ARTIFICIAL INTELLIGENCE CO 304

Even Semester 2021-22
Delhi Technological University

Artificial Intelligence: Course Contents

S.No.	Contents	Contact Hours
1.	**Introduction**: AI Problems, Task Domains of AI, AI Techniques: search knowledge, abstraction. Introduction to Intelligent program and Intelligent agents. Problem Solving: Basic Problem solving Method: state space search, problem characteristics, Production systems characteristics,issues in design of Intelligent search algorithm.	6
2.	**Heuristic search Techniques**: Hill climbing techniques, Best First search, A* Search, Problem Reduction: AO* Search, Constraint Satisfaction, Means-End Analysis. **Game Playing**: Game Tree, Searching procedure Minimax, alpha-beta pruning	7

Artificial Intelligence: Course Contents (contd..)

3.	**Knowledge Representation**: Knowledge Representation issues. Knowledge Representation using Predicate Logic: Unification, resolution. Rule based Systems: Forward versus backward reasoning, conflict resolution. **Structured Knowledge Representation**: Semantic Nets, Frames, conceptual dependency, scripts.	7
4.	**Programming Languages**: Fundamental and concepts of Programming languages like Prolog or Lisp. Relationship of languageswith Knowledge representation and inferences	6

Artificial Intelligence: Course Contents (contd..)

5.	**Reasoning**: Handling uncertainty Non-Monotonic Reasoning, Probabilistic reasoning, use of certainty factors, fuzzy logic.Learning Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets.	8
6.	**Applications:** Expert Systems: Architecture, Domain Knowledge, Knowledge Acquisition, Case Studies: MYCIN, RI, Natural language Processing: Syntactic, Semantic and Pragmatic Analysis, Robotics etc.	8

Artificial Intelligence: Books

S.No.	Name of Books / Authors/ Publishers/ Year of Publication/ Reprint
	Text Books
1.	Artificial Intelligence, E. Rich and K. Knight, TMH, 2nd ed.(ISBN- 978-0070522633),1992
2.	Principles of AI, N.J. Nilsson, , Narosa Publ. House, (ISBN: 978-81-85198-29-3),1990
	Reference Books
1.	"Neural Networks in Computer Intelligence" by KM Fu, McGraw Hill (ISBN- 978-0136042594),1992
2.	Artificial Intelligence: Structures and Strategies for Complex Problem Solving (5th Edition), George F. Luger, 2005. Addison-Wesley. (ISBN: 978-8131723272)
3.	Artificial Intelligence: A Guide to Intelligent Systems (2nd Edition).Michael Negnevitsky, 2005. Addison-Wesley. (ISBN: 978-8131720493)
4	"Introduction to AI and Expert Systems", D.W. Patterson, , PHI, 1992(ISBN: 978-0134771007)

Artificial Intelligence: Course Evaluation

ETE: 50%

3 Class Tests: Best 2 i.e. 20% * 2 = 40%

2 Minor Class Tests: Best 1 i.e. 10% * 1 = 10%

MTE: 25%

Innovative Project (Max. 2 students per group)

Mid Evaluation (10%) + End Evaluation (15%)

Deliverables: Code + PPT + Project Report in ACL Paper Format

Target: Conference Paper

Artificial Intelligence: Course Evaluation (contd..)

CWS: 25%

In-class Quiz: 10%

2 minute quiz with 2 MCQ anytime during any class.

~23 Quizzes. Best n-3 quizzes would be considered.

+

Assignment: 15% (4 Assignments)

Theoretical + Implementation Based.

Pre-requisite for Recommendation Letter:

A+ or O grade in the course + Publication with me.

What is Artificial Intelligence (AI)?

It is a branch of Computer Science that pursues creating the computers or machines as intelligent as human beings.

It is the science and engineering of making intelligent machines, especially intelligent computer programs.

It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable

What is Artificial Intelligence (AI) contd..?

Definition: Artificial Intelligence is the study of how to make computers do things, which, at the moment, people do better.

According to the father of Artificial Intelligence, John McCarthy, it is “The science and engineering of making intelligent machines, especially intelligent computer programs”.

Artificial Intelligence is a way of making a computer, a computer-controlled robot, or a software think intelligently, in the similar manner the intelligent humans think.

AI is accomplished by studying how human brain thinks and how humans learn, decide, and work while trying to solve a problem, and then using the outcomes of this study as a basis of developing intelligent software and systems.

What is Artificial Intelligence (AI) contd..?

It has gained prominence recently due, in part, to big data, or the increase in speed, size and variety of data businesses are now collecting. AI can perform tasks such as identifying patterns in the data more efficiently than humans, enabling businesses to gain more insight out of their data.

From a business perspective AI is a set of very powerful tools, and methodologies for using those tools to solve business problems.

From a programming perspective, AI includes the study of symbolic programming, problem solving, and search.

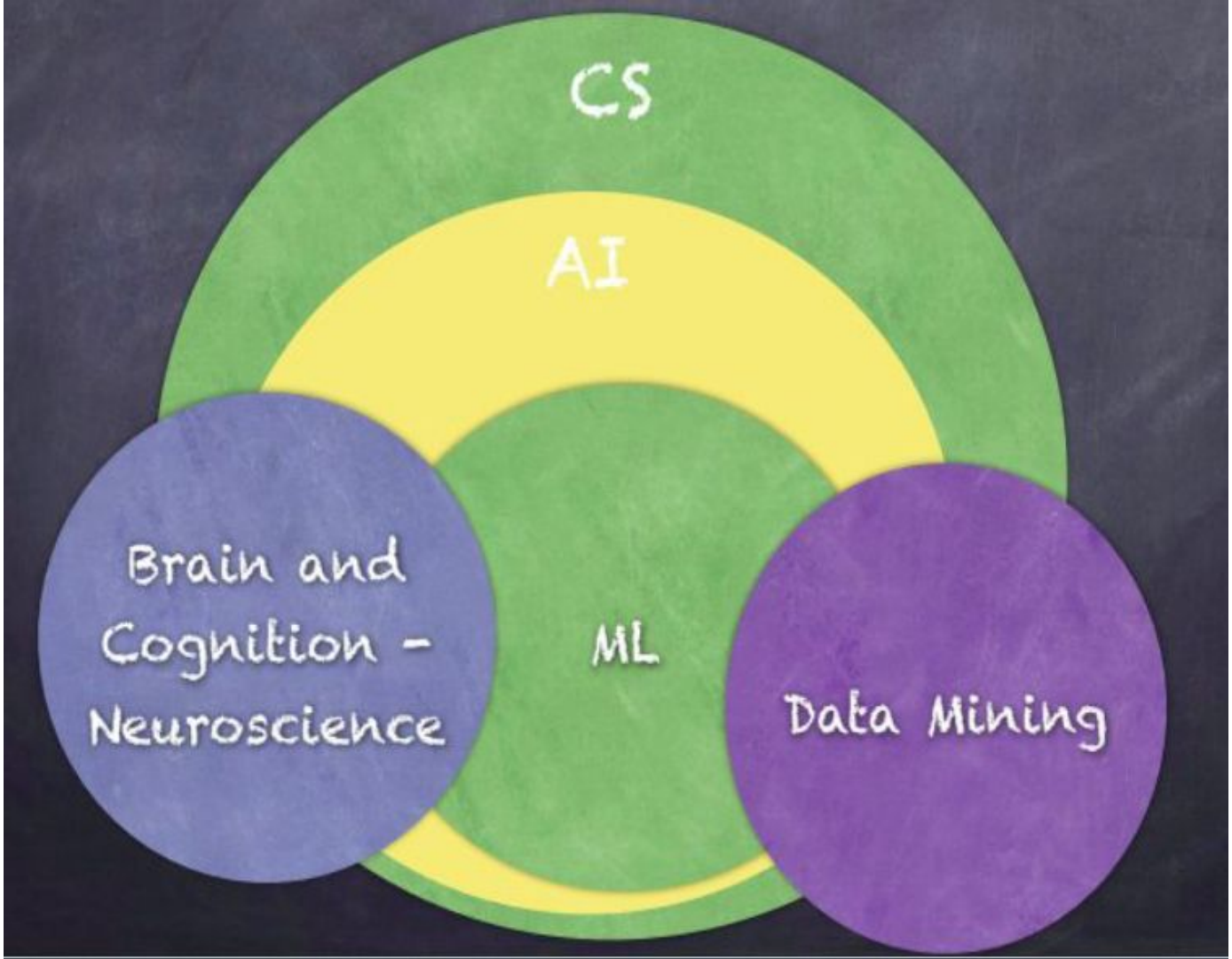
AI Definition

We call programs intelligent if they exhibit behaviors that would be regarded intelligent if they were exhibited by human beings.

-- Herbert Simon

AI is the study of techniques for solving exponentially hard problems in polynomial time by exploiting knowledge about the problem domain.

-- Elaine Rich


CS
AI
ML
Brain and Cognition - Neuroscience
Data Mining

ELIZA

….named after Eliza Doolittle, a working-class character in George Bernard Shaw's play *Pygmalion*,

ELIZA was a simple natural language processing program written at MIT by Joseph Weizenbaum around 1966.

It had simple rules to manipulate language and would essentially modify the users input to generate its response. A popular version called Doctor was running a script designed to make respond like a Rogerian psychotherapist.

A Russian scientist chatting with Doctor at Stanford

Doctor: What brought you here to see me today?
Visitor: Oh, nothing much. I'm feeling a bit tired, that' s all.
Doctor: Why do you think you' re feeling a bit tired.
Visitor: Well I' ve been traveling a lot, and away from home.
Doctor: Tell me about your family.

What AI can do?

- **Learning - e.g. Text Categorization**
- **Games - Chess Champion**
- **..**

What AI can’t do?

- **Understand natural language robustly**
- **Surf web**
- **Interpret an arbitrary visual scene**
- **Learn a natural language.**

Problems in AI

Intelligence does not imply perfect understanding; every intelligent being has limited perception, memory and computation. Many points on the spectrum of intelligence versus cost are viable, from insects to humans.

AI seeks to understand the computations required from intelligent behaviour and to produce computer systems that exhibit intelligence.

Aspects of intelligence studied by AI include perception, communicational using human languages, reasoning, planning, learning and memory.

Problems in AI (contd..)

The following questions are to be considered before we can step forward:

1. What are the underlying assumptions about intelligence?
2. What kinds of techniques will be useful for solving AI problems?
3. At what level human intelligence can be modelled?
4. When will it be realized when an intelligent program has been built?