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Harnessing the Internet for Free Cutting-Edge Computer Software and Other Tools

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In this chapter, I describe various ways that the Internet can be utilized to get free state-of-the-art computer software and other apparatuses to conduct research on African phenomena. As Faleh Alshameri and I have shown in several papers (Bangura 2009a and 2009b, Alshameri and Bangura 2013), while a great deal of attention has been paid to the 'digital divide' within developed countries and between those countries and the developing ones, most Africans do not even have such luxury as access to books, periodicals, radio and television channels, which is precisely why information and communication technology (henceforth, ICT) is so important to Africa. ICT has the potential to positively impact Africa's development. So, how can Africans transform that potential into reality? And for the purpose of this chapter, how can African researchers and others conducting research on African phenomena access that technology? Without access, that technology cannot do much for Africans–thus, the significance of digital technology (Bangura 2009a and 2009b, Alshameri and Bangura 2013).

Digital technology often refers to the newest ICT, particularly the Internet. There are, of course, other more widely available forms of ICT, such as radio and telephones. But there are many problems concerning the generally abysmal state of networks of every kind on the continent that make it difficult to fully utilize the development potential of even this technology. Africa's electrical grid

is grossly inadequate, resulting in irregular or nonexistent electrical supplies. The biggest problem is that in many countries, significant power distribution networks are non-existent in rural areas (Bangura 2009a and 2009b, Alshameri and Bangura 2013).

Africa's phone systems are spotty and often rely on antiquated equipment. Progress is often hamstrung by bureaucracy and, in most instances, state-owned monopolies. However, African governments have the power to alter these circumstances and, gradually, some are doing so. The signs of progress are unbelievable. A few years ago, a couple of countries had Internet access. Today, all 54 countries and territories in Africa have permanent connections. There is also rapidly growing public access provided by phone shops, schools, police stations, clinics, and hotels (Bangura 2009a and 2009b, Alshameri and Bangura 2013).

Although Africa is becoming increasingly connected, access to the Internet, however, is progressing at a limited pace. Of the 770 million people in Africa, only one in every 150, or approximately 5.5 million people in total, now use the Internet. There is roughly one Internet user for every 200 people, compared to a world average of one user for every 15 people, and a North American and European average of approximately one in every two people (Bangura 2009a and 2009b, Alshameri and Bangura 2013).

In the rest of this chapter, I discuss various free cutting-edge computer software and other tools that can be accessed via the Internet to conduct research pertaining to African phenomena. Before doing so, however, I will begin by discussing tips for conducting effective Internet searches.

Tips for Conducting Effective Internet Searches

A Google search of the Internet with the phrase 'tips for conducting effective internet searches' at 6:50 PM on Sunday, April 30, 2017 yielded approximately 3,180,000 results in 0.81 seconds, a reflection of the wide coverage the topic has received on the World Wide Web (WWW). Of course, it is impossible, and even unnecessary, to discuss every result here. Instead, I present the following brief statements of those tips I perceive to be the most useful based on my extensive background in conducting Internet searches and training in Computer Science:

a. Begin by reading the help or tips menu
b. Prepare yourself before beginning the search
c. Customize your searches and make them short

d. Start with simple searches and take advantage of the search tools
e. Use both the simple and advanced modes of search tools
f. Use unique or specific terms when possible to get more specific results
g. Use the directories or subject directories in search tools
h. Use more than one search tool
i. Use the MetaSearch (a search tool that utilizes another search engine's data to produce its own results from the Internet) and natural language (a language that has developed naturally in use as contrasted with an artificial language or computer code) tools to begin and/or refine a search
j. Use capitalization when necessary to refine a search
k. Use quotation marks or other symbols to specify a phrase
l. Use Find or Ctrl-F to help navigate search results
m. Use basic math operators (addition + and subtraction -) to narrow down your search results
n. Don't use common words and punctuation
o. Do not use suffixes: i.e. morphemes added at the end of words to form derivatives, e.g., -ation, -fy, -ing, -itis
p. Maximize AutoComplete: i.e. a software function that gives users the option of completing words or forms by a shorthand method based on what has been typed before
q. Use the browser history
r. Set a time limit and then change tactics
s. Search a domain extension (.com, .org, .edu, etc.)
t. Use the wildcard or asterisk (*)

The Java Software Imperative

The Java computer software was released in 1995 as a core component of the platform of the Sun Microsystems, which is now owned by Oracle Corporation. Before downloading and installing any of the computer software discussed in the following sections, a researcher must first download and install the free Java software or upgrade it if one already exists in his/her computer. In fact, none of the following software will download properly if the updated Java software is not in a computer. Julie Anderson and Hervé Franceschi tell the very interesting story of the Java language development as follows:

> On May 23, 1995, Sun Microsystems introduced Java, originally named Oak, as a free, object-oriented language targeted at embedded applications for consumer devices. A Java Machine was incorporated immediately into the Netscape Navigator Internet browser and, as the browser grew, small Java programs, known as applets, began to appear on webpages in increasing numbers. Java syntax is basically identical (with some minor exceptions) to that of C++ [a general-purpose programming language with imperative object-oriented and generic programming features and facilities for low-level memory manipulation], and soon programmers all over the world started to realize the benefits of using Java (Anderson and Franceschi 2016:21).

One reason for this popularity of the Java program may be due to its structure. According to Anthony J. Dos Reis and Laura L. Dos Reis, one or more *classes* (or basic units) can be found in a Java program. Embedded in a class are *methods* (i.e. named sequences of statements) and other forms. These authors add that 'The **header** of a method contains the name of the method as well as several other items. It is followed by the **body** of the method. The body consists of a sequence of statements enclosed by braces. When a computer **executes** a method, it performs the operations specified by the statements in its bod' (Dos Reis and Dos Reis 2012:6-7; bolded words are as they appear in the original text).

Another reason for Java's popularity may hinge on the fact that it is an object-oriented (OO) language. Dos Reis and Dos Reis define and state the advantages of this type of programming language as follows:

> …Java programs, when executed, can create and use objects. An **object** is a structure that contains data and the methods that operate on that data. Object-oriented programming languages have significant advantages over other types of programming languages [in that] objects are constructed from classes…The Java programming language comes with many predefined classes. Thus, we do not have to create classes before we can create objects; we can simply use the predefined classes as long as they satisfy our requirements (Dos Reis and Dis Reis 2012:12-13; bolded word is as it appears in the original text).

In essence, it is easier to utilize the Java program to compile, debug, learn and write other programming languages, and to also develop modular programs and codes that can be reused.

ATLAS.ti

ATLAS.ti was released in 1993 by Scientific Software Development, which later became ATLAS.ti Scientific Software Development GmbH. The computer

program is described as 'a powerful workbench for the qualitative analysis of large bodies of textual, graphical, audio and video data. [Its] **s**ophisticated tools help you to arrange, reassemble, and manage your material in creative, yet systematic, ways. [It] keeps you focused on the material itself. Whether your field is anthropology, economics, criminology, or medicine, [it] will meet your qualitative analysis needs' (atlasti.com). The program (atlasti.com)

a. offers a set of tools and features that are powerful and flexible enough to get to the bottom of even the most complex data material;
b. serves as a container for your project's data;
c. allows you to code by simply dragging codes onto the selected piece of data; Object Managers, the Project Explorer, and the Co-occurrence Explorer let you browse and navigate through your project data;
d. allows you to link your findings in a semantically meaningful way; and
e. allows you to visualize your findings and interpretations in a digital mind map as you go.

The following are the key features of ATLAS.ti (atlasti.com):

a. The interactive margin area is a unique work space that permits a uniquely intuitive way of interacting with your data, digitally transferring the traditional paper-and-pen analogy in the digital world.
b. The quotation level is also radically unique in that it offers an analytic level below coding and better supports inductive, interpretive research approaches like grounded theory, hermeneutic, discourse analysis, sociology of knowledge, or phenomenology than any other software.
b. The network/visualization function offers the most integrated way of working with your data; it is a tool for visualization as well as for analysis, for data organization as well as conceptual level analytic work and data presentation.
c. Due to the way ATLAS.ti manages data under the hood, it allows for handling much larger projects than other products that contain thousands of documents and/or tens of thousands of coded data segments.
d. ATLAS.ti supports collaborative work in several highly effective ways. Dedicated tools as well as some general principles of the software make collaborations easier.
e. In order to support multi-method multi-user projects across space and time (longitudinal studies)**,** project data export using XML is available.

f. The Support Center lets you conveniently contact developers via a state-of-the-art helpdesk system, guaranteeing swift turnaround and short response times.
g. Peer-to-peer support is available through the ATLAS.ti User Forum with thousands of members. The ATLAS.ti Research Blog offers a range of articles written by ATLAS.ti users world-wide on a large variety of topics.
h. ATLAS.ti workshops are held worldwide, face-to-face or online. A self-paced E-learning course is also available in English and Spanish.

There is also a free trial version of ATLAS.ti that has no expiration date. This version is fully functional, except that its capacity is limited.

Moreover, the ATLAS.ti user interface is a highly user-friendly interactive feature. Susanne Friese describes this attribute as follows: 'At the top of the user interface you have a title bar which displays the file name. Underneath you find the main menu, the tool bar and a number of drop-down menus. In addition, there is a vertical toolbar at the left margin. The rest of the screen is dedicated to displaying project data' (2012:10).

Excel

Initially released in 1987, Microsoft Excel, part of Microsoft Office, is a spreadsheet developed by Microsoft for Android (a mobile operating system developed by Google), iOS (formerly iPhone OS, a mobile operating system developed by Apple Inc.), macOS (a family of Macintosh operating systems developed by Apple Inc.), and Windows (a metafamily of graphical operating systems developed by Microsoft). Excel comprises calculation, graphing tools, a macro programming language called Visual Basic for Applications, and pivot tables (products.office.com).

The Excel program allows a researcher to gain greater insights into his/her data by doing the following (products.office.com:

a. laying out the data;
b. reformatting and rearranging the data to look at different configurations;
c. doing the analysis;
d. getting a better picture of the data by flowing them into charts and graphs;
e. finding the best storyline by discovering and comparing different ways to represent the data and one's intents visually;
f. highlighting trends and patterns;
g. adding another set of eyes by sharing from the cloud and making sure that everyone has the latest version;

h. collaborating in real time once a researcher has saved his/her spreadsheet to OneDrive, OneDrive for Business, or SharePoint;
i. collaborating on shared projects;
j. jumpstarting a design by showing style and professionalism with templates; and
k. connecting with experts to **s**ee what is new and getting classic tips and editors' tricks to develop, edit, and polish documents professionally.

In addition, as Neil J. Salkind has demonstrated, Excel's functions, which are predefined formulae, and Analysis ToolPak can be utilized to do quite sophisticated statistical computations. These attributes can allow a researcher to provide answers to both simple and complex statistical questions about data used in applied circumstances (Salkind 2013:ix).

Flash

First released by Adobe Systems in 1996, Flash or Adobe Flash, written in C++ for Android, BlackBerry OS, Linux, macOS, Microsoft Windows, and Solaris, is a free software meant for using content developed on the Adobe Flash platform to view multimedia, execute rich Internet applications, and stream video and audio. Flash delivers high-impact, rich Web content, and allows for the development of designs, animation, and application user interfaces to be deployed immediately across all browsers and platforms, thereby attracting and engaging users with a rich Web experience. Flash is endowed with the following features (adobe.com):

a. Stage 3D for building stunning, blazing-fast cinematic two-dimensional and three-dimensional games, and using fully accelerated graphic processing unit (GPU) rendering, which leverages the power of OpenGL and DirectX graphics;
b. Concurrency for developing high-performance, more responsive games and content using ActionScript workers and shared ByteArray support, sharing memory, and leveraging machine resources by offloading tasks to background workers that run concurrently;
c. Full-screen support for delivering exciting full-screen games with full keyboard support across browsers (including Chrome, Firefox, and Internet Explorer) and operating systems (Mac and Windows);
d. Enhanced mouse control for developing immersive, panoramic games that take advantage of infinite scrolling, mouse lock, relative mouse coordinates, and right- and middle-click events;

e. High definition (henceforth, HD)-quality video for playing high-quality HD video with industry-standard codecs such as H.264, AAC, and MP3 and using GPU hardware optimization and chipsets that scale across all platforms to provide best-in-class video performance;
f. High quality of service for engaging viewers with optimized and adaptive bitrate video streaming as well as an extensive feature set, and supporting streaming standards such as Hitachi Data Systems (HDS), Real-Time Messaging Protocol (RTMP), and progressive video that allows video content to be delivered efficiently and flexibly across various network and content delivery network (CDN) configurations;
g. Content protection for delivering protected premium video content using Adobe Access, which supports a wide range of business models, including video on demand, live broadcast, HD rental, subscription, and electronic sell-through;
h. Multicore rendering for building high-performance vector graphics and display true 1080-progress-scan videos that take advantage of up to four central processing unit (CPU) cores;
i. Small Web Format (SWF) file optimization for delivering optimized SWF files for faster download through the Lempel–Ziv–Markov chain algorithm (LZMA–an algorithm used to perform lossless data compression); and
j. Advanced bitmap control for delivering smoother animations and interactivity using enhanced high-resolution bitmap support, bitmap caching, and asynchronous bitmap decoding.

A concomittant question is: How can Flash be utilized by a researcher for sophisticated research projects? Yana Weinstein provides a succinct answer to this question. As she states and also demonstrates, Flash can be used to conduct questionnaire-based studies and 'sophisticated experiments involving stimuli such as pictures, dramatic shapes, and animation' (Weinstein 2013:xiv). She adds and shows that the program allows a researcher to have 'absolute control over design and visual aspects and only requires simple online implementation. Accurate reaction time is also possible…' (Weinstein 2013:xiv).

MATLAB

The Matrix Laboratory (henceforth, MATLAB), which interfaces to C, C++, Hadoop (an open source Java-based programming framework that supports the processing and storage of extremely large data sets in a distributed computing

environment), Java, Microsoft Excel, NET (a Microsoft web services strategy used to connect devices, information, people, and systems via software, thereby making it easier for users to share and use their information among multiple computers, programs, and websites), Python (a high-level programming language designed to be easy to read and implement), and structured query language (SQL), is used for numerical computing using Linux, macOS and Windows. MATLAB first appeared in the 1970s but was officially first released by MathWorks in 1984 (mathworks.com; Butt 2010:705). MATLAB is described as follows:

> MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation. Typical uses include math and computation; algorithm development; modeling, simulation and prototyping; data analysis, exploration, and visualization; scientific and engineering graphics; application development, including Graphical User Interface building (cimss.ssec.wisc.edu).

The main features of MATLAB are stated as follows (mathworks.com):

a. High-level language for scientific and engineering computing;
b. Desktop environment tuned for iterative exploration, design, and problem-solving;
c. Graphics for visualizing data and tools for creating custom plots;
d. Applications for curve fitting, data classification, signal analysis, and many other domain-specific tasks;
e. Add-on toolboxes for a wide range of engineering and scientific applications;
f. Tools for building applications with custom user interfaces; and
g. Royalty-free deployment options for sharing MATLAB programs with end users.

It also should be noted that MATLAB comes with a simulation and model-based design called Simulink. It is described as follows:

Simulink is a block diagram environment for multi-domain simulation and Model-Based Design. It supports simulation, automatic code generation, and continuous test and verification of embedded systems. Simulink provides a graphical editor, customizable block libraries, and solvers for modeling and simulating dynamic systems. It is integrated with MATLAB, enabling you to incorporate MATLAB algorithms into models and export simulation results to MATLAB for further analysis (www.mathworks.com).

MATLAB has a free 30-day free-trial period. The six trial packages available during this period include (1) Data Analytics, (2) Image Processing and Computer Vision, (3) Signal Processing and Communications, (4) Computational Finance, (5) Control Systems, and (6) Computational Biology (mathworks.com).

NetLogo

First appearing in 1999, NetLogo is a free multi-agent programmable modeling environment utilized by tens of thousands of students, educators and researchers across the globe to simulate natural and social phenomena. NetLogo also powers HubNet participatory simulations. It is authored by Uri Wilensky and developed at the Northwestern University's Center for Connected Learning and Computer-Based Modeling (CCL) where he is a professor. The advantages of NetLogo are stated as follows (ccl.northwestern.edu):

a. particularly well suited for modeling complex systems developing over time;
b. allows users to open simulations and 'play' with them, while exploring their behavior under various conditions;
c. provides an authoring environment which enables users to develop their own models;
d. serves as a powerful tool for researchers in many fields;
e. provides extensive documentation and tutorials, a Models Library, and a large collection of pre-written simulations that can be used and modified;
f. allows users to utilize simulations that address content areas in the natural and social sciences including biology and medicine, physics and chemistry, mathematics and computer science, and economics and social psychology;
g. is the next generation of the series of multi-agent modeling languages including StarLogo and StarLogoT; and
h. runs on the Java virtual machine, so it works on all major platforms (Mac, Windows, Linux, etc.); runs as a desktop application; and a command line operation is also supported.

The preceding advantages are made possible by NetLogo's features which are listed as follows (ccl.northwestern.edu):

a. System: free, open source; cross-platform: runs on Mac, Windows, Linux, etc.; international character set support;
b. Programming: fully programmable; approachable syntax; language is Logo dialect extended to support agents; mobile agents (turtles) move over a grid

of stationary agents (patches); link agents connect turtles to make networks, graphs, and aggregates; large vocabulary of built-in language primitives; double precision floating point math; first-class function values (also known as anonymous procedures, closures, lambda); runs are reproducible cross-platform;

c. Environment: command center for on-the-fly interaction; interface builder with buttons, sliders, switches, choosers, monitors, text boxes, notes, output area; info tab for annotating your model with formatted text and images; HubNet: participatory simulations using networked devices; agent monitors for inspecting and controlling agents; export and import functions (export data, save and restore state of model, make a movie); BehaviorSpace, an open source tool used to collect data from multiple parallel runs of a model; System Dynamics Modeler; NetLogo three-dimension for modeling three-dimensional worlds; headless mode allows doing batch runs from the command line;
d. Display and visualization: line, bar, and scatter plots; speed slider lets you fast forward your model or see it in slow motion; view your model in either two-dimension or three-dimension; scalable and rotatable vector shapes; turtle and patch labels; and
e. Application program interfaces (APIs): controlling API allows embedding NetLogo into a script or application; extensions API allows adding new commands and reporters to the NetLogo language; open source example extensions are included.

NVivo

Designed to be used on Microsoft Windows, the first NVivo software was developed by Lyn and Tom Richards in 1999. It was called NUD*IST and comprised tools for detailed analysis and qualitative modeling. NVivo is produced by QSR (Qualitative Software Research) International, and it has emerged as one of the leading qualitative data analysis (QDA) computer software packages. Qualitative researchers in academia, government, and business working with rich text-based and/or multimedia information in which deep levels of analysis on small or large volumes of data are required have found NVivo extremely useful (us.sagepub.com; qsrinternational.com). The following is what QSR International, says about the utility of its software:

> NVivo is software that supports qualitative and mixed-methods research. It's designed to help you organize, analyze and find insights in unstructured or

> qualitative data like interviews, open-ended survey responses, articles, social media and web content. When working with qualitative data, if you don't use NVivo, your work will be more time consuming, challenging to manage, and hard to navigate. Importantly, completing this kind of research without software can make it very hard to discover connections in your data and find new insights that will give you an edge. NVivo gives you a place to organize and manage your material so that you can start to find insights in your data. It also provides tools that allow you to ask questions of your data in a more efficient way (qsrinternational.com/). QSR International adds that a researcher using NVivo provides the opportunity for a researcher to 'work more efficiently; save time; quickly organize, store and retrieve data; uncover connections in ways that are not possible manually; and rigorously back-up findings with evidence' (qsrinternational.com). The other benefits NVivo provides include the portability of the research, working anywhere, keeping projects secure, collaborating with other researchers; and accessing team-based solutions. NVivo also has a 14-day free trial package that can allow a researcher to switch between editions (qsrinternational.com).

Furthermore, the laudation for NVivo and caution provided by Pat Bazeley are worth quoting here for the researcher who would like to use the software:

> NVivo has been developed by researchers, with extensive researcher feedback, and is designed to support researchers in a varied way [as] they work with data. The use of a computer is not intended to supplant time-honoured ways of learning from data, but to increase the effectiveness and the efficiency of such learning. The computer's capacity for recording, sorting, matching and linking can be harnessed by the researcher to assist in answering their (sic) research questions from the data, without losing access to the source data or contexts from which the data have come (Bazeley 2007:2).

R

First appearing in 1993 and designed by Ross Ihaka and Robert Gentleman, and developed by the R Core Team, the R software system operates on a dynamic multi-paradigm that is array, functional, object-oriented, procedural, and reflective. This free software is utilized for statistical computing (classical statistical tests, classification, clustering, linear and nonlinear modeling, time-series analysis, etc.) and graphical techniques. As an Open Source route for participation by any researcher, R is a highly extensible software that is used to compile and run data on a wide variety of macOS, UNIX, FreeBSD, Linus and Windows platforms. R

is a GNU (a recursive accronym which stands for 'GNU's not Unix') project: i.e. a mass collaborative initiative for the development of free software (r-project.org).

According to the R Core Team, 'One of R's strengths is the ease with which well-designed publication-quality plots can be produced, including mathematical symbols and formulae where needed. Great care has been taken over the defaults for the minor design choices in graphics, but the user retains full control' (r-project.org). The Team also states the following features of the program:

a. an effective data handling and storage facility;
b. a suite of operators for calculations on arrays, in particular matrices;
c. a large, coherent, integrated collection of intermediate tools for data analysis;
d. graphical facilities for data analysis and display either on-screen or on hardcopy; and
e. a well-developed, simple and effective programming language which includes conditionals, loops, user-defined recursive functions and input and output facilities.

The R software has both strengths and weaknesses. As it pertains to its strengths, Andy Field, Jeremy Miles and Zoë Field state that 'the beauty of R is that it can be expanded by downloading packages that add specific functionality to the program…These packages as well as the software itself are stored in a central location known as CRAN (Comprehensive R Archive Network). Once a package is stored in the CRAN, anyone with an Internet connection can download it from CRAN and install it to use within their (sic) own capacity of R. R is basically a big global family of fluffy altruistic people contributing to the goal of producing a versatile data analysis too that is free for everyone to use' (2012:63). Also, as John Fox and Sanford Weisberg state, 'In addition to the common arithmetic operators, R includes many–literally hundreds–of functions for mathematical operations, for statistical data analysis, for making graphs, and for other purposes' (2011:4).

Nonetheless, in terms of its weaknesses, as Philip H. Pollock III says that while 'R is powerful, flexible, richly supported, increasingly popular, and free…R is hard; the learning curve is steep. The R interface can be described as either retro or primitive…Although a handful of promising graphical user interfaces (GUIs) exist, R's core power is unlocked by the keyboard, not the mouse. (Yes, R is command line.) Because different programmers have contributed to R's development, not all commands adhere to the same syntactical rules' (2014:2).

SAS

The Statistical Analysis System (henceforth, SAS) software was developed at North Carolina State University from 1966 to 1976, when it was initially released. The development of the software continued during the 1980s and 1990s under the auspices of the SAS Institute when it was incorporated. The software can be used on the International Business Machines (henceforth, IBM) mainframe, OpenVMS Alpha, Unix/Linux, and Windows operating systems. The software is utilized for advanced analytics, business intelligence, data management, multivariate analyses, and predictive analytics. New statistical procedures, additional components, and JMP (more on this later) have been added to the program. In 2004, a point-and-click interface was added in version 9; and in 2010, a social media analytics product was added.

SPSS

The Statistical Package for the Social Sciences (henceforth, SPSS) was long produced and released in 1968 by SPSS Inc. It was acquired by IBM in 2009 and is now referred to as IBM SPSS Statistics. Its companion products in the same family include collaboration and deployment of batch and automated scoring service, IBM SPSS Data Collection, data mining, IBM SPSS Modeler, and text analytics, all of which are employed for survey authoring and deployment, health sciences, and business. SPSS operates on a Java platform and used in Linux, Linux on z Systems, macOS, and Windows (ibm.com).

The SPSS program is described by its owner as a 'leading statistical software used to solve a wide variety of business and research problems. This powerful tool provides a range of techniques, including ad-hoc analysis, hypothesis testing and reporting, to make it easier to access and manage data, select and perform analyses and share your results. The solution offers a base edition with optional add-ons that can be activated to expand your predictive analytics capabilities as you need them' (ibm.com). The software is characterized as having (a) a comprehensive set of statistical tools, (b) improved decision-making, and (c) flexibility and cost-effectiveness.

Pollock III provides us with important information about the various SPSS releases as follows: 'There are many commonalities across releases…including the graphic dialogs and the Chart Editor. Although SPSS [now] uses one editor for all graphics output, there are currently two ways to obtain unedited charts: the Legacy Dialogs and Chart Builder. Chart Builder was meant to be a

one-stop, easy-to-use vehicle for constructing any chart, from the simple to the complex. However, the Legacy Dialogs offer superior flexibility and intuitiveness' (2012:xiv).

STATA

Originally authored by William Gould and developed by StataCorp in 1985, the Stata software is used by biomedical experts, economists, epidemiologists, political scientists and sociologists engaged in research. It is a complete and integrated software that operates on Linus, macOSX, Unix and Windows platforms and utilized for custom programming, data management, graphic designs, regression and other statistical analyses, and simulations. The various packages of Stata/MP (Multiple Processors) for multiprocessor computers (including dual-core and multicore processors) include (a) Stata/SE (Special Edition) for large databases; (b) Stata/IC (Intercooled), which is the standard version; and (c) Small Stata, which is a smaller, student version for educational purchase only (stata.com).

Stata features data management facilities that provide a researcher with complete control of all types of data; matrix programming with Mata that helps a researcher to compile what s/he types into bytecodes, optimizes it, and executes it fast; documentation of over 12,000 pages in 23 volumes; free technical support; extensive new features added by developers and users every day; and cross-platform compatibility. Other valuable resources offered by Stata include the following (stata.com):

a. The *Stata Journal* which is a quarterly publication containing articles about statistics, data analysis, teaching methods, and effective use of Stata's language. The journal publishes reviewed papers together with shorter notes and comments, regular columns, book reviews, and other material of interest to researchers applying statistics in a variety of disciplines.
b. The Stata Press which publishes books, manuals, and journals about Stata and general statistics topics for professional researchers of all disciplines.
c. The *Stata News* which is a free quarterly publication containing articles on using Stata, announcements of new releases and updates, training schedules, new books, Conferences and Users Group meetings, new products, and other announcements of interest to Stata users.
d. The Stata Not Elsewhere Classified (NEC) Stata Blog which keeps users up to date about all things related to Stata, including product announcements, service announcements such as on-site and public training, and timely tips and comments related to the use of Stata. Individually signed, the articles in

the NEC Stata Blog are written by the same people who develop, support, and sell Stata. NEC is informal but useful, and even entertaining.

e. Training for users who would like to become proficient at Stata quickly. Stata provides hands-on public training courses, customized on-site training courses, and online training through NetCourses and video tutorials.

f. Video tutorials for new users to Stata who want to learn a new feature in Stata and professors looking for aids in teaching with Stata.

Pollock III also informs us that on the command side of STATA, a researcher can find the same step-by-step functions of the program across the various releases. On the graphics side of the software, however, things are different: whereas the earlier versions of STATA had drop-down functionality to the program's command-driven graphics capabilities, the later versions feature a graphics editor (Graph Editor) that allows a user to add content- and appearance-enhancing features (Pollock III 2011:xiii).

Furthermore, Stata provides evaluation licenses only to professional researchers who want to explore all the features of Stata while making purchasing decisions. The trial period lasts for 30 days (stata.com).

Other Internet Tools

There are other free Internet tools that can be harnessed to conduct serious research on African phenomena. Discussed here are free online survey tools, METANET, and social media.

Free Online Survey Tools

WebpageFX has done a good job in comparing 11 of the top free online survey tools in terms of types and numbers of surveys, questions, respondents, question design options, and data export options. The 11 survey tools compared, and their rankings are (1) Google Forms, (2) SurveyMonkey, (3) Typeform, (4) SurveyLegend, (5) Polldaddy, (6) Survey Planet, (7) SurveyNutts, (8) Zoho Survey, (9) FreeOnlineSurveys, (10) SDurvs, and (11) SurveyGizmo (webpagefx.com).

METANET

As Alshameri and I point out, the proposed approach for mining massive datasets for studying Africa from an African-centric perspective depends on the METANET concept: a heterogeneous collection of scientific databases envisioned as a national and international digital data library which would be available via

the Internet. We consider a heterogeneous collection of massive databases such as remote sensing data and text data (Bangura 2009a:79, Alshameri and Bangura 2013:352).

Through METANET, Data Documentation Initiative (DDI) and OpenSurvey methodologies can be used to collect data in areas where the technological infrastructure is less developed and less consistent. DDI allows researchers to use XML-based tools, using open standards, to access extensive machine-readable textual descriptions of past surveys, and make them more readily available. OpenSurvey will make it possible for researcher to use survey software and open source software to generate data. The common tools the researcher can use through open survey are (a) AskML, an XML-based metadata standard for a survey instrument, and (b) TabsML, an instrument used to access crosstab reports (Bangura 2009a:79, Alshameri and Bangura 2013:352).

Social Media

ClickZ has done a good job in comparing the top ten social media research tools. The owners of six of these tools charge fees. The following are the four that are free of charge and their capabilities, according to ClickZ (clickz.com):

1. Google Trends is a free tool from Google that a researcher can use to spot trends happening currently in the world. It shows the hottest searches currently going on and a researcher can drill in to find out a little bit more about the trends. This can be useful in creating content on the fly and being relevant to current conversations.
2. Google Insights is a little different than the Trends tool in that a researcher can choose the terms s/he wants to compare in trending. This is helpful in discovering if one word is used more than another, or perhaps one person is more popular than another. It gives a researcher a country breakdown of the popularity too.
3. Twitter Trends are used to look at conversational trends, and identifying those trends that are not promoted can lead a researcher into conversations that are very relevant during the moment and can gain him/her quick insight.
4. Technocrati can help a research team to find key influencers in a community in order to build relationships. By searching on either 'Blog' or 'Post' for certain key phrases, a researcher can discover who the key bloggers are that have some sort of 'sway' with their followers.

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