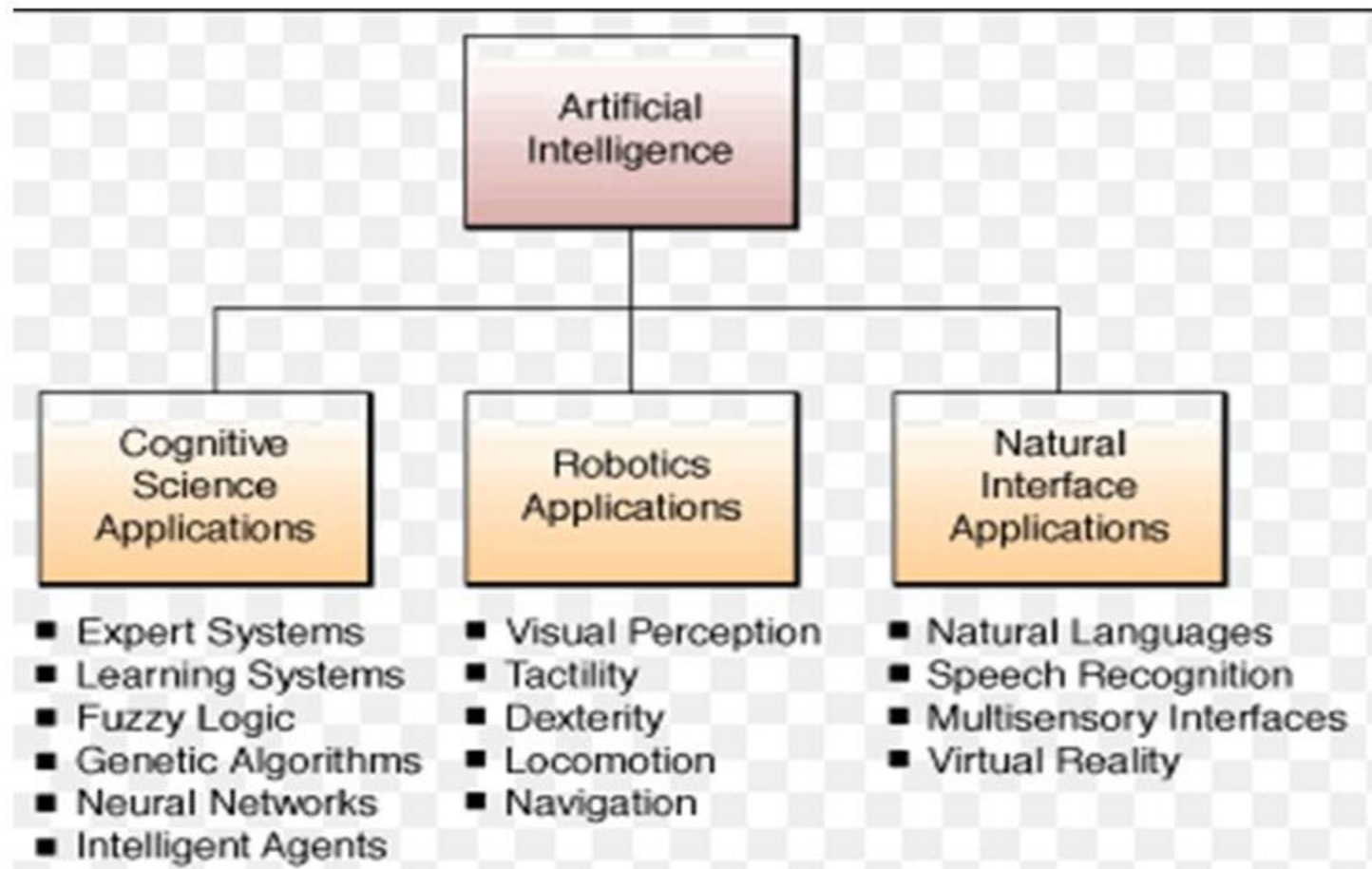


Sony AIBO

aibō (相棒), "pal" or "partner" in Japanese



Unit 1 Application areas of AI



What is intelligence?

- Intelligence is hard to describe.
- More a performance view rather than a structural one.
- Intelligence is observed in NEW areas.
 - New areas → where the knowledge is still incomplete.

**Intelligence - ability to work *efficiently* with
Incomplete, Complex patterns**

Artificial Intelligence - Enabling **computers** to work efficiently with *Incomplete, Complex* Patterns.

What is the problem?

Incomplete, complex patterns → a large, unbounded search space.

Searching this is time consuming – Non Polynomial time complexity.

More details on patterns:

- Pattern – a set of repeating, significant attributes.
- Complexity of a pattern – measured by the number of attributes and the relationships between these attributes.
 - The more attributes – The more complex
 - The more relationships (inter dependencies) – The more complex.

A view of the world:

Three segments –

Segment 1 – Totally known segment.

- All knowledge in this segment is known →
Methods exist for all problems →
- Solutions are method oriented. Underlying patterns can be ignored.
- **Example** - Find the square root of a number.

A view of the world:

Segment 3 - Totally Unknown

- Hardly anything of topics in this area is known.
→ Human beings are themselves unable to do much here.
- **Example** - Life on other planets

A view of the world:

Segment 2 – Partially Known.

- Quite a lot is known about topics in this segment, but not everything. => Incomplete, Ambiguous patterns.
- **Example** – Diagnosing diseases.

Intelligence is required to handle problems in Segment **2**.

- Algorithmic approaches cannot work here as an algorithm, by definition is finite, definite, and effective. (Definite is the **opposite** of ambiguous.)
- As more knowledge is acquired, topics in Segment 3 move to Segment 2 and topics in Segment 2 move to Segment 1.

Problem that **artificial intelligence** attempts to handle is “Providing efficient solutions to problems in an ambiguous, incomplete pattern area”.

Artificial intelligence itself lies in Segment 2 of the view of the world.

Solution - Non-algorithmic approaches.

Unit 2 -Search Strategies

- Uninformed Search strategies: Breadth first search (BFS), Depth first search(DFS)
- Informed Search Strategies : Generate and Test, Hill Climbing, Best first search, A* algorithm, Constraint satisfaction Problem

Package Required : simpleai

Unit 3 - Knowledge Representation & Knowledge Reasoning

- Propositional logic
- Predicate logic
- CNF
- Forward versus backward reasoning
- solving problem using logic programming
- Introduction to logic programming
- understanding the building blocks of logic

Package required: logic, sympy

Unit 4 -Natural Language Processing

- Introduction to Natural Language Processing,
- phases of NLP
- construction of parse tree
- Tokenizing text data
- word stemming
- word lemmatization
-
- Dividing text data into chunks
- Bag of Words model
- Applications of NLP,
- Spell checking
- Soundex algorithm

Package required: nltk

Unit 5 - Building games using AI

- Using search algorithms in games
- Combinatorial search
- Minmax Problem
- Alpha-beta pruning
- Negamax algorithm
- Last Coin standing game
- Tic-Tac-Toe game ,
- Hexapawn game.

Package required: easyAI

Unit 6 - Advance topics in Artificial Intelligence

- Definition of Machine Learning
- Types of Machine Learning
- Activation functions,
- Single neuron model
- neural network architectures
- Genetic Operators
- genetic algorithm and its application
- Fuzzy logic
- fuzzification and defuzzification
- Mamdani fuzzy inference system

Package Required: sklearn, skfuzzy