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Statistical Tools for Research Scholars: A Comparative Study of SPSS and PSPP

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Abstract

Data analysis involves a variety of techniques under various different names and that are used in various education, business, science and social science domains. It deals with the collection, organisation, analysis and drawing of inferences from the samples to the whole population or target audience. There have been number of open sources, free and commercial statistical tools available for data analysis. In this article the authors are focusing to highlight the different features and functions available in two popular data analysis tools like SPSS and PSPP. The comparison of SPSS proprietary and PSPP open source software for data analysis and statistical tools used for the research work.

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Keywords

Data Analysis, Statistical Software, Data Management, SPSS, PSPP, Proprietary software, Open Source software

Introduction

Data analysis is the process of monitoring, clearing, modifying, and modelling data with the purpose of finding useful information, concluding and supporting decision making. Statistical software's help in analysis of data manipulates the information; they possess to discover patterns which can help the user profits. Analysis of Variance, Bayesian Analysis, Categorical Data Analysis, Casual inference, Cluster Analysis, Descriptive Statistics, Multivariate Analysis, Regression Analysis, Spatial Analysis etc.

Bansal & Srivastava (2018) noted that the statistical tool is popular in its own feature like cost, visualization, packages, statistics, etc. In their study, some of the top tools have been taken that are used in data analysis then comparison is done based on some important factors to know the best tool in data science field. They also find out the factors that taken into consideration are cost, data handling capabilities, graphical capabilities, big data, etc. They made comparison on the basis of rating of 1 to 5 and by their own experiences on various data analysis tools. This study considers the facts that researchers has said in their published papers.

For this study collected more than 50 articles for the review, and displayed only relevant literature in this section they are as follows;

1. The role of statistical software in data analysis (Abatan & Olayemi, 2014).
2. Basic statistical tools in research and data analysis (Ali & Bhaskar, 2016).

3. The importance of statistical tools in research work (Begum & Ahmed, 2015).
4. Evaluation of statistical packages for suitability for use by clinical investigators in medicine (Chan & Portnoy, 1988).
5. Statistical techniques and tools for describing and analyzing data in research (Karthikeyan, Kumar, & Thirunavukkarasu, 2018).
6. Selection of Statistical Software for Data Scientists and teachers. (Ozgur, Dou, & Rogers, 2017).
7. A comparative study of open source software and proprietary software in libraries. (Rahi, 2017).
8. Use of statistical packages for designing and analysis of experiments in agriculture (Sharma, & Mehta, 2014).
9. Comparative study: proprietary software vs. open source software (Sood, Shipra, & Soni, 2016).
10. Comparison of statistical packages (Wikipedia. 2019).

Objectives of the study

The main objectives of the study were as follows:

1. To find the features and functions of both SPSS and PSPP statistical tools
2. To Find out the statistical techniques used in these tools
3. To understand the popularity and use of the investigator
4. Ability to apply fundamental concepts in exploratory data analysis
5. To have a proper understanding of statistical applications used by the investigator

Materials and Methods

Methodology is a way to systematically solve the research problem. It may be understood as a science of studying how the research is done scientifically. Based on the practical experiences the investigators tried to explore the features, functions and overall process of both SPSS and PSPP software.

Results and Discussion

The GUI and CLL based statistical tools of SPSS proprietary and PSPP open source software selected for this study. The detailed features, use and the output of both PSPP and SPSS statistical tools are clearly highlighted in the Table 1. The open source software PSPP of GNU Project was launched in the year 1997 and proprietary software of SPSS IBM Corporation product was launched in the year 1989.

The cost of IBM SPSS Base v25 is $1,250 USD* per year but, the PSPP is available free with open source. The PSPP written in C language will support only for statistical analysis, but SPSS written in Java and support for statistical analysis, data mining, text analytics and so on.

Table 2 highlights that the features and functions of both PSPP and SPSS statistical tools. The SPSS listed all the values, but the PSPP have only 10 features. The remaining 6 functions like Regression, Time series analysis, mixed model, Charts and diagrams, MANOVA and import excel file is not more useful for the basic analysis users.

Table 3 indicates that the comparison of the operational functions in the main menu of both SPSS and PSPP statistical analysis tools. The majority of the operational functions icons are available in the main menu of both SPSS and PSPP software, where as the only add-on operational function icon is not available in the PSPP statistical analysis tools software. But, all operational function icons are more important for the researchers for their accurate statistical result.

Table 4 indicates that the comparison variable value of both SPSS and PSPP statistical analysis tools. Where as in the table PSPP software doesn't have the Arranged from variable value and the other side Role variable value is not available in the SPSS statistical software. But, all variable value function icons are the same in both statistical analysis tools.

The Table 5 reveals that to focus on the tool bars as well as the three main areas are used by the research scholars for their research work is DATA VIEW, VARIABLE VIEW, DATA MENU, TRANSFORM and ANALYSIS. The SPSS statistical analysis tools will provide more user friendly options while, variable view comparative to PSPP, because the SPSS software is almost 25 versions available in the market and more users friendly but the PSPP statistical analysis tool is so infant tool rather than SPSS software.

Table.1 Comparison of details of SPSS and PSPP statistical tools

Sl.No.	Description	PSPP	SPSS
1	Developer(s)	GNU Project	IBM Corporation
2	URL	www.gnu.org/s/pspp/	www.ibm.com/SPSS-Statistics/Software
3	Logo		
4	Price	Free and Open Source Software	- IBM SPSS Base v25- $1,250 USD*/ Year. - IBM SPSS Statistics Standard v25 - $2,770 USD*/Year. - IBM SPSS Statistics Professional v25 -$5,560 USD*/Year. - IBM SPSS Statistics Premium v25 - $8.290 USD*/Year.
5	Stable release	1.2.0 (2018)	25.0 (2017)
6	Operating System	GNU, MacOS, Windows, Linux, BSD, Unix	Windows, MacOS, BSD, Linux on z Systems, Linux, Unix, and Cloud
7	Written in	C	Java
8	Size	~40.9 MB	~700 MB
9	Type	Statistics	Statistical analysis, data mining, text analytics
10	Developers	GNU Project	IBM
11	License	GPL (1983)	Trialware or SaaS (1968)
12	Copyright	1997, 1998, 2004, 2005, 2007, 2010, 2014 - 2016	1989, 2017
13	Interface	CLL, GUI	CLL, GUI
14	Scripting languages	Perl (by PSPP-Perl)	R, Python, SaxBasic
15	Output format	ASCII, PDF, PostScript, SVG or HTML	PDF, XLS, HTML, XML, JPEG, PNG, and BMP

Note: SPSS= *Statistical Package for the Social Sciences;* SaaS = *Software as a Service;* GPL = *General Public License*

Table.2 Comparison of features and functions of SPSS and PSPP statistical tools

Sl.No.	Features / Functions	PSPP	SPSS
1	Base stat	√	√
2	Graphical capabilities	√	√
3	Numerical-analysis	√	√
4	Import Text file	√	√
5	Import Excel file	X	√
6	One way ANOVA	√	√
7	Two way ANOVA	√	√
8	MANOVA	X	√
9	GLM	√	√
10	Mixed model	X	√
11	Charts and diagrams	X	√
12	Normality tests	√	√
13	Time series analysis	X	√
14	Regression	X	√
15	Data handling capabilities	√	√
16	Multiple data analysis	√	√

Note: ANOVA = *Analysis of Variance;* GLM = *General linear model;* MANOVA = *Multivariate Analysis of Variance*

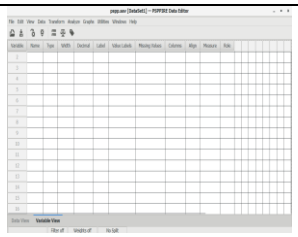
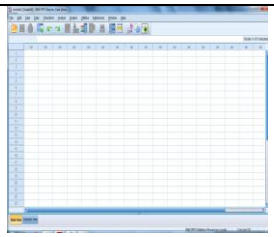
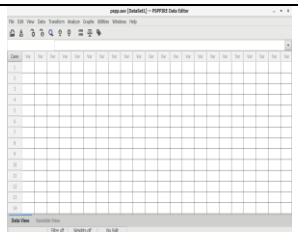
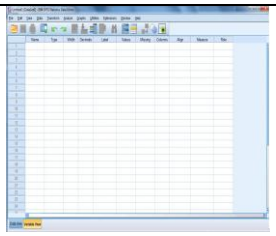
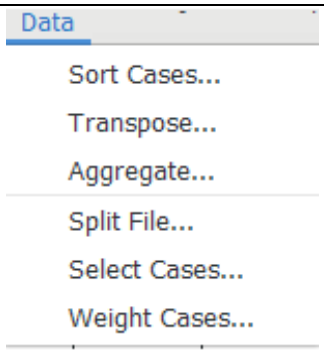
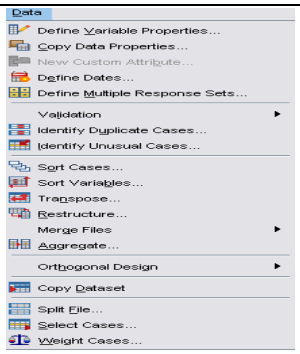
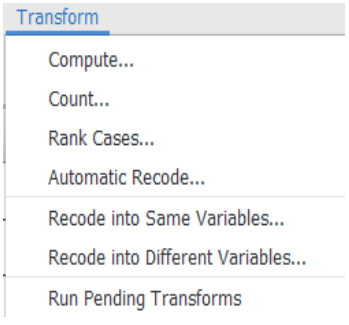
Table.3 Comparison of main menu of both SPSS and PSPP

Sl. No.	Operation	PSPP	SPSS
1	File	√	√
2	Edit	√	√
3	View	√	√
4	Data	√	√
5	Transform	√	√
6	Analysis	√	√
7	Graphs	√	√
8	Utilities	√	√
9	Add-On	X	√
10	Windows	√	√
11	Help	√	√

Table.4 Comparison of variable value of both SPSS and PSPP

Sl.No.	Description	PSPP	SPSS
1	Name	√	√
2	Variable Type	√	√
3	Width	√	√
4	Dimension	√	√
5	Label	√	√
6	Value	√	√
7	Column	√	√
8	Align	√	√
9	Measure	√	√
10	Role	√	X
11	Arranged from	X	√

Table.5 Important parts of both SPSS and PSPP tools

Sl.No.	Description	PSPP	SPSS
1	Tool Bars		
2	Variable View		
3	Data View		
4	Analysis Menu		
5	Data Menu		
6	Transform		

In conclusion, Statistical tools are wide subject, useful in almost all disciplines especially in research studies. Based on the result of their quality assurance of the work must be dealt with: the statistical operations and interpretation part of the work. The statistical value lies with organizing and simplifying data, to permit some objective estimate showing that an analysis is under control. And also equally important is that the results of the statistical procedures are accurately recorded and can be retrieved simultaneously. In this paper, the authors have focused on the two important statistical tools like SPSS and PSPP software were critically examined and explained for the purpose of to get the accurate results in research works like preparations of thesis and dissertations for different subject fields. One should have the skill of selecting a statistical tool for their research work which renders good result and conclusions. Further, the more information can be given for the researchers for their future research works.

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