Role of Computers and Their Applications in Sociology Subject Area

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Abstract
Today, most sociologists, whether professionals or students, have their own computers equipped with printers for writing and internet access for emailing. In addition to basic writing and emailing, there are many computer-based research tools used for both quantitative and qualitative studies. This article explains how sociologists and other social scientists utilize these tools and what resources are available to them. It serves as a guide on how to effectively use computers and related applications within the field of Sociology.

Keywords: Computers, Sociology, Applications of computer, Sociology and computer, Internet, Sociological computing

1.1 Introduction:

Social research has linked sociologists with computers for over a century. The 1890 U.S. census prompted Herman Hollerith, a researcher, to create the first automated data processing machine. Although Hollerith's punchcard system isn't considered a real computer by today's standards, it laid the groundwork for modern data management. In 1948, the U.S. Bureau of the Census foresaw the extensive data needs for the 1950 census and commissioned the creation of Univac I, the first commercial electronic computer. This computer was crucial for counting, sorting, and analyzing census data, which led to the introduction of a high-speed magnetic tape storage system, sort-merge software, and a statistical package with matrix algebra programs. By the early 1960s, many social scientists were eager to integrate computers into their research, resulting in the publication of the first book focused solely on computer applications in social science (Borko 1962). Not only did they write about computer use, but they also created new software. Notable statistical software packages, including SPSS (Nie, Bent, and Hull 1975), were developed by social scientists.

During the 1980s, colleges and universities began purchasing microcomputers, recognizing that all researchers needed access to their own desktop computers. A 1985 survey by the American Council of Learned Societies (Morton and Price 1986) revealed that 50 percent of sociologists had a computer for their exclusive use. Another survey supported by the American Sociological Association (Koppel, Dowdall, and Shostak 1985) indicated that just under half of sociology faculty members had immediate access to microcomputers. By 1985, of the roughly 9,000 sociologists, about 4,500 owned their

computers, and around 5,200 regularly used them. Today, it is uncommon to find a sociologist's office without at least one computer, and most sociology students in many countries have their own computers for writing and accessing online resources.

1.2 An Overview of the Sociology and Computer:

a. Sociology and the Internet

The Internet is one of the largest and fastest-growing peaceful social movements in history. It is more than just a set of technologies; it represents a changing social and cultural phenomenon, often referred to as "cyberspace" or "cyberculture." Regardless of how it is described, it is transforming how sociologists carry out their research.

By the mid-1990s, sociology, like many other fields, started to rely on email for communication. Additionally, a growing number of sociologists began using the World Wide Web (WWW), commonly known as the Web. Bainbridge noted in 1995 that the Web was becoming an important communication tool for sociologists and suggested that it could quickly become essential for the field. In January 1999, a search for the term "sociology" using the Alta Vista search engine returned 750,000 results, a significant increase from 250,000 just two years earlier, indicating that sociology was rapidly establishing its online presence.

The Internet and the Web serve as communication tools through email, online chats, electronic conferencing, group collaboration, and data sharing, all of which involve social interaction. The Web also acts as a database for finding and retrieving information. However, new uses for the Web are emerging. For individuals, it has become a platform for showcasing personal and professional information. For organizations, the Web offers opportunities for advertising, recruitment, public communication, and conducting business. The increasing number of personal websites indicates that many view the Web primarily as a means for managing personal and organizational images.

b. Publications on Sociological Computing.

Publications on Sociological Computing provide valuable resources for those interested in the use of computers in social science. The main outlet for articles in this field is the Social Science Computer Review, published quarterly by Sage Publications, Inc. This publication also includes reviews of books and software. Additionally, software reviews can occasionally be found in journals like Educational and Psychological Measurement, the Journal of Marketing Research, The American Statistician, and Simulation and Games. JAI Press also releases occasional volumes titled "Computers and the Social Sciences."

In the late 1980s, the American Sociological Association (ASA) created a "Section on Micro-computing." By 1990, over 350 sociologists had joined, making it the fastest-growing section in ASA history. The section produces a quarterly newsletter and organizes events during annual meetings. In 1993, its name was changed to "Sociology and Computers." Members also publish a regular newsletter called SCAN (Sociology and Computers: A Newsletter).

The first annual conference, "Computing in the Social Sciences," took place in 1990 in Williamsburg, Virginia. This event led to the formation of the Social Science Computing Association, which continues to hold an annual conference. Their official publication remains the Social Science Computer Review.

c. Computer Applications in Sociology

The use of computers in sociology has changed quickly over time. Computers are now part of nearly every research task, even in areas like taking field notes and conducting interviews, along with many other tasks. The various ways computing technology is used in social research can be hard to define since the applications often overlap and change. However, it's important to explore different types of applications to understand how computing is currently used in sociology. Since 1987, the Winter issue of the Social Science Computer Review has featured an annual discussion on the current state of social science computing. This article summarizes the main types of computer applications according to their popularity and also highlights some challenges faced in sociological research using computing.

d. Writing and Publishing.

Word processing, once limited to secretarial tasks, is now essential for almost all graduate students and professionals in sociology. It includes not just writing, but also creating tables, formatting mathematical equations, and adjusting items like three-dimensional graphs within documents. Social researchers are increasingly using these features and are quickly moving towards work environments that make it hard to distinguish between analyzing data and preparing manuscripts. Researchers write papers on their computers, and word processing software also plays a key role in improving data collection tools, especially surveys and codebooks, allowing for the quick creation of different versions and drafts.

e. Communicating Electronically (E-mail, etc.)

Networks for computer-mediated communication (CMC) are growing worldwide, following a typical pattern of spread. Electronic networks now enhance most other social communication methods. E-mail remains the most widely used form of online interaction due to its asynchronous nature, but Internet-based options like synchronous mailing lists, newsgroups, chat rooms, and discussion groups are also increasingly popular. With advancements in sharing digital audio and video, new types of video conferencing are expected to become common. At the start of the 21st century, desktop video conferencing became readily available, though it often suffers from background noise and motion issues. While sociologists use e-mail in different ways, it is a vital tool for many in developed countries for specific communications. E-mail messages are usually simple text, but attachments now allow users to send formatted documents, including graphics and multimedia, quickly around the world. This technology makes collaboration and co-authoring much easier by saving time and reducing costs.

f. Statistics

Numerous computer programs and articles have been created to meet the demands of statistical computing in social research. Before the 1980s, most statistical analysis was done on large mainframe computers. However, improvements in hardware and software for personal computers now allow

researchers to perform statistical analysis for small to moderate studies on these devices. Much of the ongoing analysis of social data, such as large census data, would not be possible without computers. For instance, using LISREL, a tool for analyzing linear relationships through maximum likelihood, would take weeks or months if done manually.

Statistical computing not only saves time but also reveals important patterns in data. Quick data manipulation and the ability to present it in various formats help researchers notice significant trends and relationships in complex datasets. Some insights can only be discovered with specialized software. For example, Heise's Ethno program helps researchers visualize and analyze event sequences. Additionally, various general statistical packages offer powerful exploratory data analysis features, allowing users to see changes in one window reflected in another.

Finding the right statistical program for a specific issue can be difficult, especially if the intended user group is small. Good places to find such software include journals like the Social Science Computer Review and The American Statistician. Another useful resource is the annual Sociological Methodology list available online, which includes programs that may be free or low-cost. Regardless of price, it's essential to remember that complex programs can have errors. Therefore, testing with sample data and comparing results across different programs is critical to ensure accuracy.

g. Accessing, Retrieving and Managing Data.

In the past, students and researchers needed to visit libraries to find bibliographic data. Now, they can easily access this information from their computers or through external storage like CD-ROMs or DVDs. Major bibliographic databases, such as Sociological Abstracts and Psychological Abstracts, are available in these formats, along with a large variety of data in the form of statistical tables and maps. With the cost of devices that write to CD-ROMs becoming affordable, it is likely that even small research projects will share their data this way.

Software for storing and analyzing social data is relatively new, being less than fifty years old. However, we can expect significant improvements in the coming fifty years. Websites that allow for interactive data analysis suggest what these improvements could look like. For example, the SDA Archive website enables users to create a detailed crosstabulation table for any three variables from the General Social Survey, which includes over 35,000 respondents, faster than typing out the variable names.

h. Qualitative Computing

Computer-based content analysis started with Stone and his colleagues in 1966 and has since become crucial in the social sciences. A study of 110 researchers focused on qualitative methods revealed that three out of four regularly use computers for their work. Ragin and Becker pointed out that using these computing tools in qualitative research allows for a better understanding of diversity by encouraging a detailed look at differences between cases.

As researchers began to combine content analysis with other qualitative tasks, the use of this computing method grew significantly. Several general-purpose programs for qualitative analysis became widely

available. These tools enhance the accuracy and efficiency of analyzing large text volumes while guiding the focus on analytical methods. The basic tasks of text entry, coding, counting, and organizing data have evolved to include specific routines that improve coding quality and management. Additionally, Hesse-Biber, Dupuis, and Kinder expanded this approach to also manage and analyze audio and video segments alongside text.

i. Simulating and Modeling.

Neural networks, when paired with other artificial intelligence methods and expert systems, have captured the interest of many social scientists. These networks mimic how human brain cells work, allowing computers to process multiple tasks at once. They excel at recognizing patterns, but running these systems requires powerful computers.

j. Computer-Assisted Data Collection.

Computer-Assisted Telephone Interviewing (CATI) is a system that helps telephone interviewers by using online questionnaires or input screens. It is widely used in sociological research, although its full effects are not yet clear. CATI can run on stand-alone personal computers, networked PCs, or larger systems. Typically, these setups include features such as centralized monitoring for interviewer stations, immediate checks for incorrect answers, and automatic question routing based on responses. Other popular methods for collecting data with computers include Computer-Assisted Personal Interviewing (CAPI), which involves face-to-face interviews using laptops or handheld devices, Computerized Self-Administered Questionnaires (CSAQ) for direct input from respondents, and data-entry programs for manually collected information. Additionally, there are software tools for creating online questionnaires. One such tool is the Questionnaire Programming Language (QPL), developed by Dooley, which lets researchers write questionnaires using any word processor. This software can generate two versions of a questionnaire—one for computer use and another for interviews or self-completion. It also produces commands for data analysis in SPSS or SAS automatically.

k. Visualization and Graphics.

Social researchers increasingly use computer graphic systems to create maps, charts that summarize statistical data, and network diagrams, as well as to access data from Geographic Information Systems (GIS) databases. GIS data includes coordinates that link specific locations to various characteristics, like social density. However, the adoption of these complex data techniques among sociologists has been slow. One reason for this is the lack of methods to analyze such data effectively. Research by Cleveland in 1993 on graphical data analysis and visualization may help sociologists use this data more frequently. Furthermore, new methods for sharing interactive audio and video online may encourage sociologists to explore multimedia data, which includes sounds and moving images.

l. Teaching and Learning

In the 1970s, before the rise of microcomputers, a small group of social science teachers started to look into how computers could be used in education. Today, using computer technology in teaching is quite

normal, with many instructional programs focused on sociology in use. The most well-known programs are Chipendale, created by James Davis, and MicroCase, developed by Roberts and Stark. These programs have been the foundation for exercises included in numerous textbooks and workbooks. Various teaching methods and software are frequently discussed in publications like Teaching Sociology and the Social Science Computer Review.

1.3 Conclusion:

The integration of computing into social research has progressed significantly over time. Computers are now utilized for nearly every aspect of research, including tasks that may seem unconventional, such as conducting interviews, along with numerous other functions (Brent and Anderson 1990). This diverse range of computer applications is expected to further develop alongside emerging Internet-based technologies. However, the incorporation of computing into sociology presents certain challenges. There are frequent errors in both data and software, yet social scientists seldom verify their findings by employing multiple programs on the same dataset. The costs associated with data and software can be substantial, and various barriers hinder the sharing of these essential resources. While there is a need for improved software, graduate students are often dissuaded from creating new programming solutions. Nevertheless, ongoing advancements in computer technology will continue to unfold, presenting significant new opportunities. Many forthcoming developments in sociological computing are likely to align with previously noted trends, such as hypertext networks, integrated high-performance graphic data analysis systems, software for collaborative work, and neural networks designed for intricate models of social systems.

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