



## DATA ANALYSIS, INTERPRETATION AND PRESENTATION: SELLECTING APPROPARIMATE TOOLS FOR DATA ANALYSIS

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**Abstract:** The aim of this article is to provide and share several tools for analyzing researchable data collected from research participants or research respondents or even secondary data, be it quantitative research methodology or qualitative research methodology. In order to achieve the aim of this article, the researchers carefully itemized and discuss how tools for analyzing quantitative data would be used such tools are: R Programming, Tableau Public, Python, SAS, Apache Spark, Excel, Rapid Miner, KNIME, QlikView, Splunk. Moreover, the tools for analyzing qualitative data are: NVivo, ATLAS.ti, MAXQDA, QUIRKOS, DEDOOSE, PROVALIS RESEARCH TEXT, Raven's Eye, and Hyper RESEARCH. Finally, the researchers suggested numerous recommendations for practical intervention.

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### Introduction

Data analysis and presentation is very important for both academic studies, commercial, industrial and marketing activities as well as professional practices. However, it is necessary to make use of collected data which is considered to be raw data which must be processed to put for any application. Data analysis helps in the interpretation of data and take a decision or answer the research question. In every scientific research before any data that would be analyzed, interpreted and presented, research questions must be formulated and during the analysis, the data collected must tally with the research questions, same as the interpretation and presentation of results. Furthermore, there are different tools for data analysis and also there are different ways in which data can be interpreted and present in both qualitative and quantitative research methodology. The next section will discuss and explain different

tools for data analysis for both qualitative and quantitative research.

### TOOLS FOR QUANTITATIVE DATA ANALYSIS

#### 1. R Programming

R is the leading analytics tool in the industry and widely used for statistics and data modeling. It can easily manipulate researchable data and present it in different ways. It has exceeded SAS in many ways like capacity of data, performance and outcome. R compiles and runs on a wide variety of platforms viz -UNIX, Windows and MacOS. It has 11,556 packages and allows researchers to browse the packages by categories. R also provides tools to automatically install all packages as per user requirement, which can also be well assembled with Big data.

#### 2. Tableau Public

Tableau Public is a free software that connects any data source be it corporate Data Warehouse, Microsoft Excel or web-based data, and creates data visualizations, maps, dashboards etc. with



real-time updates presenting on web. They can also be shared through social media or with the client. It allows the access to download the file in different formats. If you want to see the power of tableau, then we must have very good data source. Tableau's Big Data capabilities makes them important and one can analyze and visualize data better than any other data visualization software in the market.

### **3. Python**

Python is an object-oriented scripting language which is easy to read, write, maintain and is a free open source tool. It was developed by Guido van Rossum in late 1980's which supports both functional and structured programming methods. Python is easy to learn as it is very similar to JavaScript, Ruby, and PHP. Also, Python has very good machine learning libraries viz. Scikitlearn, Theano, Tensorflow and Keras. Another important feature of Python is that it can be assembled on any platform like SQL server, a MongoDB database or JSON. Python can also handle text data very well.

### **4. SAS**

SAS is a programming environment and language for data manipulation and a leader in analytics, developed by the SAS Institute in 1966 and further developed in 1980's and 1990's. SAS is easily accessible, manageable and can analyze data from any sources. SAS introduced a large set of products in 2011 for customer intelligence and numerous SAS modules for web, social media and marketing analytics that is widely used for profiling customers and prospects. It can also predict their behaviors, manage, and optimize communications.

### **5. Apache Spark**

The University of California, Berkeley's AMP Lab, developed Apache in 2009. Apache Spark is a fast large-scale data processing engine and executes applications in Hadoop clusters 100 times faster in memory and 10 times faster on disk. Spark is built on data science and its concept makes data science effortless. Spark is also popular for data pipelines and machine learning models development. Spark also includes a library – MLlib, that provides a progressive set of machine algorithms for repetitive data science techniques like Classification, Regression, Collaborative Filtering, Clustering, etc.

### **6. Excel**

Excel is a basic, popular and widely used analytical tool almost in all industries. Whether you are an expert in Sas, R or Tableau,

you will still need to use Excel. Excel becomes important when there is a requirement of analytics on the client's internal data. It analyzes the complex task that summarizes the data with a preview of pivot tables that helps in filtering the data as per client requirement. Excel has the advance business analytics option which helps in modelling capabilities which have prebuilt options like automatic relationship detection, a creation of DAX measures and time grouping.

### **7. RapidMiner:**

RapidMiner is a powerful integrated data science platform developed by the same company that performs predictive analysis and other advanced analytics like data mining, text analytics, machine learning and visual analytics without any programming. RapidMiner can incorporate with any data source types, including Access, Excel, Microsoft SQL, Tera data, Oracle, Sybase, IBM DB2, Ingres, MySQL, IBM SPSS, Dbase etc. The tool is very powerful that can generate analytics based on real-life data transformation settings, i.e. you can control the formats and data sets for predictive analysis.

### **8. KNIME**

KNIME Developed in January 2004 by a team of software engineers at University of Konstanz. KNIME is leading open source, reporting, and integrated analytics tools that allow you to analyze and model the data through visual programming, it integrates various components for data mining and machine learning via its modular data-pipelining concept.

### **9. QlikView**

QlikView has many unique features like patented technology and has in-memory data processing, which executes the result very fast to the end users and stores the data in the report itself. Data association in QlikView is automatically maintained and can be compressed to almost 10% from its original size. Data relationship is visualized using colors – a specific color is given to related data and another color for non-related data.

### **10. Splunk:**

Splunk is a tool that analyzes and search the machine-generated data. Splunk pulls all text-based log data and provides a simple way to search through it, a user can pull in all kind of data, and perform all sort of interesting statistical analysis on it, and present it in different formats.

### **TOOLS FOR QUALITATIVE DATA ANALYSIS**



Some tools for qualitative data analysis can be apply for mixed methods, meanwhile, it allows researchers to integrate numerical and textual data into a single project and to seamlessly move back and forth between quantitative and qualitative data analysis.

### **1. NVivo**

NVivo is a software program used for qualitative, in some cases it used for mixed-methods research. Specifically, it is used for the analysis of unstructured text, audio, video, and image data, including (but not limited to) interviews, focus groups, surveys, social media, and journal articles. It is produced by QSR International. As of July 2014, it is available for both Windows and Macintosh operating systems; however, the Macintosh version is missing some of the features that the Windows version has.

### **2. ATLASiti**

ATLASiti, is a computer software used to analyzed qualitative data. It is a powerful workbench for qualitative data analysis, particularly for large sections of text, visual and audio data. This software offers support to the researcher during the data analysis process, in which where texts are analysed and interpreted using coding and annotating activities. The trial version of ATLASiti has no expiration date. It is fully functional except for the following limitations. It is not possible to save projects that exceed a certain size, although you can open and use projects of any size. Maximum allowable sizes are:

- 10 primary documents (of unlimited size)
- 100 quotations (= data segments)
- 50 codes
- 30 memos
- 10 network views
- Auto backup is disabled.

### **3. MAXQDA**

MAXQDA it can be analyses both qualitative, quantitative and mixed methods, it has more advantages that other tools. It is also a professional software solution for qualitative, quantitative and mixed methods data analysis – for both Windows and Mac – used by thousands worldwide. Released in 1989, it has a long history of providing researchers with powerful and easy-to-use analytical tools to help make every research project a success. Analyze interviews, reports, tables, surveys, focus group discussions, videos, audio files, literature, images and more. You can easily organize and categorize any kind of unstructured data,

search and retrieve information, test theories and create impressive illustrations and reports. MAXQDA has transcription tools onboard as well as multimedia functions to directly analyze all kinds of media files. Outstanding mixed methods features allow you to combine standardized quantitative data with qualitative information.

### **4. QUIRKOS**

QUIRKOS is a qualitative data analysis of text data, commonly used in social science research .It provides a graphical interface in which the nodes or themes of analysis are represented by bubbles. It is designed primarily for new and non-academic users of qualitative data, to allow them to quickly learn the basics of qualitative data analysis.

### **5. DEDOOSE**

DEDOOSE is a software used to analyzed qualitative data and facilitates the coding and their integration with demographic and other quantitative data. Dedoose is in use by marketing, ethnographic, clinical trial, social policy, education, and other research professionals. Dedoose is a SaaS application, so simply accessing the Dedoose website and logging in is all that is required to utilize the service-although we encourage the use of the desktop app as noted above.

### **6. PROVALIS RESEARCH TEXT**

Provalis Research Text Analytics Software allows you to perform advanced computer assisted qualitative coding on documents and images using QDA Miner, to apply the powerful content analysis and text mining features of WordStat on textual data, and to perform advanced statistical analysis on numerical and categorical data using SimStat. The interoperability of Provalis Research Text Analytics Tools (QDA Miner, WordStat and SimStat) allows researchers to integrate numerical and textual data into a single project and to seamlessly move back and forth between quantitative and qualitative data analysis. For example, one can easily analyse relationships between closed and open-ended survey questions, identify social media topic trends over time, find out how supporters' comments differ from those of detractors, or easily explore differences in word usage between gender, age groups, or geographic locations.

### **7. Raven's Eye**

Researchers use Raven's Eye to automatically analyze natural language data and produce themes and model statements that capture the thoughts of any sampled population in their own



vocabulary. In this way, Raven's Eye provides powerful and instantaneous insight into the thoughts evoked, and words used to describe, an experience or perspective.

#### **8. Hyper RESEARCH**

HyperResearch is a qualitative software for coding and analysis of text, video and audio data. It is the only major QDA that allows user to install on more than 2 computers. It also provides a flexible range of different ways to handle the analysis of qualitative data - good coding tools, memoing, case-based data organisation, in-context retrieval, interrogation and mapping functions are applicable to multiple media data types. HyperTranscribe (sister package) provides compatible transcription of digital media

#### **9. F4analyse**

F4analyse can be installed on Mac, Windows, and Linux systems. This lightweight coding tool is excellent for transcribing and coding interviews. It can import the audio file and transcribe the texts directly in F4analyse as you listen to the audio recording. The transcripts will have automatic timestamps for each line, making it very easy to locate a sentence in the original recording. The coding of the transcripts are easy to use, you can color-code your codes, drag and drop them to form structures, and filter text snippets based on your search criteria. F4analyse supports multiple languages, an important factor for any multilingual researcher. Although it is not as feature-rich as NVivo and

Dedoose, F4analyse does generate a number of tables and charts that help you visualize your data.

#### **Conclusion**

This paper highlighted different tools for both qualitative and quantitative data analysis that can help scholars from different disciplines to select appropriate tools for analyzing their data. The paper also highlighted some tools for analyzing mixed methods research in some of the qualitative tools, though most of the qualitative tools also has the advantages of analyzing mixed methods research data. This paper is also expected to help scholars to look at the different ways or methods of interpreting and presenting a research data.

#### **Recommendation**

Based on the several literature consulted by the researchers of this article, the following are their recommendations:

1. Universities, polytechnics and colleges of education should be frequently organizing conferences and workshops aims at educating students and faculty members how to use data analysis tools.
2. Video recordings on tools for analyzing researchable data should be made available in university library or college library.
3. PDF or Word format text on tools for data analysis should be share via universities' or college's websites, blog, wastap group, Facebook group and Twitter handle.