17C010 ARTIFICIAL INTELLIGENCE

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Course Description and Objectives:

To familiarize students with Artificial Intelligence techniques for building well engineered and efficient intelligent systems. Pattern-directed inference systems and different types of truth maintenance systems will be discussed in length from both theoretical and applied point of view. Some cutting edge applications of these systems will also be discussed. Introduction to Artificial Intelligence Programming using Prolog will be provided to help students with the programming part of the course.

Course Outcomes:

Upon completion of this course, student should able to :
- ✓ Understand the basic concepts of search techniques in intelligent systems and game playing.
- ✓ Represent facts in propositional and first order logic and deduct the new sentence from old sentences.
- ✓ Formulate the planning problem as search problems and construct planning graph.
- ✓ Understand the concept of rule based system(expert system) and importance of knowledge in decision support systems.
- ✓ Understand the different types of learning concepts and construct the decision tree

Skills
- ✓ Apply the search techniques and gaming concepts
- ✓ Explore the facts and apply the inference mechanism
- ✓ Formulate the planning problem as search problem
- ✓ Understand the concepts of expert systems.
- ✓ Solving the different types of learning.

UNIT – I
Artificial Intelligence Introduction: Artificial Intelligence Agents, Problem Solving, Solving Problems by searching, informed Search Methods, Game Playing.

UNIT - II
Knowledge and reasoning: Agents that Reason Logically, First Order Logic, Building a Knowledge Base.

UNIT - III
Logical Reasoning Systems: Acting Logically, Practical planning. Planning and Acting.

UNIT - IV
Uncertain knowledge and reasoning: Uncertainty, Probabilistic Reasoning System, Making Simple Decisions

UNIT - V
Learning: Learning from Observations, Learning in Neural and Belief Networks, Reinforcement learning, Knowledge in Learning.

TEXT BOOKS :
1. Stuart J. Russell and Peter Norvig, "Artificial Intelligence A Modern Approach" Second Edition, Pearson Education.

REFERENCE BOOKS:
1. Jeff Heaton, "Artificial Intelligence for Humans", Volume 1:
2. Ivan Bratko , "Fundamental Algorithms by Prolog Programming for Artificial Intelligence", 4th Edition, AddisonWesley, 2011
3. Saroj Kaushik, "Logic And Prolog Programming", first edition, 2002

Activities

✓ Solve the 8 puzzle Problem-using A* algorithm in Prolog.
✓ Write a program in prolog to solve Tower of Hanoi by using AO* algorithm
✓ Write a program to develop TIC-TAC-TOE game.
✓ Write a program using variables in Prolog. Write a Prolog program containing facts related to following predicates
  - Location (city, state)
  - Stays (person, city)
  - Display: (i) list of person, state and city (ii) Given person staying in which state.
✓ Write a program to implement Sussman Anomaly problem, In the problem, three blocks (labeled A, B, and C) rest on a table. The agent must stack the blocks such that A is atop B, which in turn is atop C. However, it may only move one block at a time.
✓ Write Prolog program of water jug problem.
  - Given a 4 - liter jug filled with water & an empty 3 - liter Jug, how can one obtain exactly 2 liters in 4 liters jug. There is no measuring mark on any of them.
✓ 7. Write a program to implement Missionaries and Cannibals problem.
  - There are three missionaries and three cannibals on the left bank of a river. They wish to cross over to the right bank using a boat that can only carry two at a time. The number of cannibals on either bank must never exceed the number of missionaries on the same bank, otherwise the missionaries will become the cannibals' dinner! Plan a sequence of crossings that will take everyone safely across.