

# USE OF COMPUTERS IN MEDICAL PRACTICE

Pages with reference to book, From 307 To 309

Syed Ejaz Alam ( PMRC Research Centre, Jinnah Postgraduate Medical Centre, Karachi. )

## **What is a Computer?**

It is a device which makes it possible to process vast amounts of data, and to perform calculations on the stored data at a very high speed; many million operations a second in some modern machines.

## **Types of Computers**

Computers can be classified in a number of ways — by physical size, by data storage capacity, by the task they perform or by their cost. Recently the divisions between types of computers have become more and more arbitrary. Since the most powerful computers may be built up of hundreds of small processors. However, there are three traditional classifications of computers according to their size. They are Main-frame, Mini and Micro computers. The advent of the microcomputers, and especially the development of software for all possible professional uses, has literally revolutionized the practise of medicine. The latest innovations that will make computers indispensable to physicians are the truly portable machines with an easy interface with microcomputers in office or at home and mainframes, mini in hospitals, and the availability of the laser disk for storage of enormous amounts words and data and high fidelity pictures.

## **Hardware**

It is the material component of the computer. Its main parts are:

### **Input:**

Th method of feeding instruction and data into the device. For a simple system the input will be a typewriter-style keyboard.

### **Output**

The basic methods of presenting numbers and words to the user are by printout on a teletype device or by display screen.

### **Central Processing Unit (CPU)**

This is the brain of the computer. It contains necessary electronic components for storing instructions and data, for carrying out arithmetic operations, and for routing the data from place to place within the systems. (eg. from input to store to arithmetic unit, back too store and then to input).

### **Backing Stores**

The CPU contains some fast access memory. However, if the amount of data for a problem or the accumulation of answers is to large to be stored in the fast memory, then there is a need for large capacity backing store where from stored data maybe retrieved. For example Magnetic disk stores.

### **Software**

These are the chains of commands which are critical for the efficient application of computer. A large variety of software packages are of routine correspondence in which duplication of effort is available from a “Software house” for some simple non-technical work such as word processing to scientific purposes such as wave form analysis, curve fitting, and a number of advanced mathematical problems in nuclear science, X-ray diffraction analysis etc. Some of the statistical packages used in Medical practice are Word processing, Spreadsheet, Languages (We will discuss only BASIC language).

10 M = 0	A Variable, M, is specified and put equal to 0.
20 S = 0	Ditto for S
30 Print "Input 10 Ages"	Prints and Instruction to the user.
40 For I = 1 to 10	Starts a loop, lines 50 to 90 will be repeated
50 Input A	This will print a "?" and the program waits until a number is typed in.
60 S = S +	Adds the input value of A to the current value of S.
70 IF A < M go to 90	If the condition is met, the program jumps to line 90.
80 M = A	Puts M equal to the largest number so far.
90 Next I	end of the loop. When I = 10, we go to line 100.
100 X = S/10	Calculate the average age for the 10 put values.
110 Print 'Average Age = ', X	Prints out text then the number
120 Print 'Maximum Age = ', M	
130 Stop	

Word processing makes writing significantly easier and more efficient because the program frees writers to set down their thoughts as they come to mind, knowing that they can make changes quickly and intelligibly. Many professionals believe that word processing has made their writing better because they are able to revise and polish their work at will, and are spared from the burden of retying. This results in clearer and more cost-effective printed communication. Word processing is likely to be one of the most vital capabilities the microcomputer offers. For most professionals, the word processing programs, such as spreadsheets and graphics packages, will need to communicate their results with this program. Word processing software offers features that also make it useful for the generation not an important issue. Through storage on electronic media (particularly floppy and hard disks), word processing of software offers a compact and economical way to store information. With current technology, a floppy disk stores over 300,000 text characters. On the other hand, a typical 8 1/2 x 11

inch sheet of paper can store only approximately 5000 characters at its maximum. A search of atypical 300,000 character floppy disk, which stores approximately 200 single-page letters, takes less than 3 seconds from the issuance of the command until the file has been recalled. Even a well-organized conventional filing system would probably take several minutes to retrieve the same information. In conjunction with word processing software, additional programs can be purchased, such as those which check grammar punctuation, or spelling. These programs can all but eliminate the proofreading process. In particular, spelling programs can give information about the number of words in the manuscript and the number of different types of words and may even correct spellings. To perform this process, spelling programmes maintain a set of dictionaries that are user-created and stored on disk. Usually, the user adds and deletes words from the dictionary after the document has been searched for misspellings. Any word in the document that is not in the dictionary can either be corrected, if it is misspelled, or used to update the dictionary. The rearrangement of sentences and paragraphs is a common need when editing a document. Programs refer to this cutting and pasting process as “block movement”, in which the sentence or paragraph is the block to text. To perform this function, most programs place an identification marker at the beginning and the end of the block. By moving the cursor to the appropriate location and then typing the proper command sequence, the block of text can be moved, copied, deleted, or even moved to a separate file on disk. Simple editing functions that all programs should support are insertions, deletions, and over typing. Editing a document requires functions that allow the user to scroll through the text without necessarily making changes. Screen scrolling and cursor movement are necessary and useful functions that allow a document to be quickly examined and proofread.

### **Spreadsheet**

An electronic spreadsheet is a two-dimensional matrix of cells that make up a grid of rows and columns in many ways, the spreadsheet (Lotus 123/others) resembles a ledger pad. In most programs, the columns of the spreadsheets are labeled with a letter of the alphabet; after “Z” columns are labeled “AA”, “AB”, “AC”, and so on. Likewise, each row is given a number starting with “1”. The letter and numbers appear on the screen across the top of the rows and down the left side of the columns with the system, each cell in the matrix has a unique address. By referring to a cell’s address in a formula, the contents of the cell are accessed and may be used in a calculation. Every cell in the worksheet may contain only one item of information. The information may be a value—either a number or a formula telling how to calculate a number. In many ways, electronic spreadsheets act as programming languages. The user gives the spreadsheet a set of instructions and the spreadsheet executes them. Unlike programming language, spreadsheets are meant to be used interactively so that information can be derived from the instructions instantaneously. Unlike a programming language, most of the instructions like “max” followed by a list of cell addresses will return the maximum value of the contents of those cells. Likewise, the command “average” followed by a range of cell addresses will return the average value. Simpler functions such as addition and subtraction logical boolean operators such as “and”, “or” and “not”, and conditional “if...then” statements are universally supported commands in all spreadsheet programs. By using these commands appropriately, a physician can customize a spreadsheet to any application. The recent availability of built-in statistical functions in some spreadsheets has significantly enhanced their utility to the basic and clinical researcher. The statistical features offered are not extensive however, they usually include mean, standard deviations, standard error, and confidence intervals. Statistical functions, which are a part of the spreadsheet instruction set, prevent mistakes (and wasted effort) when programming these features into a worksheet. Naturally, the presence of these features is not as important to the private physician as it is to those in academic medicine. When setting up a worksheet for a particular application, the contents of cells are continually being revised and additional cells are being added. An important utility that makes this process much simpler is the ability to readily take the contents of some cell (s) and move it to some cell (s) in a different location of the worksheet.

## Languages

A computer can understand only binary codes - a series of zeros and ones. A computer user, however, generally does not know this language. To facilitate the computer users "high level" language such as FORTRAN and BASIC have been developed. Programs are written in one of the "high level" languages. Following is an example of a short BASIC program. It is designed to find the mean and the maximum age of group of 10 people:

Other scientific languages include Algol and PASCAL, each includes programming features that make them particularly suited for certain types of work.

## COMPUTERS IN MEDICINE

At present the most common use of computers in medicine is for statistical calculations and it is one of the most straight forward applications. However, the applications are quite vast.

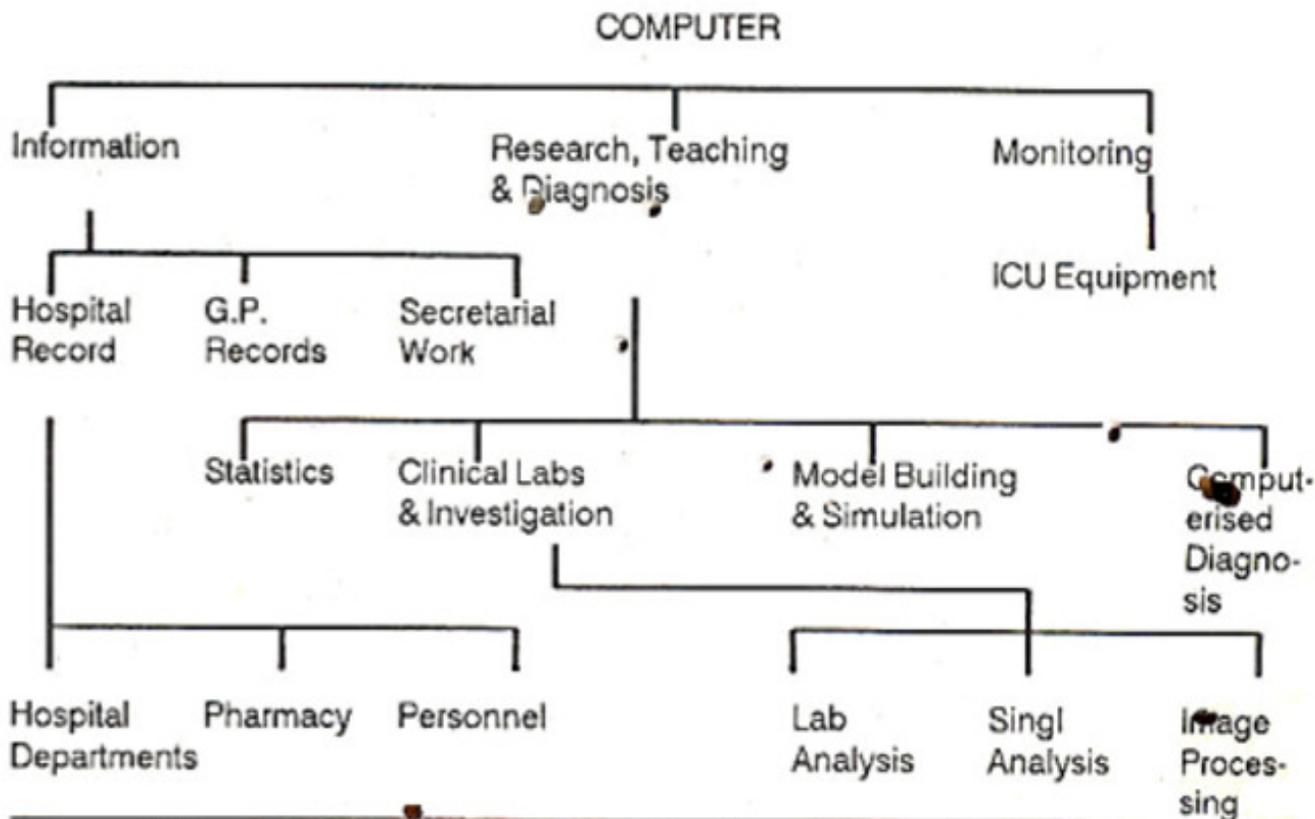


Figure. Some important uses of computers in medicine.

The figure briefly explains the major fields where the computers can be used and are being used in medicine.

## REFERENCES

1. Hassan, M.M., Computer in medicine, NED University of Engineering and Technology, Karachi.
2. Javvit, J. Computer in medicine Philadelphia Saunders, 1986, p.7.