CSC 555 - ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS

CREDIT HOURS: 3
PREREQUISITES: Graduate Standing and Nine Advanced Hours of CSC
GRADE REMINDER: Must have a grade of C or better in each prerequisite course.

CATALOG DESCRIPTION

Use of computers in problem solving involving information representation, searching, theorem proving, and pattern matching with substitution. Methods for knowledge representation, searching, spatial, temporal and common sense reasoning, and logic and probabilistic inferencing. Applications in expert systems and robotics.

PURPOSE OF COURSE

To introduce basic concepts and techniques of artificial intelligence and provide insights into active research areas and current applications.

EDUCATIONAL OBJECTIVES

The goal of this course is to have students develop concepts and skills associated with problems that are classified as requiring intelligence for their solution. These problems require solution strategies that use searching, pattern matching, knowledge representation, machine learning, reasoning, uncertainty, and the ability to perform “common sense” processing. Evaluation will be based on successful completion of laboratory assignments, performance on homework, and analysis of exam responses. Specific skills include:

1. Demonstrate knowledge of the issues, concerns, and problem in computationally solving problems that are usually solved by humans.
2. Develop skills in problem analysis and solution design where searching, pattern matching, and substitution are the primary tools.
3. Apply analysis techniques to logic problems using propositional calculus and predicate calculus.
4. Explore artificial intelligence applications including, production systems, expert systems, robotics, natural language processing, and computer vision.
5. Expand problem solving techniques to include spatial, temporal, qualitative, and common sense reasoning.
6. Enhance problem solving by programming in symbolic manipulation languages including LISP and Prolog.
7. Discuss active research areas and examples.

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<td>Overviews of Artificial Intelligence, History, Approaches, and Debates.</td>
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Introduction to a symbolic manipulation language (LISP) .................................................. 3

Knowledge Representation and Issues ................................................................. 3
   Notational systems
      Trees, graphs, hierarchies, propositional and predicate logics, frames, semantic networks, constraints,
      conceptual dependencies, database, knowledge discovery in databases (KDD)

Search ............................................. 8
   State-space representations
      Depth-first, breadth-first, heuristic search
   Production systems, planning and game playing

Logical Reasoning ............................................. 8
   Predicate Calculus resolution, completeness, and strategies
   Unification, Prolog, monotonic and non-monotonic reasoning

Probabilistic Reasoning ......................................................... 3
   Probabilistic inference networks
   Fuzzy inference rules, Bayesian rules, SCF, Dempster-Shafer Calculus

Learning ................................................................. 2
   Knowledge acquisition, classification rules, self-directed systems

Planning and Common Sense Reasoning ......................................................... 3
   Robot actions, strips, triangle tables, case-based reasoning, spatial and temporal formalisms.

Neural networks/Social ......................................................... 3
   Principles, biological analogies
   Training (techniques and errors)
   Recognition
   Genetic algorithms

Expert Systems ......................................................... 3
   Organization, tools, limits, examples

Robotics ......................................................... 3
   Behavioral control, navigation

Exams ......................................................... 3

TOTAL 45

REFERENCES


