

Course Name: Intelligent Agents

Course Code: CCS 421

Credit Units 3

Pre-requisite: CCS 329

Purpose of the Course

To explore the idea that computers can be programmed to emulate "human-like" intelligence in solving the problems in the Real-world.

Expected Learning Outcomes

On completion of this module the students shall be able to:

1. Explain basic principles and applications of Artificial Intelligence.
2. Describe the design and implementation of intelligent agents.
3. Develop simple AI programs.
4. Apply methods used in AI programs to make the program behave intelligently in particular heuristic planning.

Course Content

Fundamental concepts: Definition of artificial intelligence (AI). Brief history of AI. Approaches to AI: Turing test approach; cognitive modeling approach; "laws of thought" approach; and rational agent approach. Common applications of AI. The nature of typical problems to which AI is applied. Principles of agency: Agent-environment loop. Interaction between an agent and its environment. Functional components of an agent: sensors, agent program and actuators. Characterization of environments. Definition of a rational agent. Characteristics of a rational agent. Factors that determine rationality. Basic types of agents: reflex agents, model-based agents, goal-based agents, utility-based and learning agents. Reactive agents: Table look-up implementation. Rule-based implementation. Advantages and limitations of reactive agents. Practical examples and applications of reactive agents. Goal-based agents: Principles of goal-driven agency. Applications: problem-solving by searching, constraint satisfaction and planning. Search methods. Knowledge-based agents: Propositional and predicate calculi. Representation of knowledge. Reasoning. Knowledge-based systems. Learning agents: The rationale for machine learning. The architecture of a learning agent. Forms of learning. Utility-based agents: Concept of utility agency. Comparison of utility agency and goal-based agency. Basis of utility theory. Utility functions. Multi-attribute utility functions. Applications of utility-based agents. Applications: Web-based agency. Applications in robotics.

Laboratory component: 3 hours per week.

Mode of delivery

Directed reading, practical demonstrations of typical computing systems.

Assessment	Type	Weighting (%)
	Examination	70
	Continuous Assessment	30
	Total	100

Core Reading Material for the course

1. "Artificial Intelligence: A modern Approach," 3rd Edition, Stuart Russell and Peter Norvig, Prentice Hall, ISBN 860-1419506989
2. "Artificial Intelligence," 3rd Edition, Winson P.H, Addison Wesley, ISBN 978-0201533774
3. "Programming in prolog," 2nd Ed, Bratko I, Addison Wesley, ISBN 0201416069
4. "A Guide to Intelligent Systems," Negnevitsky, M. Addison Wesley, ISBN 978-1408225745
5. "Artificial Intelligence, an Engineering Approach," Robert S.F, McGraw Hill, ISBN 978-0071009324

they are employed unconsciously by authors (Anwar et al., 2019; Castro-Castro et al., 2019.; Sari, 2018; Koppel & Schler, 2004). An overview of most frequently used syntactic features is given in table 1.2.

Table 1. 2: List of Syntactic Features

Feature Type	Examples
Syntactic Features	Part of speech tags
	Punctuations
	Functional words
	Verbal phrases
	Frequencies of part of speech pair
	Frequencies of Punctuations
	Punctuational Frequency
	Syntactically classified punctuation
	Frequency of word pairs
	Stop words

Structural features are used to define the general document organization by individual authors (Elmanarelbouanani & Kassou, 2014). They include features like length of sentences in a