ARTIFICIAL INTELLIGENCE

LECTURE NOTES

(Subject Code: BCS-404)

for

Bachelor of Technology

in

Computer Science and Engineering

&

Information Technology

Department of Computer Science and Engineering & Information Technology

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Module - I

Formalized symbolic logic: Propositional logic-first order predicate logic, wff conversion to clausal form, inference rules, the resolution principle, Dealing with inconsistencies and uncertainties, fuzzy logic.

Module - II

Probabilistic Reasoning Structured knowledge, graphs, frames and related structures, Knowledge organization and manipulation.

Module – III

Matching Techniques, Knowledge organizations, Management.

Module - IV

Natural Language processing, Pattern recognition, expert systems.

Text Book:

1. Artificial Intelligence, Dan W Patterson, Prentice Hall of India (1999) Chapter-4, 5,7,9,10,11,12,13,15.

Reference Books:

1. Artificial Intelligence, Nils J.Nilsson, ELSEVIER.
2. E.Rich and K.Knight, Artificial Intelligence, - TMH

Overview of Artificial Intelligence

What is AI ?

- **A**rtificial Intelligence (AI) is a branch of *Science* which deals with helping machines find solutions to complex problems in a more human-like fashion.
- This generally involves borrowing characteristics from human intelligence, and applying them as algorithms in a computer friendly way.
- A more or less flexible or efficient approach can be taken depending on the requirements established, which influences how artificial the intelligent behavior appears
- Artificial intelligence can be viewed from a variety of perspectives.
  - ✓ From the perspective of **intelligence** artificial intelligence is making machines "intelligent" -- acting as we would expect people to act.
    - o The inability to distinguish computer responses from human responses is called the Turing test.
    - o Intelligence requires knowledge
    - o Expert problem solving - restricting domain to allow including significant relevant knowledge
  - ✓ 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.
    - o Typically AI programs focus on symbols rather than numeric processing.
    - o Problem solving - achieve goals.
    - o Search - seldom access a solution directly. Search may include a variety of techniques.
    - o AI programming languages include:

– LISP, developed in the 1950s, is the early programming language strongly associated with AI. LISP is a functional programming language with procedural extensions. LISP (LISt Processor) was specifically designed for

processing heterogeneous lists -- typically a list of symbols. Features of LISP are run- time type checking, higher order functions (functions that have other functions as parameters), automatic memory management (garbage collection) and an interactive environment.

– The second language strongly associated with AI is PROLOG. PROLOG was developed in the 1970s. PROLOG is based on first order logic. PROLOG is declarative in nature and has facilities for explicitly limiting the search space.

– Object-oriented languages are a class of languages more recently used for AI programming. Important features of object-oriented languages include: concepts of objects and messages, objects bundle data and methods for manipulating the data, sender specifies what is to be done receiver decides how to do it, inheritance (object hierarchy where objects inherit the attributes of the more general class of objects). Examples of object-oriented languages are Smalltalk, Objective C, C++. Object oriented extensions to LISP (CLOS - Common LISP Object System) and PROLOG (L&O - Logic & Objects) are also used.

- Artificial Intelligence is a new electronic machine that stores large amount of information and process it at very high speed
- The computer is interrogated by a human via a teletype It passes if the human cannot tell if there is a computer or human at the other end
- The ability to solve problems
- 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

Importance of AI

- **Game Playing**

  You can buy machines that can play master level chess for a few hundred dollars. There is some AI in them, but they play well against people mainly through brute force computation--looking at hundreds of thousands of positions. To beat a world champion by brute force and known reliable heuristics requires being able to look at 200 million positions per second.

- **Speech Recognition**