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# COMPUTERS IN THE PROFESSIONS

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## INTRODUCTION

Since its inception, computers have been applied in a great many areas and in diverse fields. The number of applications run into thousands[2] and many more are added every week. However, the potential of computers as information processing machines has not yet been fully realized. The aim of this paper is to present some novel applications/uses of computers in a few selected professions. The Webster's Dictionary defines a profession as follows[7]:

(a) a vocation or occupation requiring advanced training in some liberal art or science, and usually involving mental rather than manual work, as teaching, engineering, writing, etc.; especially, medicine, law, or theology (formerly called the learned professions).

(b) the collective body of persons engaged in or practicing a particular calling or vocation.

According to the above definition, quite a number of today's employments would be regarded as professions. But can we call academics, research scientists, actuarists, etc., professionals? In a certain sense, they are. Nevertheless, from a purely traditional view point, there are many who would disagree with the above statement. Therefore, in what follows, we shall limit our discussions to the following professions only: accounting, engineering, medicine, law, and teaching.

## Computers and Accounting:

It is beleived that the years between 1958 and 1963 saw the beginning of business computing throughout the world[4]. Since then the majority of the computers installed in offices are working on payroll, routine statistics and accounting. The benefits accrued are timely and accurate information for managerial decision making. The other benefit, of course, is the reduction of clerical duties. Several software houses and computer vendors have written basic accounting packages and their use has become wide-spread. Recently, a few organizations have developed their own computerized financial and management accounting informations systems. These systems extend beyond the basic accounting packages and are, essentially, specialized forms of management information systems (MIS).

## Computers and Engineering:

It is said that the initial applications of computer in any area or discipline is to perform specific computations, or to carry out well-defined processes. Consequently, present day engineers are able to calculate in much more detail than has hitherto been possible, in the design stage. Also, it has been suggested that once the tedium of calculations is delegated to the computer, engineers could use their skills more creatively. A computer technique which is coming to the fore is computer-aided design. Here, the computer is used to design various structures ranging from bridges to super jet planes, computers included. A few typical uses of computers in some engineering disciplines are given in Table 1.

TABLE 1. Some Computer Applications in Engineering

| Discipline | Applications/Uses |
|---|---|
| Chemical engineering | Plant simulation; process control |
| Civil engineering | Structural analysis; project planning, scheduling and control |
| Electrical engineering | Design of motors, electrical circuits |
| Electronic engineering | Design of integrated circuits |
| Industrial engineering | Management techniques |
| Mechanical engineering | Design of gears, springs and other machine parts |
| Production engineering | Process optimisation |

Under each of these disciplines, there are a number of subordinate branches which are themselves gaining prominence, in their own way. One such area is process control. This is a real-time computer application in industrial plants and processes. In these situations, computers are being used for the automatic control of an actual industrial or scientific process. A process control computer performs the following important functions:

(i) control complex or high-speed processes;
(ii) monitor dangerous operations to ensure safety;
(iii) maintain product quality;
(iv) maximise the output;
(v) aid the operators by simplifying the presentations of information.

Examples of this type of computer application abound: steel mills, nuclear reactions, electric power industries, petroleum and chemical processes are typical.

Computers and Medicine:

The use of computers in medical research is well established throughout the world. Vast amounts of experimental data concerning patients could be analysed by the computer to find the probable causes of an unknown disease, or the effectiveness of a certain drug against a particular disease[5], in a matter of seconds! In the more advanced countries, computers are assisting the physicians by presenting them patient history, results of laboratory tests, treatment information and the like. In some areas of medicine, the computer is used in the activity of diagnosing diseases and the success rate is incredible. The skill demonstrated by the computer in the diagnosis is equal to or better than the best physician in that area[9]. Patient and resources allocation by computer is becoming commonplace. Quite recently the Science Digest of Voice of America reported a revolutionary development of computer application in medical technology - the use of computer assisted cartography - in producing a three dimensional X-ray image of any part of the human body. One of the direct applications of this technique is the detection of cancerous tumors thereby reducing the number of costly exploratory surgery cases. The above technique has saved a great deal of surgeons' time as well as millions of dollars. It has also been reported that the computer is used to monitor patients' conditions in the intensive care unit after complicated surgery while its use in the blood and organ matching in contributing significantly to transplant successes[1].

Computers and the Legal Profession:

In legal work computers could be used in searching and retrieving information such as statutes, precedents, and judgements. A recent issue of the Law Reporter noted the following:

> It is difficult to predict when every lawyer will have at his desk a computer terminal or other microprocessing equipment. But, it would provide him with a facility for instant recall of all written legal sources that he would not have matched even on the day of his final examinations. There is no doubt that there is a clear prospect of computer hardware for all[6].

It is a well known fact that trial courts are way behind their schedules. Consequently, a great many people are inconvenienced, for instance, those who cannot pay for their bail. The computer could be used with advantage to schedule magistrates, attorneys and select jurors[3,8]. In crime detection, computers have come to the aid of law-enforcing officers by identifying sets of finger prints and searching large data bases for identification of criminals.

Computers in the Teaching Profession:

Besides their ability for record keeping functions, computers also have instructional applications in education. One of the early applications in this area is the 'drill and practice'. Although, many of the drill and practice exercises have used examples from Mathematics, its use is not limited to Mathematics alone. It has been used in diverse areas, for instance, acquiring skills in reading. Another educational technique which is gaining respectability is computer assisted instruction (CAI). Essentially, CAI works as follows: a unit of information is presented to the participant through the terminal (often a visual display unit). Following this, a question to be answered or a statement to be completed is given. The participant responds to this stimulus. Then the computer evaluates the response and informs the participant whether it is correct or not. If the response is wrong, the participant may also be told why. Next, the second unit of information is presented, and the above process is repeated until the whole lesson is finished. At the end, the computer may give a summary of the participant's performance.

Scheduling of classrooms and assigning of groups of students to tutors by computer are becoming commonplace. At a more higher level, computers have been used in the "tutorial mode". In these situations, the computer is doing the job of a tutor, i.e. teaching. One of the advantages of this technique is that the students can repeat those parts of the course which were troublesome and do this at his or her own pace.

CONCLUDING REMARKS

In the preceding paragraphs we have attempted to highlight some of the areas and applications of computer in the professions. However, the list of examples presented is by no means exhaustive. In libraries, for instance, computerizewd circulation and

retrieval systems are commonplace; computers are increasingly being used in printing and publishing. They have also been used in diverse fields such as literature, archaeology, leisure activity (chess, checkers) etc. With costs of the machines dropping quickly, some industry watchers even predict that by 1990 small computers will become as common as automobiles. These will be used for financial, educational, and informational purposes. By then there is no doubt that there is a clear prospect of computer hardware for all.

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