

CS639 Artificial Intelligence

Objective

- To learn symbolic knowledge representation to specify domains .
- To analyse how a particular inference algorithm works on a given problem specification.
- To Understand the conceptual and computational trade-offs between the expressiveness of different formal representations.

Unit I

Search: Problem representation; State Space Search; A* Algorithm and its Properties; AO* search, Minimax and alpha-beta pruning, AI in games.

Unit II

Logic: Formal Systems; Notion of Proof, Decidability, Soundness, Consistency and Completeness; Predicate Calculus (PC), Resolution Refutation, Herbrand Interpretation, Prolog.

Unit III

Knowledge Representation: PC based Knowledge Representation, Intelligent Question Answering, Semantic Net, Frames, Script, Conceptual Dependency, Ontologies, Basics of Semantic Web.

Unit IV

Learning: Learning from Examples, Decision Trees, Neural Nets, Hidden Markov Models, Reinforcement Learning, Learnability Theory.

Uncertainty: Formal and Empirical approaches including Bayesian Theory, Fuzzy Logic, Non-monotonic Logic, Default Reasoning.

Unit V

Planning: Blocks World, STRIPS, Constraint Satisfaction, Basics of Probabilistic Planning.
Advanced Topics: Introduction to topics like Computer Vision, Expert Systems, Natural Language Processing, Big data, Neuro Computing, Robotics, Web Search.

Text Book

1. Stuart J. Russel, Peter Norvig, Artificial Intelligence: A Modern Approach (3rd ed.). Upper Saddle River: Prentice Hall, 2010.

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References

1. N.J. Nilsson, Principles of Artificial Intelligence, Morgan Kaufmann, 1985.
2. Malik Ghallab, Dana Nau, Paolo Traverso, Automated Planning: Theory & Practice, The Morgan Kaufmann Series in Artificial Intelligence, 2004.
3. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2006.
4. Mark Stefik, Introduction to Knowledge Systems, Morgan Kaufmann, 1995.
5. E. Rich and K. Knight, Artificial Intelligence, Tata McGraw Hill, 1992.

Outcomes

- Analyze a problem, and identify and define the computing requirements appropriate to its solution.
- Use and apply current technical concepts and practices in core computing and information technologies.
- Design, implement, and evaluate computer-based systems, processes, components, and programs both in teams and individually to meet desired outcomes.