

Advance Role of Computers in Modern Research Study

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ABSTRACT

There is a lot of interest in advanced computing technologies when it comes to artificial intelligence. This paper is designed to help promote the research and application of advanced computing technologies by providing a forum for researchers and practitioners from around the world to exchange research results and share development experiences. The papers featured in this anthology cover various aspects of advanced computing technologies and experimental studies of some application systems.

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Received: August 04, 2022; **Accepted:** August 18, 2022, **Published:** October 21, 2022

Keywords: Computer, Research, Data Processing, Editing, Coding, Classification, Application

Introduction

Computers in Research

The computers are indispensable throughout the research process. The role of computer becomes more important when the research is on a large sample. Data can be stored in computers for immediate use or can be stored in auxiliary memories like floppy discs, compact discs, universal serial buses (pen drives) or memory cards, so that the same can be retrieved later. The computers assist the researcher throughout different phases of research process.

Role of Computers in the Phases of Research Process

There are five major phases of the research process where computer plays different vital roles.

They are:

- Role of Computer in Conceptual phase
- Role of Computer in Design and planning phase
- Role of Computer in Empirical phase
- Role of Computer in Analytic phase and
- Role of Computer in Dissemination phase

Role of Computer in Conceptual Phase

The conceptual phase consists of formulation of research problem, review of literature, theoretical frame work and formulation of hypothesis.

Role of Computers in Literature Review

Computers help for searching the literatures (for review of literature) and bibliographic references stored in the electronic databases of the World Wide Web's. It can thus be used for storing relevant published articles to be retrieved whenever needed. This has the advantage over searching the literatures in the form of books, journals and other newsletters at the libraries which consume considerable amount of time and effort.

Role of Computers in Design and Planning Phase

Design and planning phase consist of research design, population, research variables, sampling plan, reviewing research plan and pilot study.

Role of Computers for Sample Size Calculation

Several software's are available to calculate the sample size required for a proposed study. NCSS-PASS-GESS is such software. The standard deviation of the data from the pilot study is required for the sample size calculation.

Role of Computers in Empirical Phase

Empirical phase consist of collecting and preparing the data for analysis.

Data Storage

The data obtained from the subjects are stored in computers as word files or excel spread sheets. This has the advantage of making necessary corrections or editing the whole layout of the tables if needed, which is impossible or time-consuming in case of writing in papers. Thus, computers help in data entry, data editing, data management including follow up actions etc. Computers also allow for greater flexibility in recording the data while they are collected as well as greater ease during the analysis of these data.

In research studies, the preparation and inputting data is the most labour-intensive and time consuming aspect of the work. Typically the data will be initially recorded on a questionnaire or record form suitable for its acceptance by the computer. To do this the researcher in conjunction with the statistician and the programmer, will convert the data into Microsoft word file or excel spread sheet. These spread sheets can be directly opened with statistical software's for analysis.

Role of Computers in Data Analysis

This phase consist of statistical analysis of the data and interpretation of results.

Data Analysis

Much software is now available to perform the ‘mathematical part’ of the research process i.e. the calculations using various statistical methods. Software’s like SPSS, NCSS-PASS, STATA and Sysat are some of the widely used. They can be like calculating the sample size for a proposed study, hypothesis testing and calculating the power of the study. Familiarity with any one package will suffice to carry out the most intricate statistical analyses.

Computers are useful not only for statistical analyses, but also to monitor the accuracy and completeness of the data as they are collected.

Role of Computers in Research Dissemination

This phase is the publication of the research study.

Research Publishing: The research article is typed in word format and converted to portable data format (PDF) and stored and/or published in the World Wide Web.

Use of Computer in Data Processing and Tabulation

Research involves large amounts of data, which can be handled manually or by computers. Computers provide the best alternative for more than one reason. Besides its capacity to process large amounts of data, it also analyses data with the help of a number of statistical procedures. Computers carry out processing and analysis of data flawlessly and with a very high speed. The statistical analysis that took months earlier takes now a few seconds or few minutes. Today, availability of statistical software and access to computers has increased substantially over the last few years all over the world. While there are many specialised software application packages for different types of data analysis, Statistical Package for Social Sciences (SPSS) is one such package that is often used by researchers for data processing and analysis. It is preferred choice for social work research analysis due to its easy-to-use interface and comprehensive range of data manipulation and analytical tools.

Basic Steps in Data Processing and Analysis

There are four basic steps involved in data processing and analysis using SPSS. They are:

- Entering of data into SPSS,
- Selection of a procedure from the Menus,
- Selection of variables for analysis, and
- Examination of the outputs.

You can enter your data directly into SPSS Data Editor. Before data analysis, it is advised that you should have a detailed plan of analysis so that you are clear as to what analysis is to be performed. Select the procedure to work on the data. All the variables are listed each time a dialog box is opened. Select variables on which you wish to apply a statistical procedure. After completing the selection, execute the SPSS command. Most of the commands are directly executed by clicking ‘O.K’. On the dialog box. The processor in the computer will execute the procedures and display the results on the monitor as ‘output file’.

Data Processing

Data Processing is, broadly, “the collection and manipulation of items of data to produce meaningful information’s.” In this sense it can be considered a subset of *information processing*, “the change (processing) of information in any manner detectable by an observer.”

Processing Operations

We can now proceed with the explanation of all the processing operations.

Editing

Editing of data is a process of examining the collected raw material (especially in surveys) to detect errors and omissions and to correct these when possible. As a matter of fact, editing involves a careful scrutiny of the completed questionnaires and or schedules.

Types of Editing

Editing may be in the form of field editing or central editing

- **Field Editing:** - field editing consists in the review of the reporting forms by the investigator for completing what the letter has written in abbreviated and or in illegible form at the time of recording the respondent’s responses.
- **Central Editing:** -central editing should take place when all forms or schedules have been completed and returned to the office. This type of editing implies that all form should get a through editing by a single editor in a small study and by a team of editors in case of large of inquiry.

Some Points of Editing

Editors must keep in view several points while performing their editing work which are as follows

- They should be familiar with instructions given to the interviewers and coders as well as with the editing instructions supplied to them.
- They must make entries on the in some distinctive colour and that too in a standardised form.

Coding

Coding refers to the process of assigning numerals or other symbols to answers so that responses can be put into a limited number of categories or classes. Coding is necessary for efficient analysis and through it the several replies may be reduced to a small number of classes which contain the critical information required for analysis.

Coding is translating answers into numerical values or assigning numbers to the various categories of a variable to be used in data analysis. Coding is done by using a code book, code sheet, and a computer card. Coding is done on the basis of the instructions given in the codebook. The code book gives a numerical code for each variable.

Now-a-days, codes are assigned before going to the field while constructing the questionnaire/schedule. Pose data collection; pre-coded items are fed to the computer for processing and analysis. For open-ended questions, however, post-coding is necessary. In such cases, all answers to open-ended questions are placed in categories and each category is assigned with a code.

Manual processing is employed when qualitative methods are used or when in quantitative studies, a small sample is used, or when the questionnaire/schedule has a large number of open-ended questions, or when accessibility to computers is difficult or inappropriate. However, coding is done in manual processing also.

Classification

Most research studies result in a large volume of raw data which must be reduced into homogeneous group if we are to get meaning full relationships. The classification arranged on the basis of common characteristics.

Types of Classification

Classification of two types

- a) Classification according to attributes
- b) Classification according to class intervals

Tabulation

When a mass of data has been assembled, it becomes necessary for the researcher to arrange the same in some kind of concise and logical order. This procedure is referred to as tabulation. Thus tabulation is the process of summarising raw data and displaying the same in compact form (i.e. in the form of statistical tables) in a broader sense, tabulation is an orderly arrangement of data in columns and row. After editing, which ensures that the information on the schedule is accurate and categorized in a suitable form, the data are put together in some kinds of tables and may also undergo some other forms of statistical analysis. Table can be prepared manually and/or by computers. For a small study of 100 to 200 persons, there may be little point in tabulating by computer since this necessitates putting the data on punched cards. But for a survey analysis involving a large number of respondents and requiring cross tabulation involving more than two variables, hand tabulation will be inappropriate and time consuming.

Importance of Tabulation

Tabulation is essential because of the following reasons:-

- a) It facilitates the process of comparison.
- b) It provides a basis for various statistical computation
- c) The present an overall view of findings in a simpler way.
- d) They identify trends.
- e) They display relationships in a comparable way between parts of the findings.
- f) By convention, the dependent variable is presented in the rows and the independent variable in the columns.

Principles of Tabulation

- a) Every table should be given a distinct number to facilitate easy reference.
- b) The column headings and the row headings of the table should be clear and brief.
- c) The columns may be numbered to facilitate reference.
- d) Total of row should normally be placed in the extreme right column and that of columns should be placed at the bottom.

Some Problems in Processing

We can take up the following two problems of processing the data for analysis purpose.

- a) **The Problem Concerning “don’t know” (or DK) Responses:** - while processing the data the researcher often comes across some responses that are difficult to handle. One category of such responses may be „Don’t know response or simply DK response. When the DK response group is small it is of little significance but when it is relatively big it becomes a matter of major concern in which the case the question arises.
- b) **Use of Percentage** – percentages are often used in data presentation for reducing all of them to a 0 to 100 range.

Rules of Percentage

- a) Two or more percentages must not be averaged unless each is weighted by the group size from which it has been derived.
- b) Use of too large percentage should be avoided since a large percentage is difficult to understand and tends to confuse, defeating the very purpose for which percentage are used.
- c) Percentage hides the base from which they have been computed. If this is not kept in view the real difference may

not be correctly read.

Data Analysis

Analysis of data is a process of inspecting, cleaning, transforming, and modeling data with the goal of discovering useful information, suggesting conclusions, and supporting decision making. Data analysis has multiple facets and approaches, encompassing diverse techniques under a variety of names, in different business, science, and social science domains. As stated earlier, by analysis we mean the computation of certain indices or measures along with searching for patterns of relationship that exist among the data groups. Data analysis is an ongoing activity, which not only answers your question but also gives you the directions for future data collection. Data analysis procedures (DAP) help you to arrive at the data analysis. The uses of such procedures put your research project in perspective and assist you in testing the hypotheses with which you have started your research. Hence with the use of DAP, you can

- a. Convert data into information and knowledge, and
- b. Explore the relationship between variables.

Types of Analysis

Analysis may, therefore be categorized as descriptive analysis and inferential analysis.

- a) **Descriptive Analysis** – descriptive analysis is largely the study of distribution of one variable. This study provides us with profiles of companies, work groups, persons and other subjects on any of a multiple of characteristics such as size, composition, efficiency, preferences.
- b) **Inferential Analysis**- is concerned with the various tests of significance for testing hypothesis in order to determine with what validity data can be said to indicate some conclusion or conclusions. It is also concerned with the estimation of population values.

Method and Material

We conducted this research paper by observing the different types of reviews, as well as conducting and evaluating literature review papers.

Result & Discussion

Advanced computing technologies are well-suited for artificial intelligence. This document aims to help promote the research and application of advanced computing technologies by providing a forum for researchers and practitioners from around the world to share research results and share development experiences and experimental investigations of some application systems. Computers are useful tools that can speed up the research process and provide accuracy. The programmer or computer operator should have a thorough knowledge of the capabilities and disabilities of the software used to make the computer more effective. The data must be processed in order to be analysed in accordance with the research plan that was in place when the data was collected. This is essential for a scientific study and for ensuring all relevant data is included [1-124].

Conclusion

In conclusion, we can say that computers are useful tools that simplify and speed up the research process, providing accuracy, greater reliability and fewer errors. The programmer or the computer operator should have a thorough knowledge of the capabilities and disabilities of the software used for better use of computers. The data must be processed in order to be analysed according to the plan for the research that was developed at the time the data was collected. This is essential for a scientific study

and for ensuring that all relevant data is included in the analysis.

Acknowledgment

My grateful thanks to all the sincere and extremely helping friends for their support and help for the completion of work. Last but not the least, I am thankful to all those who cooperated and helped me directly or indirectly to carry out this work.

Ethical Approval

Ethical approval was not required for this letter. All data used is publicly accessible.

Funding

There were no external sources of funding for this research.

Financial Support and Sponsorship

Nil.

Conflicts of Interest

All authors are declaring that they have no conflicts of interest.

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