Crosstalk

The art of artificial intelligence

The term artificial intelligence (AI) has been bandied around scientific and engineering communities for several years, but it is only recently that the fruits of a worldwide research programme into its possibilities have begun to appear.

Communication between researchers and potential users is vital in such a situation, and to aid this Texas Instruments has decided to hold a satellite symposium on the subject on a yearly basis. This year's symposium, the third such affair, concentrated on recent and future developments by interviewing users, manufacturers and research workers, and on stimulating panel discussions on both sides of the Atlantic.

Several major companies have already developed rule-based AI systems for both internal and external use. Such systems take knowledge from reference books and convert it to computer form for easier access, increasing productivity by a factor of between 10 and 100. General Motors, for example, is currently working on an engine diagnostic system, called Engine, which it intends to use in its service department, and a similar diagnostic system for drive-chain components called Vibration.

Numerous applications

These systems are not expert systems in that they do not take knowledge from human experts directly, but they are finding numerous applications in a wide variety of fields because they enable staff to increase their speed of working by doing away with the need to plough through textbooks to find the answer.

According to American experts, rule-based diagnostic systems should become fairly standard in general instrumentation during the next 5-7 years, but systems based on human expert knowledge are still some way off. Problems with expert systems arise because of the difficulties involved in acquiring the information from the expert and in making that information easily accessible to the system user. Natural-language interfaces are attempting to alleviate the second of these problems.

Natural language

Natural-language interfaces are based on the concept of using English, or the user's native spoken language, to interface with a computer. In the 1970s such interfaces were expected to become the great success of AI, but this has not happened, basically because the products just have not appeared on the market.

One of the reasons for this is that there appears to be a lot of resistance among users to natural-language systems: they simply do not believe in them, which makes them extremely difficult to sell. However, where systems have been installed, they have met with approval from staff.

There are two main types of natural-language interface available at present: those based on menus, whereby the user is given the system vocabulary limitations on screen, and those where the user has to discover what questions the computer will respond to by trial and error. The US Navy has been using a system called Fresh that has both interfaces, and it appears from its experience that, although the menu-based interface is slightly more difficult to use, it does eliminate problems caused by bad typing and spelling

Narrow constraints

All in all, despite some evidence to the contrary, AI research is progressing at a steady rate. Systems that work within narrow constraints are available now, but more general-purpose systems are very difficult to produce and will probably not be around *en masse* in a workable form for several years.

However, in the meantime, there are several expert-system shells already on the market for use on personal computers like the IBM and Apple, and experts all over the world think it essential that users acquire some experience on these systems so that they are used to the expert-system environment when AI systems become more commonplace.

GLENIS MOORE

The origins of espionage

Intelligence gathering is as old as civilisation. From the beginning of recorded history nations have employed spying and covert action to further national policies. The Bible has many references to spies that were sent to infiltrate enemy camps and cities to determine military strength and vulnerability. The ancient Egyptians, whose empire covered large areas of the Middle East, were experts in military and diplomatic spying which they used to control the neighbouring kingdoms. The Assyrians and the Persians added communications capability in the form of an extensive road network and established 'secret services' to gather internal and external intelligence concerning the state of the realm and the intentions of powerful neighbours. These eastern despots found such services essential to their survival.

Classical tradition

The Greeks and Romans were much more haphazard in their use of espionage. The Greeks in particular never developed a central intelligence organisation even though they knew about the Persian system. They understood the need for secrecy in military operations, mail was censored and battle plans were not promulgated until the last possible moment, but they were often lax in the use of scouts and long-range patrols to check on the status of enemy forces and warn of danger to bases and lines of communication.

The Romans, although noted for their organising ability, were surprisingly slow in establishing an intelligence service. The leaders of the republic rarely used spies and relied on friendly neighbours to warn them of the approach of hostile armies. Sometimes there was no warning or the warning was ignored and Rome came close to being destroyed. In the days of the Empire when the borders were extensive and distant the Romans sometimes placed special agents in allied nations but usually relied on 'fides Romana' (fidelity to Rome) of their client states to keep them out of trouble.

Frumentarii and Agentes Rebus

In the second century AD a secret police service was established. It was known as the 'frumentarii' and was formed from the military supply organisation. The original functions of grain distribution were changed to those of message carrying, tax collection, and maintenance of internal security. The members of the service derived their powers from the emperor, they supplied him with information on the state of the realm and on any illegal or subversive activities there.

The opportunities for corruption were great and the abuse of power became so blatant that the organisation was eventually disbanded and replaced by a civilian operation called 'agentes in rebus' whose members were distributed throughout the Roman bureaucracy to observe and spy on officials at all levels.

It is noteworthy that in spite of the example set by the eastern empires Rome never developed an effective intelligence system. The spying activities that existed were directed at the Roman populace by despotic and corrupt emperors rather than against the enemies that eventually destroyed the Empire.

J.E. BOARD