

Expert Systems

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Cognitive-Decisions



Who would you want with you

- During an exam on US Constitution?
 - *Thomas Jefferson*
- While making candy?
 - *Fannie Farmer*
- While driving down I-85?
 - *Bill Elliott*

What do they have in common?

- They are experts
- Each in their own field
- Each has information
- Each has knowledge
- Knows what to do in given situation

Other places where expert would be helpful

- Investing
- Math test
- Medical
- Homework
- Social interactions
- Much more
- Insurance
- Car repair
- Car purchase
- Real Estate
- Retirement planning

Imagine:

- You take your car in for repairs, but the mechanic can't figure it out
- You go to doctor, but he doesn't know what it is
- Your bread doesn't rise, but you don't know why
- You can't figure out how to do a homework problem

What do they have in common?

- An expert would help solve the problem
- The more knowledge that the expert had, the more help it would be
- The more organized the information is, the easier it would be to find it

Enter the Expert System

- A program that stores knowledge from experts
- Knowledge about a specific topic
- Organized
- Can help direct
- Can answer questions

The Knowledge

- Stored in rules
 - If Then type
 - Antecedent – the **if** part
 - Consequent – the **then** part
- Examples:
 - **If** snowing outside **then** wear warm coat
 - **If** have exam **then** must study
 - **If** gas gauge on E **then** stop at service station

What is required?

- The program
- The computer programmer
- The Expert who has the knowledge
- The knowledge engineer
 - Usually psychologist
 - Gets knowledge from expert and gives to programmer

Examples

- Mycin
 - Famous project by Gordon & Shortliffe
 - For determining infectious blood diseases
- E-Mycin
 - Empty Mycin program
 - Shell for expert system
- Tieresius
 - Investment program

Advantages

- Knowledge Based
- Works without expert present
- Consistent performance
- Can explain why (very major point)
- Rules can easily be added
- Rules can easily be modified

Disadvantages

- Does not learn
- Requires an expert
- Requires a knowledge engineer
- Must have rules for all possibilities
- Contains bias of expert

Future

- Rules obtained from other sources
- Case Based Reasoning
- Rules exported to other uses

References

- *Intelligent Decision Support Methods*, Dhar & Stein
- *Intelligent Decision Systems*, Holtzman
- *Expert Systems*, Harmon & King
- *Expert Systems for Business*, Silverman
- *Expert Systems*, Giarratano & Riley
- *Expert System Technology Development & Application*, Keller

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