Information Systems
ISM 3011

Fall 2003
Unit 11A

Assignment for Next Class

- Read and prepare case studies 1, 2, and 3 (p. 494 – 496).

Specialized Business Information Systems

Chapter 11

Principles and Learning Objectives

- Artificial intelligence systems form a broad and diverse set of systems that can replicate human decision making for *certain* types of *well-defined problems.*
  - Define the term artificial intelligence and state the objective of developing artificial intelligence systems.
  - List the characteristics of intelligent behavior and compare the performance of natural and artificial intelligence systems for each of these characteristics.

Principles and Learning Objectives

- Expert systems can enable a novice to perform at the level of an expert but must be developed and maintained very carefully.
  - List the characteristics and basic components of expert systems.
  - Identify at least three factors to consider in evaluating the development of an expert system.
  - Outline and briefly explain the steps for developing an expert system.
  - Identify the benefits associated with the use of expert systems.

Principles and Learning Objectives

- Virtual reality systems have the potential to reshape the interface between people and information technology by offering new ways to communicate information creatively.
  - Define the term virtual reality and provide three examples of virtual reality applications.

An Overview of Artificial Intelligence

The Nature of Intelligence

- Learn from experience & apply the knowledge
- Handle complex situations
- Solve problems when important information is missing
- Determine what is important

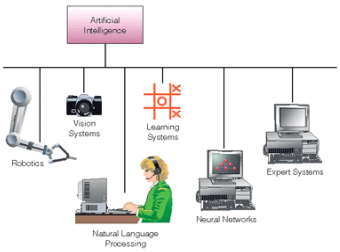
The Nature of Intelligence

- React quickly & correctly to new situations
- Understand visual images
- Process & manipulate symbols
- Be creative & imaginative
- Use heuristics

The Difference Between Natural and Artificial Intelligence

Attributes	Natural Intelligence (Humans)	Artificial Intelligence (Machine)
The ability to use senses (eyes, ears, touch, smell)	High	Low
The ability to be creative and imaginative	High	Low
The ability to learn from experience	High	Low
The ability to be adaptive	High	Low
The ability to afford the cost of acquiring intelligence	High	Low
The ability to use a variety of information sources	High	High
The ability to acquire a large amount of external information	High	High
The ability to make complex calculations	Low	High
The ability to transfer information	Low	High
The ability to make a series of calculations rapidly and accurately	Low	High

The Major Branches of Artificial Intelligence



An Overview of Expert Systems

Characteristics of an Expert System

- Can display "intelligent" behavior
- Can draw conclusions from complex relationships
- Can explain their reasoning or suggested decisions
- Can provide portable knowledge
- Can deal with uncertainty

Characteristics of an Expert System

- Limited to relatively narrow problems
- Cannot readily deal with "mixed" knowledge
- Possibility of error
- Cannot hardly its own knowledge
- May have high development costs
- Raise legal and ethical concerns

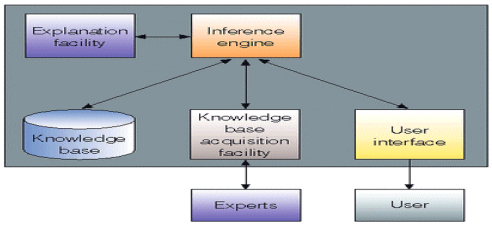
Capabilities of an Expert Systems

- Strategic goal setting
- Planning
- Design
- Decision-making
- Quality control and monitoring
- Diagnosis

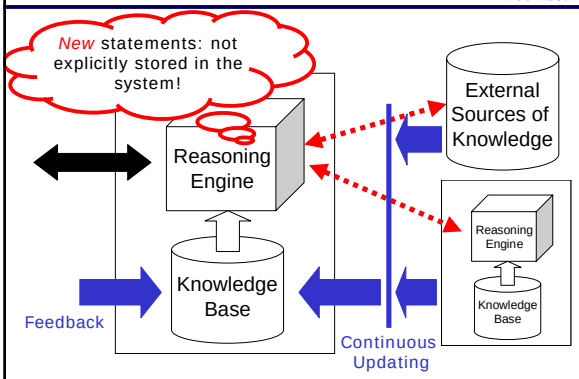
Components of an Expert System

FIGURE 11.3

Components of an Expert System



Not just Database Queries!



When to Use Expert Systems

- High payoff
- Preserve scarce expertise
- Distribute expertise
- Provide more consistency than humans
- Faster solutions than humans
- Training expertise

The Use of Rules

Mortgage Application for Loans from $100,000 to $200,000

If there are no previous credit problems and

If monthly net income is greater than 4 times monthly loan payment and

If down payment is 15% of the total value of the property and

If net assets of borrower are greater than $25,000 and

If employment is greater than three years at the same company

Then accept loan application

Else check other credit rules

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FIGURE 11.5
Rules for a Credit Application

Inference Engine

- Backward chaining
  Starting with conclusions and working backwards to the supporting facts
- Forward chaining
  Starting with the facts and working forward to the conclusions

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The Knowledge Acquisition Facility

FIGURE 11.6
The knowledge acquisition facility acts as an interface between experts and the knowledge base

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Expert Systems Development

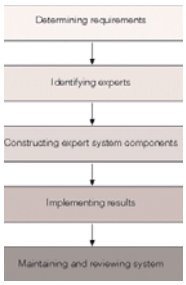

FIGURE 11.7
Steps in the Expert System Development Process

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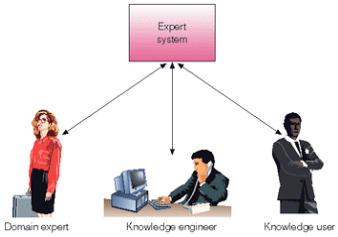
Participants in Developing and Using Expert Systems



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Domain Experts

- Recognize the real problem
- Develop a general framework for problem solving
- Formulate theories about the situation
- Develop and use general rules to solve a problem
- Know when to break the rules or general principles
- Solve problems quickly and efficiently

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Expert Systems Development Tools and Techniques

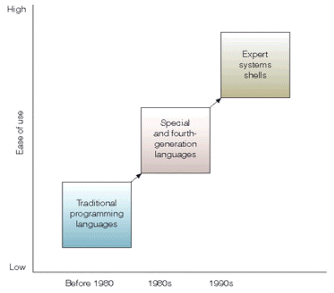

FIGURE 11-9

Software for expert systems development has evolved greatly since 1980, from traditional programming languages to expert system shells.

Applications of Expert Systems and Artificial Intelligence

- Credit granting and loan analysis
- Stock picking
- Catching cheats and terrorists
- Budgeting

Thank you!

Any questions? Please send an e-mail to mhepp@computer.org!

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