CS 3011: Artificial Intelligence

Introduction

Instructors: Dr. Durgesh Singh

CSE Discipline, PDPM IIITDM, Jabalpur -482005

Evaluation Scheme	Quiz I (10%), Mid-Term (20%), Quiz II (10%), End term (40%), Project (20%)

Learning Objective : The students will understand the principles and development of artificial intelligence. They will also learn its many applications in different areas.

Course Details:

Module 1: Overview: foundations, scope, problems, and approaches of AI, Intelligent agents: reactive, deliberative, goal-driven, utility-driven, and learning agents, Artificial Intelligence programming techniques. Problem-solving through Search: forward and backward, state-space, blind, heuristic, problem-reduction, A, A*, AO*, minimax, constraint propagation, neural, stochastic, and evolutionary search algorithms, sample applications. **[10H]**

Module 2: Knowledge Representation and Reasoning: ontologies, foundations of knowledge representation and reasoning, representing and reasoning about objects, relations, events, actions, time, and space; predicate logic, situation calculus, description logics, reasoning with defaults, reasoning about knowledge, sample applications. Planning: planning as search, partial order planning, construction and use of planning graph. **[10H]**

Module 3: Representing and Reasoning with Uncertain Knowledge: probability, connection to logic, independence, Bayes rule, bayesian networks, probabilistic inference, sample applications, Decision-Making: basics of utility theory, decision theory, sequential decision problems, elementary game theory, sample applications. **[10H]**

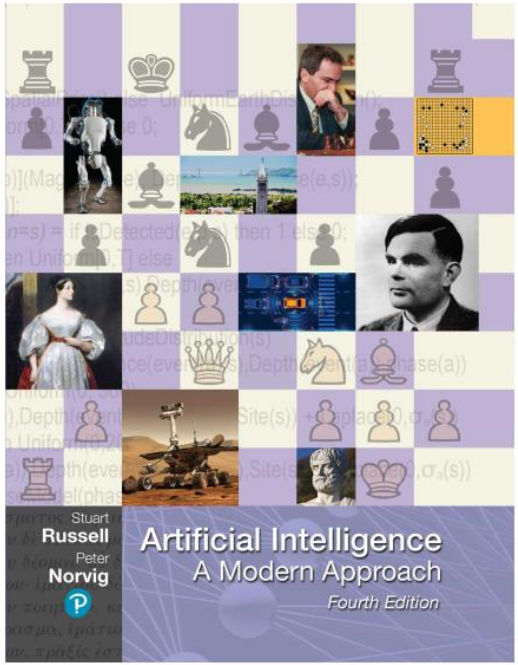
Module 4: Machine Learning and Knowledge Acquisition: learning from memorization, examples, explanation, and exploration, learning nearest neighbour, naive Bayes, and decision tree classifiers, Q-learning for learning action policies, applications, Sample Applications of AI. **[10H]**

Text/Reference books:

1. N. J. Nilsson, Artificial Intelligence-A Modern Synthesis. Palo Alto: Morgan Kaufmann, 1998.

Textbook

- **Russell & Norvig, Artificial Intelligence: A Modern Approach, 4th Ed.**



- Teaching Assistant
  - Mr. Bhagvan Krishna Gupta (Research Scholar, CSED)

- Project work (20 Marks)
  - In the group of at most 5 students
  - Mid Term evaluation (5 Marks)
  - End Term evaluation (15 Marks)

Introduction

- **Intelligence** is so important to humans, and we have been tried to understand '*how we think and act* ' for thousands of years.
- Currently, we do not completely understand '*how we think and act*'

  — that is, how our brain can perceive, understand, predict, and manipulate a world far larger and more complicated than itself.
- The field of **artificial intelligence, or AI**, is concerned with not just understanding but also building intelligent entities.
- AI currently encompasses a huge variety of subfields, ranging from the general (learning, reasoning, perception, and so on) to the specific, such as playing chess, proving mathematical theorems, writing poetry, driving a car, or diagnosing diseases.
- AI is relevant to any intellectual task, and it is truly a universal field.

Some Definition of Artificial Intelligence (AI)

- Artificial intelligence leverages computers and machines to mimic the problem-solving and decision-making capabilities of the human mind.
- Artificial intelligence (AI) makes it possible for machines to learn from experience, adjust to new inputs and perform human-like tasks.
- Most AI examples that you hear about today – from chess-playing computers to self-driving cars – rely heavily on deep learning and natural language processing.
  - Using these technologies, computers can be trained to accomplish specific tasks by processing large amounts of data and recognizing patterns in the data.

Note: Machine learning is a subfield of AI that studies the ability to improve performance based on experience. Some AI systems use machine learning methods to achieve competence, but some do not.