

Computer and Research-Applications and Limitations

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Abstract— *Computers play a major role today in every field of scientific research from genetic engineering to astrophysics research. This article is a brief overview of the role that computers and Internet have played in research and the ways in which they are helping unravel several scientific mysteries. While they are still far away from the supreme ideal of thinking themselves as artificially intelligent machines, the brute force of their ability to calculate and process information at phenomenal speed powers research in every field.*

I. INTRODUCTION

Performing calculations almost at the speed of light, the computer has become one of the most useful research tools in modern times. Their use, apart expediting the research work, has reduced human drudgery and added to the quality of research activity. Different scenarios are made available to researchers by computers in no time which otherwise might have taken days or even months. The developments now taking place in computer technology which further enhance and facilitate the use of computers and technology for researchers through various kinds of analytical softwares, computers are contributing to research in every field, ranging from biology to astrophysics, discovering new patterns and providing novel insights. It is not possible to capture the whole range of computer and technology applications in conducting research. In this article, I have discussed some important applications of technology. After a period of intensive experimentation with computer technology and its application to a wide range of research activities, scientists are in a position to consolidate and extend recent advance.

II. APPLICATIONS IN RESEARCH

There are five important characteristics of computer which can help a researcher in his research

A. Computation

The computers can perform many statistical calculations easily and quickly. Computation of means, standard deviations, correlation coefficients, 't' tests, analysis of variance, analysis of covariance, multiple regression, factor analysis and various nonparametric analyses are just a few of the programs and subprograms that are available at almost all computer centres. Similarly, canned programs for linear programming, multivariate analysis, monte carlo simulation

etc. are also available in the market. In brief, software packages are readily available for the various simple and complicated analytical and quantitative techniques of which researchers generally make use of. The only work a researcher has to do is to feed in the data he/she gathered after loading the operating system and particular software package on the computer. The output, or to say the result, will be ready within seconds or minutes depending upon the quantum of work. Techniques involving trial and error process are quite frequently employed in research methodology. This involves lot of calculations and work of repetitive nature. Computer is best suited for such techniques, thus reducing the drudgery of researchers on the one hand and producing the final result rapidly on the other hand.

B. Data storage and Analysis

Every Experiment in any field of research generates a lot of data, that need to be stored and analysed to derive important conclusions, to validate or disprove hypothesis. Computers attached with experimental apparatus, directly record data as it is generated and subject it to

analysis through specially designed softwares .Analysing tons of statistical data is made possible using specially designed algorithms that are implemented by computers. This makes the extremely time consuming job of data analysis to be a matter of few minutes. Data from different sources can be stored and accessed via computer networks set up in research labs. The data storage capacity of the present day computer is much more than its earlier counterpart but even then the internal memory of the CPU is only large enough to retain a certain amount of information just as the human brain selects and retains what it feels to be important and relegates unimportant details to the back of the mind or just forgets them. Hence, it is impossible to store all types of information inside the computer records. If need be, all unimportant information/data can be stored in auxiliary storage devices and the same may be brought into the main internal memory of the computer, as and when required for processing.

C. Scientific Simulations

One of the prime use of computers in pure science and engineering research projects is running of simulations. A simulation is a mathematical modelling of problem and a virtual study of its possible solutions .Problems which do not yield themselves to experimentation can be studied through simulations carried out on computers. For example, astrophysicists carry out structure formation simulations, which are aimed at studying how large scale structures like galaxies are formed. space missions to the Moon, satellite launches and interplanetary missions are first simulated on computers to determine the best path that can be taken by the launch vehicle and spacecraft to reach its destination safely. The list of sciences that make extensive use of computer simulation has grown to include astrophysics, particle physics, materials science, engineering, fluid mechanics, climate science, evolutionary biology, ecology, economics, decision theory, medicine, sociology, epidemiology, and many others. Simulations can be used for heuristic purposes, for the purpose of predicting data that we do not have, and for generating understanding of data that we do already have. Another broad class of purposes to which computer simulations can be put is in telling us about how we should expect some system in the real world to behave under a particular set of circumstances. simulations can be used to understand systems and their

behaviour. If we already have data telling us how some system behaves, we can use computer simulation to answer questions about how these events could possibly have occurred; or about how those events actually did occur.

D. Instrumentation Control

Instrumentation control is one of the most important applications of computers. Instrument control is a PC-based approach that combines programmable software and hardware connectivity for automating measurement acquisition from third-party instrumentation. An instrument control system consists of instrumentation, connectivity hardware, and a computer with programmable software. Most advanced scientific instruments come with their own on-board computers. Which can be programmed to execute various functions. For example, the Hubble space craft has its own on-board computer system which is remotely programmed to probe the deep space.

E. Research through Internet

Most people use the Internet to do research. In the form of internet, computers have provided an entirely new way to share knowledge and conducting research. The Internet is a "network of networks" that consists of millions of smaller academic, business, domestic and government networks. Sharing of knowledge through the internet has made international cooperation on scientific research projects possible. Internet is a major source for scholarly journals, books, magazines, current news, general information and other relevant content Using Internet; you can find information about any topic you desire. The Word Wide Web has made it possible for individuals to contact researchers quite easily by using e-mail or Web sites. The World Wide Web is a huge database of user-submitted content where you can access an astronomical number of informative sources, online groups and multi-media.. There are many free internet browser downloads as Internet Explorer, Firefox and Opera. Some Search Engines (e.g., AltaVista, Excite, Info seek) cover the full text of many pages and can give a higher percentage of "hits" that are closely related to your topic.

III LIMITATIONS

In spite of all these applications ,it is wise to remember that computer is just a machine. It can only calculate or obey commands and cannot think. Computerised analysis requires setting up

of an elaborate system of monitoring, collection and feeding of data. All these require time, effort and money. Hence, computer based analysis may not prove economical in case of small projects. Various items of detail which are not being specifically fed to computer may get lost sight of. The computer does not think; it can only execute the instructions of a thinking person. If poor data or faulty programs are introduced into the computer, the data analysis would not be worthwhile. Research using internet has the following limitations-

A. It can divert Attention

Distraction while using internet may divert the attention of the researcher from his objective. Online games, social media entertainment sites, you tube videos can disturb the tempo and obstruct researcher from his objective of doing research. Too much multitasking on your computer can hamper brain and cognitive functions.

B .Information not Reliable

Some online information are deceptive, biased and inaccurate. This happens especially with personal websites, political organizations or other potentially biased sources. Although the Internet contains lots of good information, still it is very difficult to separate spurious from authentic and reliable one. It is quite inevitable to do background checks on your sources so that use of flawed computer research in your work can be avoided. Websites for reputable educational institutions, scholarly journals and government agencies happens to be the trustworthy or acceptable sources for computer-based research.

C. Chances of Plagiarism

With the use of Computer and Internet facilities, chances of incidence of plagiarism have risen. Negligent use of the Internet can result in plagiarism. The copy and paste function is so convenient that students are tempted to insert portions of a source into their papers, which goes against the copyright act. Therefore it obstructs the originality and creativity of the researcher. On one hand computers help to do research and write papers, whereas on other hand they can also tempts one to plagiarize. To combat plagiarism, it is essential to carefully word your paragraph while keeping internet references and essay drafts in separate documents.

D. Everything is not Online

All of the research material needed by a researcher cannot be found on Internet. It is quite worth to look in the library for back issues of scholarly journals that aren't online. For some research material, consulting library is actually the advisable proposition. By using this offline sources of information can lead you to material that will make your projects more credible and useful to readers.

IV CONCLUSION

The above description indicates clearly the usefulness of computers to researchers in data analysis. Researchers, using computers, can carry on their task at faster speed and with greater reliability. The developments now taking place in computer technology will further enhance and facilitate the use of computers for researchers. Programming knowledge would no longer remain an obstacle in the use of a computer.

In spite of all this sophistication we should not forget that basically computers are machines that only compute, they do not think. The human brain remains supreme and will continue to be so for all times. As such, researchers should be fully aware about the limitations of computer-based research

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