

COMP 4200 – Expert Systems

Calendar Description: Organization of expert systems; knowledge representation in expert systems; inference; knowledge engineering; tools for building expert systems; limitations of expert systems.

Prerequisite: COMP 3190

Outline

- 1) Introduction (1 week)
What is expertise? Introduction to expert systems; advantages and disadvantages of expert systems
- 2) Logical Foundations (1 week)
First-order logic; Prolog; limitations of FOL and Prolog
- 3) Rule-Based Systems (1 week)
Representation, inference (pattern matching), JESS expert system shell
- 4) Uncertainty (1week)
Types of uncertainty, representing defaults, defaults and frame-based representations
- 5) Uncertainty (1week)
Representation and manipulation of certainty factors
- 6) Uncertainty (1week)
Fuzzy logic: crisp values, fuzzy values and fuzzy sets
- 7) Inference (1 week)
Rete pattern-matching algorithm; conflict resolution: salience; refractory period; recency; specificity
- 8) Case-based reasoning (1 week)
Fundamentals of CBR; comparison of rule-based and case-based systems
- 9) Expert-System Development Lifecycle (1 week)
Rapid prototyping, knowledge acquisition techniques
- 10) Verification and Validation (1 week)
Validation of knowledge bases; verification using solved problems
- 11) Business Rules (1 week)
Representing business knowledge in a declarative form; business-rule systems
- 12) Seminars (1 week)
Class seminars
- 13) Other Topics (1 week)
Human factors; liability issues

Text: Peter Jackson, *Introduction to Expert Systems*, Third Edition.

Note: Specific topics may vary depending on the instructor.