Knowledge Acquisition Tool through Network (KATTN)

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Abstract:

The network allows people at remotely located sites to communicate and share their ideas using common communication protocol. The main subject of this paper is to introduce a complete development environment for building a knowledge-based applications. It provides a step-by-step methodology knowledge engineering using TCP/IP protocol. Since the cost and performance of the application depend directly on the quality of the knowledge acquired, this tool reduces cost and improves the quality by letting domain experts to build the knowledge base file directly without needing to the knowledge engineer.

Keywords:
Knowledge acquisition, knowledge acquisition tool, production rule, knowledge-based application, knowledge creation.

The Standard Approach to Knowledge Acquisition

In the standard approach to acquiring knowledge, a knowledge engineer consults reference materials, databases, and human experts, sometimes with the help of a machine learning program. We are concerned here with the acquisition of knowledge from people[6,7]. Although there are a number of variations, the standard approach to knowledge acquisition typically involves knowledge engineers interviewing experts or observing them in action, solving sample problems.

- The first thing to note about the standard approach to knowledge acquisition is that, regardless of the variation used to elicit knowledge from the expert, the standard approach is costly because at least two (typically) expensive people are involved, i.e., the domain expert and the knowledge engineer[2,7].

- The second thing to note about the standard approach is that the methods are error prone. Surprisingly, people can't easily say what it is that they do in a manner that can be understood by others. This is mostly due to the fact that skills are usually learned through apprentice-style learning and the small, faltering steps required by the expert during initial learning have long since become

embedded in longer phases of automated behavior, and the constituent steps are no longer readily accessible[7]. Therefore, interpretations of what the expert does say are often faulty and incomplete, sometimes based on rationalizations by the expert of what they think they are doing rather than what they actually are doing. These misinterpretations are often easily committed by psychologists and well-trained knowledge engineers, let alone less well-trained practitioners[4].

- The third thing to note about the standard approach to knowledge acquisition is that it is time-consuming because errors, gaps, and inconsistencies may be difficult to discover, requiring many interactions between experts and knowledge engineers to debug a field-ready application.

Clearly, costs must be reduced, errors eliminated, and development time shortened. One approach is to automate the process by eliminating the domain expert this is the approach adopted by most ***machine learning*** programs. Another approach is to augment or replace the knowledge engineer with a structured methodology for knowledge acquisition this is the approach embraced by **KATTN**.

TCP/IP

The TCP/IP protocol suit has been around since the 1970's and continues to evolve[1,4]. Applications such as Telnet, electronic mail, file transfer all run over or are a part of the TCP/IP protocol suite. TCP/IP was developed to be robust and capable of performing in various network topologies from wired local area networks (LAN) to wireless mobile systems and satellites. Various TCP/IP protocols are reliable protocols and are based on the Transmission Control Protocol (TCP) of the TCP/IP protocol suite. Other TCP/IP protocols are unreliable protocols and are based on the User Datagram Protocol (UDP) of the TCP/IP protocol suite. UDP is an open-loop protocol and will not be considered in this paper. Instead, we will concentrate on the closed-loop Transmission Control Protocol of the TCP/IP suite. From this point on, when we refer to TCP we are referring to the Transmission Control Protocol of the TCP/IP suite[1].

TCP TUNING

The more we know about the network the better we can tune TCP for optimal

performance. For a LFN between high-end workstations [Fig1a], the overall network is usually known (i.e. the transmitting and receiving hosts and the bandwidth of the network)[1,3]. Often, we have control of the routers and switches and may use TCP over ATM to guarantee link quality. Thus, all parameters can be optimized for the known network.

tuned accordingly. The most challenging tuning scenario occurs when nothing of the network is known until the initial connection is made [Fig1c]. After passing through a network cloud, data may pass through a satellite or a wireless link experiencing errors and/or long delays. Thus, unbeknownst to the transmitter and receiver at startup, they are utilizing an error-prone LFN, the characteristics of which can only

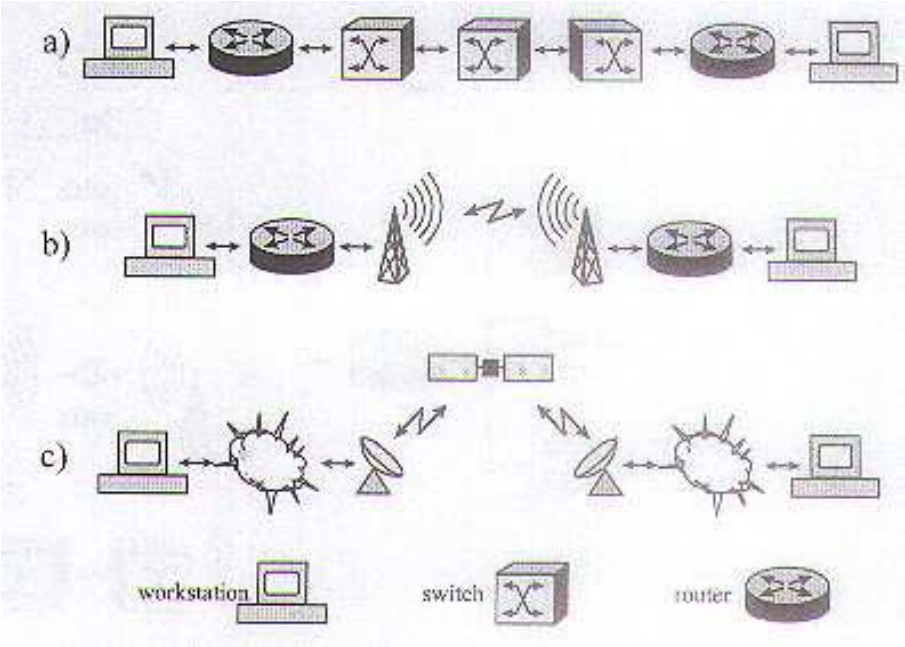


Fig (1)

From a mobile or wireless system that has either the source or sink directly at one end of a wireless link [Fig1b], we very likely know some general characteristics of that portion of the link, characteristics that most likely will dominate the TCP tuning algorithms and can therefore be

be determined after an initial connection has been established.

KATTN System

KATTN System can generate a suitable knowledge base from domain experts

without knowledge engineer interaction. This done by effecting alarm signal as in [fig 2] on the expert client location by development server. The system uses TCP/IP networking protocol for domain expert connection .

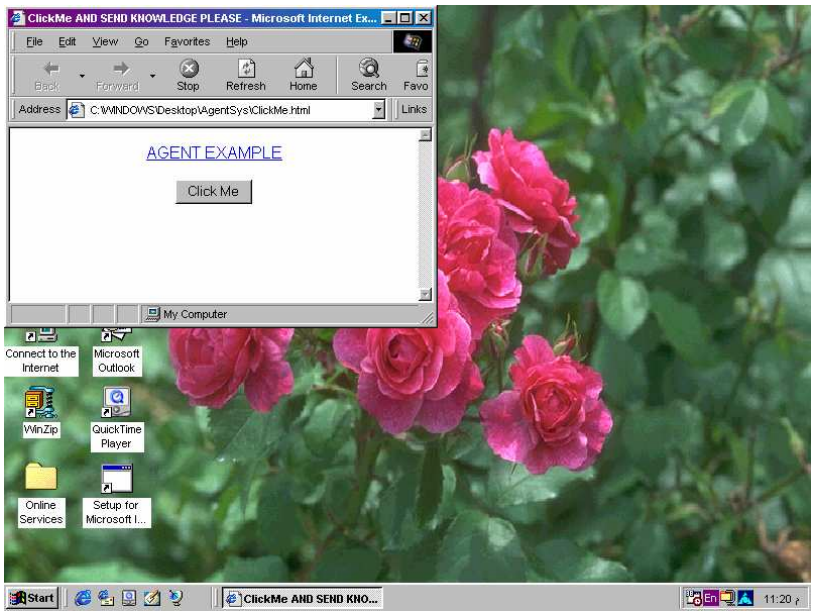


Fig (2) alarm signal for domain expert

After clicking a button we get a menu in [fig 3], and when click create knowledge , the system tall the expert for naming him/here knowledge:

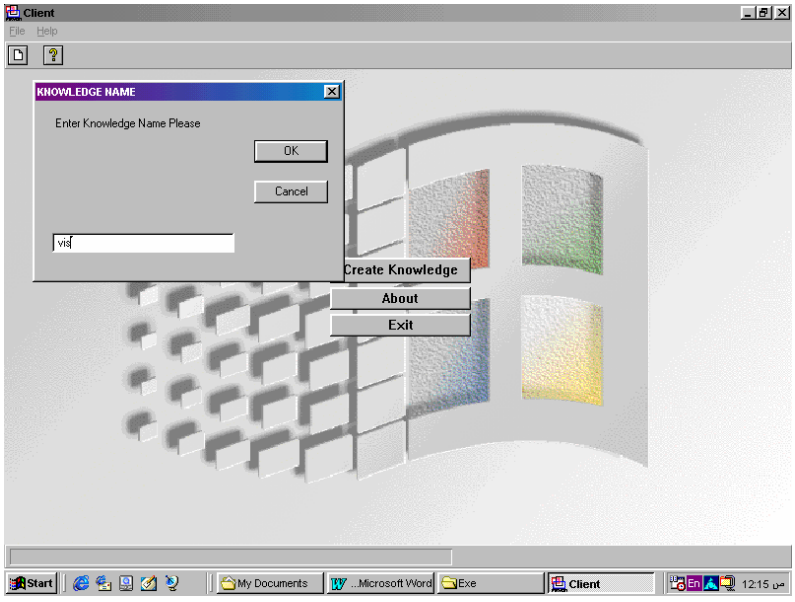


Fig (3) connection form to domain expert

When the domain expert give a knowledge name the system begin ask the expert questions though an expert interfacing form as in [fig 4]:

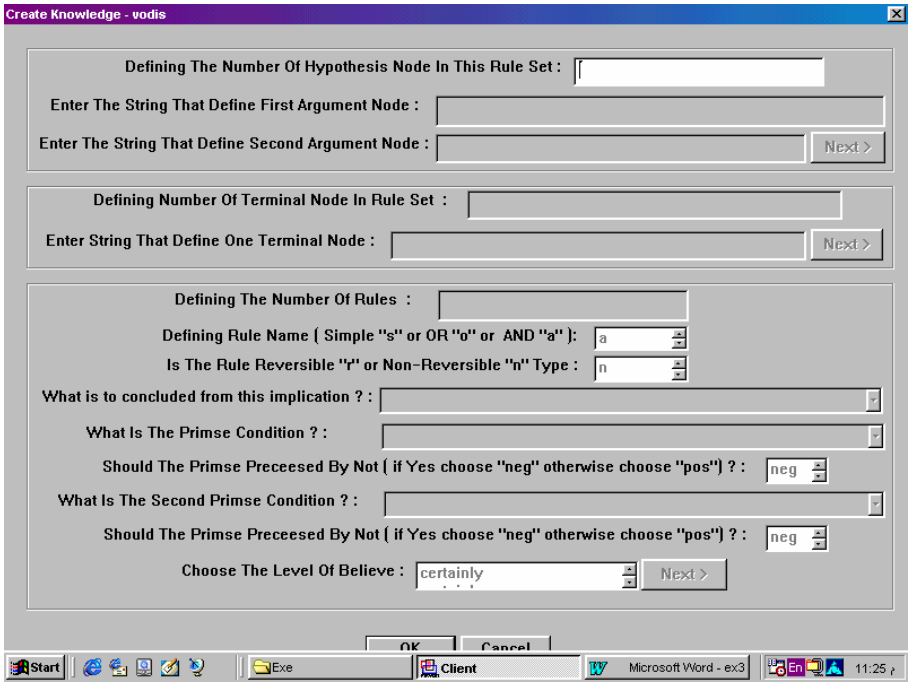


Fig (4) main domain expert interfacing menu

Step by step knowledge generation:

When answering all questions by the domain expert , the system check the registration expert code number to ensure expert authentication. After this the system begin to generate knowledge rules as in the following:

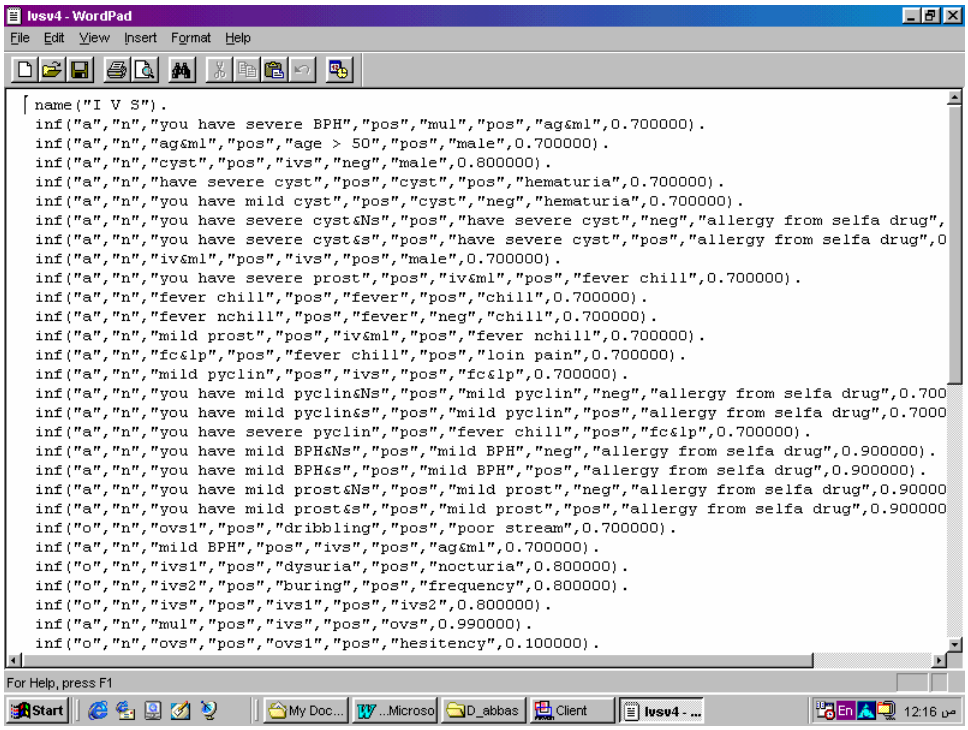
1- If the expert answer taking single condition then the rule type is simple and the system call the rule format of the form : If X Then Y where the condition assigned to X and the conclusion assigned to Y and the natural rule format asserted in the knowledge base file taking the form:

Inf(“s”,”n”,”mild BPH”,”pos”,”fever”,0.600000).

Where *s* represent to the rule type , *n* that this rule nonrecursive, *mild BPH* rule part conclusion, *pos* the sinple condition not negated, *0.600000* rule certainty factor.

2- If the expert answer having two conditions connected by AND, the system call rule format of the form : If X and Y Then Z , where X and Y

assigned to first and second condition respectively, and Z assigned to rule conclusion part. The natural rule format asserted in the knowledge base file taking the form:
inf(“a”,”n”,”you have sever BPH”,”pos”,”mul”,”pos””ag&ml ”,0.70000)



Fig(5) sample of knowledge base file (UROLOGY)

the difference between the simple rule and the AND rule that AND rule having two condition , so the rule argument numbers become eight instead of sex in simple.

3- If the expert’s answer including two conditions having OR type, the system call rule format of the form : If X or Y Then Z , where X and Y assigned to first and second conditions respectively, and Z assigned to rule conclusion part. The natural rule format asserted in the knowledge base file taking the form:
inf(“o”,”n”,”ivs1”,”pos”,”dysuria ”,”pos”,”nocturia”,0.800000).

4- The system can generated the goal nodes from hypothesis where the domain expert suggested.

5- Also the system generate the terminal nodes which represent leaf nodes in the knowledge base tree which become sequence of questions to the end user through a consultation with knowledge-based applications.

Sample of knowledge acquired in medical diagnosis (UROLOGY) shows in [fig 5]:

Conclusions:

- The quality, accuracy, and performance of knowledge acquired using this tool is more powerful than gathered by knowledge engineer.
- The System provide a way to generate a fast knowledge base files in different domains.
- The knowledge acquired in this tool can be updated at any time with lower cost.
- If we can use an expert system development tool (expert system shell) with this system , then we can generate and maintain expert systems in different domains at any time.

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