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# DECIPHERING THE COMPARATIVE PERFORMANCE ANALYSIS OF STATISTICAL TOOLS SPSS AND R SOFTWARE

**Rolando Real Codilan**

*Instructor, College of Computer Studies, Eastern Samar State University, Borongan City, Philippines*

## ABSTRACT

*This study was to decipher the performance level of R and SPSS software in terms of responsiveness and speed stability. The best performing software between the two was identified using criteria as guidelines. From the study and experiment conducted the results it yielded, the study, therefore concludes that R software was way better than SPSS software in Speed and Responsiveness. It appears on the results that the R software consumes quietly a lesser time to complete the process than SPSS software, in Windows 8 platform R software was poor in stability and R software has several cases of "Not Responding". R software was proved to have poorly built-in memory (the program itself), R shows an error message during importing large data in the third time. SPSS can import large data that has 1 million observation approximately. SPSS should be used when one is working with large amount of data, because of its ease of use for the users.*

**KEYWORDS** - *Performance Level; R software; SPSS software.*

## 1. INTRODUCTION

Comparing gadgets, software products was common to us, we compare normally in speed, storage space, accessibility, reliability, durability and other features of the gadgets or software. There are so many software products particularly in statistical software package. Their function are all for statistical analysis but they also differ in performance. Finding the suitable software is important, because companies that employs the efficient data analysis software will compete better against competition by effectively accessing and using their stockpiles of data to make better decision [2]. The Statistical Package for the Social Sciences (SPSS) Inc. was founded in 1975. R is data analysis software: data scientists, statisticians, analysts, quants, and others who need to make sense of data use R for statistical

analysis, data visualization, and predictive modeling. R was first created by Ross Ihaka and Robert Gentleman at the University of Auckland in 1993.

Statistical Tool is a tool that provides a piece of information, the top of the service is the determination of the performance of the system to validate or verify quality attributes of the system like responsiveness, speed, and the design. All data analysis tools have in common is the countless debates about why their software of choice is way better, more advanced, and faster [1]. Comparative research is simple, this just focus on the advantages and the differences between the two object that is going to be compared. Through the definitions comparative research is being conduct by stability under variety of load conditions. The best performance of time behavior and efficiency of

memory usage and CPU usage provide the measure of the performance of a particular statistical tool. Sometimes there might be a bottleneck with the performance of the system like a statistical tool; hence the conduct of the study.

The Comparative Performance Analysis of Statistical Tool SPSS and R Software was ideal for addressing the common problems like Poor response time, Long Load time, Bottlenecking, Operating System limitations, Memory utilization, CPU utilization, and insufficient hardware resources. These kinds of problem may cause the issues like slowing down of running system while simultaneously accessing system by several users, poor usability which is likely to gain the bad reputation.

Comparative research seeks to compare and contrast the statistical tools using Performance Testing. This Performance Testing is best suited to compare SPSS and R Software and find which performs better.

The Performance testing which requires the three types of testing: Load Testing; Stress Testing; Volume Testing, shall compare SPSS and R Software to find which performs better. It can also measure what part of the system or workload causes the system to perform badly. The successful of this comparative study will require a video recorder (Camtasia Studio 8.0.1), a time tracker (Task Manager for Windows,) to determine the memory usage and the CPU usage, and a (Countdown Timer) to determine the time behavior of the Statistical Tool. In order to compare this software, the study have to conduct an examination and testing, but this study does not aim in generating changes on the software.

### **Statement of the Problem**

The objective of this study is to answer the following question (s):

1 What is the performance level of R and SPSS software in terms of:

1.1 Responsiveness and Speed

1.2 Stability

## **2. METHODOLOGY**

In this chapter, different tools and methods that the Researcher planned to use were discussed. There were also hardware and software specifications that helped in the development of the study. The study will utilize several versions of Windows Operating systems. However, only one version of SPSS and R software packages will be used in the series of tests. The different software platforms will only run on the following specified hardware given: desktop, laptop, and net book to really simulate and identify the

performance capability of SPSS and R software packages in this type of computer hardware.

### **Task**

#### *1. Data Gathering*

Collection of information about the performance of SPSS and R Software in related to its functionality and efficiency and other related information.

#### *2. Collection of Research Material*

Downloading trial version of SPSS 20 and R 3.1.1; Collect data sets, other application needed: Camtasia Studio 8.0.1 and Countdown Timer; Gathering computer hardware: Desktop, Laptop, Net book and operating system's: Windows XP, Windows 7, and Windows 8.

#### *3. Conducting the experiment*

Testing SPSS and R Software with the following performance: Responsiveness, Speed and Stability

#### *4. Comparison and Interpretation*

Comparison of the similarities and differences of performance between PSS and R Software. Interpretation of the results, it includes the complete explanations of the findings.

### **Research Design**

This study was a comparative performance analysis, its main objective was to discover the performance of the two software and which of these software was the most efficient in terms of performance. To determine its system performance the study used the comparative method (experimental), and descriptive method, to achieve the main objective; to discover and identify its performance.

### ***The following was the basis in comparing:***

1. Responsiveness and speed – Does the software respond quickly enough?

2. Stability – Does the software behave correctly under load?

### ***Comparative Method:***

This study performed the following testing to be used in comparing the performance capability of SPSS and R software.

### ***Responsiveness and Speed:***

***Load Testing*** – The study are testing some of the main functions and features of the R and SPSS software. Analyzing data in getting the correlation, and etc. This study used 1 million data sets (USCENSUS 1990) as input.

***Start Up Load Test*** – This test was obtained by simply running the program.

***Correlation Load Test*** – Is a data analysis test performed in both software, the Researcher gets the

or more variable.

**Volume Testing** – This is a testing procedure where in different types of data sets with different file sizes are

**Stability:**

**Stress Testing** – This was a test where the Researcher load a large amount of data using the two software (SPSS and R Software) ten times. While the data was being loaded, the Researcher was monitoring and recording if the software behaves correctly before and after loading the large data. The Researcher gets the number of cases that the software didn't respond and its time duration of being not responding. The data set that was used was the USCENSUS 1990.

**Descriptive Method:**

This study would like to clear out that in this method there was no analysis of data that happened that could affect the results. This method was used only for more clearer results for the readers.

**Other Resources:**

**1. Data Set**

Data Sets are files of related records held in the computer. Raw data is needed of this study as an input material in testing. The following are the raw data sets that were used in testing:

1 Million Data Set: USCENSUS 1990, with 1 million observations, and 69 variables. 500,000 Data Set: nmtwins (National Merit Scholarship Qualifying Test scores for a twin series. Each case is an individual) [2015psych.colorado.edu], with 500,000 observations, and 11 variables.

**3. RESULTS AND DISCUSSION**

**Load Testing Results**

**Table 1. Runtime (ms) Comparison of Startup load test**

| RUNTIME (MS)      |         |        |        |         |       |        |          |        |        |
|-------------------|---------|--------|--------|---------|-------|--------|----------|--------|--------|
| Hardware Platform | DESKTOP |        |        | LAPTOP  |       |        | NET BOOK |        |        |
| Windows OS        | XP      | 7      | 8      | XP      | 7     | 8      | XP       | 7      | 8      |
| SPSS              | 82,160  | 45,330 | 19,030 | 140,480 | 7,320 | 12,800 | 47,057   | 2,023  | 46,065 |
| R                 | 34,064  | 1,160  | 1,710  | 34,064  | 170   | 3,330  | 8,505    | 19,321 | 8,095  |

Table above reveals the calculated runtime during the testing using Windows XP, Windows 7 and Windows 8 in different hardware platforms. For the SPSS results in desktop using Windows XP uses 82,160 ms, Windows 7 uses 45,330 ms, Windows 8 used 19,030 ms, in Laptop using Windows XP uses 140,480 ms, Windows 7 used 7,320 ms, Windows 8 used 12,800 ms and in Netbook using Windows XP uses 47,057 ms, Windows 7 used 2,023ms, Windows 8 used 46,065. And for the R results in desktop using Windows XP used

34,064 ms, Windows 7 uses 1,160 ms, Windows 8 used 1,710 ms, in Laptop using Windows XP used 34,064 ms, Windows 7 used 170 ms, Windows 8 used 3,330 ms and in Netbook using Windows XP used 8,505 ms, Windows 7 used 19,321 ms, Windows 8 used 8,056 ms. For correlation test, the result shows that SPSS Software used longest time than R Software.

**Table 2. Memory usage (kb) comparison of startup load test**

| MEMORY USAGE (Kb) |         |        |        |         |        |        |          |        |        |
|-------------------|---------|--------|--------|---------|--------|--------|----------|--------|--------|
| Hardware Platform | DESKTOP |        |        | LAPTOP  |        |        | NET BOOK |        |        |
| Windows OS        | XP      | 7      | 8      | XP      | 7      | 8      | XP       | 7      | 8      |
| SPSS              | 130,612 | 76,692 | 91,300 | 131,888 | 16,600 | 84,172 | 83,388   | 11,556 | 77,200 |
| R                 | 21,680  | 16,600 | 1,000  | 21,680  | 30,524 | 18,800 | 19,628   | 22,556 | 18,800 |

It can be gleaned from the table above the maximum memory usage during the testing using Windows XP, Windows 7 and Windows 8 in different hardware platforms. For the SPSS results in desktop using Windows XP used 130,612 KB, Windows 7

used 76,692 KB, Windows 8 used 91,300, in Laptop using Windows XP used 131,888 KB, Windows 7 uses 16,600 KB, Windows 8 used 84,172 KB and in Netbook using Windows XP used 83388 KB, Windows 7 used 11,556 KB,

Windows 8 used 77,200 KB. For the R software results in desktop using Windows XP used 21,680 KB, Windows 7 used 16,600 KB, Windows 8 uses 91,300, in laptop using Windows XP used 21,660 KB, Windows 7 used 30,524 KB, Windows 8 used 18,800 KB and in Netbook using Windows XP

used 19,628 KB, Windows 7 used 22,556 KB, Windows 8 used 18,800 KB. For the Startup test results of memory usage table shows that SPSS Software used larger amount of memory usage than R Software.

**Table 3. CPU usage (%) Comparison of Startup load test**

| CPU USAGE (%)     |         |    |      |        |    |      |          |    |      |
|-------------------|---------|----|------|--------|----|------|----------|----|------|
| Hardware Platform | DESKTOP |    |      | LAPTOP |    |      | NET BOOK |    |      |
| Windows OS        | XP      | 7  | 8    | XP     | 7  | 8    | XP       | 7  | 8    |
| SPSS              | 51      | 29 | 36.3 | 15     | 28 | 32.8 | 40       | 17 | 31.7 |
| R                 | 0       | 28 | 0    | 0      | 2  | 6.4  | 16       | 35 | 8.7  |

The table above shows the CPU usage during the testing using Windows XP, Windows 7 and Windows 8 in different hardware platforms. For the SPSS results in desktop using Windows XP used 51%, Windows 7 used 29%, Windows 8 used 36.3%, in Laptop using Windows XP used 15%, Windows 7 used 28%, Windows 8 used 32.8% and in Netbook using Windows XP used 40%, Windows 7 used 35%, Windows 8 used 8.7%.

Windows 8 used 31.7%. And for the R results in desktop using Windows XP used 0%, Windows 7 used 28%, Windows 8 used 0%, in Laptop using Windows XP used 0%, Windows 7 used 2%, Windows 8 used 6.4% and in Netbook using Windows XP used 16%, Windows 7 used 35%, Windows 8 used 8.7%. This table shows the CPU usage during start up load test that the SPSS Software used larger amount of CPU usage than R Software.

**Table 4. Runtime(ms) Comparison of Correlation load test**

| RUNTIME (MS)      |         |        |       |        |       |       |          |       |        |
|-------------------|---------|--------|-------|--------|-------|-------|----------|-------|--------|
| Hardware Platform | DESKTOP |        |       | LAPTOP |       |       | NET BOOK |       |        |
| Windows OS        | XP      | 7      | 8     | XP     | 7     | 8     | XP       | 7     | 8      |
| SPSS              | 75,650  | 10,610 | 4,260 | 25,690 | 1,950 | 3,730 | 12,226   | 9,670 | 10,310 |
| R                 | 2       | 710    | 830   | 11,070 | 100   | 160   | 4,403    | 1,795 | 1,602  |

It can be seen from the table above the calculated runtime during the testing using Windows XP, Windows 7 and Windows 8 in different hardware platforms. For the SPSS results in desktop using Windows XP used 75,650 ms, Windows 7 used 10610 ms, Windows 8 used 4,260 ms, in Laptop using Windows XP used 25590 ms, Windows 7 used 1,950 ms, Windows 8 used 3,3,730 ms and in Netbook using Windows XP used 12,228 ms, Windows 7 used 9,60 ms, Windows 8 used

10,310. And for the R results in desktop using Windows XP used 2 ms, Windows 7 uses 710 ms, Windows 8 used 830 ms, in Laptop using Windows XP used 11,070 ms, Windows 7 used 100 ms, Windows 8 used 160 ms and in Netbook using Windows XP used 4,403 ms, Windows 7 used 1,795 ms, Windows 8 used 1,602 ms. For correlation test, the results shows that SPSS Software used longest time than R Software.

**Table 5. Memory usage (Kb) Comparison of Correlation load test**

| MEMORY USAGE (Kb) |         |         |         |         |         |            |          |         |         |
|-------------------|---------|---------|---------|---------|---------|------------|----------|---------|---------|
| Hardware Platform | DESKTOP |         |         | LAPTOP  |         |            | NET BOOK |         |         |
| Windows OS        | XP      | 7       | 8       | XP      | 7       | 8          | XP       | 7       | 8       |
| SPSS              | 159,060 | 19,004  | 134,400 | 180,036 | 158,484 | 140,399    | 155,892  | 129,200 | 115,400 |
| R                 | 373,692 | 250,120 | 377,000 | 403,804 | 139,632 | 11,489,000 | 394,496  | 322,232 | 326,800 |

The table above shows the maximum memory usage during the testing using Windows XP, Windows 7 and Windows 8 in different hardware platforms. For the SPSS results in desktop using Windows XP used 159,060 KB, Windows 7 used 19,004 KB, Windows 8 used 134,400 KB, in Laptop using Windows XP used 180,036 KB, Windows 7 used 158,484 KB, Windows 8 used 140,399 KB and in Netbook using Windows XP used 155,892 KB, Windows 7 used 129,200 KB, Windows 8 used 115,400 KB. For the R software results in

desktop using Windows XP used 373,692 KB, Windows 7 used 250,120 KB, Windows 8 used 134,400 KB, in laptop using Windows XP used 403,804 KB, Windows 7 used 158,484 KB, Windows 8 used 140,399 KB and in Netbook using Windows XP used 394,496 KB, Windows 7 used 322,232 KB, Windows 8 used 326,800 KB. For correlation test, R Software has the larger amount of memory usage than R Software.

**Table 6.CPU usage (%) Comparison of Correlation load test**

| CPU USAGE (%)     |         |    |     |        |    |     |          |    |     |
|-------------------|---------|----|-----|--------|----|-----|----------|----|-----|
| Hardware Platform | DESKTOP |    |     | LAPTOP |    |     | NET BOOK |    |     |
| Windows OS        | XP      | 7  | 8   | XP     | 7  | 8   | XP       | 7  | 8   |
| SPSS              | 4       | 23 | 5.6 | 7      | 15 | 7.5 | 15       | 13 | 3.1 |
| R                 | 2       | 0  | 0   | 0      | 3  | 0.3 | 1        | 0  | 1.1 |

Table above shows the CPU usage during the testing using Windows XP, Windows 7 and Windows 8 in different hardware platforms. For the SPSS results in desktop using Windows XP used 4%, Windows 7 used 23%, Windows 8 used 5.6%, in Laptop using Windows XP used 7%, Windows 7 used 15% , Windows 8 used 7.5% and in Netbook using Windows XP used 15%, Windows 7 used 13%, Windows 8 used 3.1%.And for the R results in

desktop using Windows XP used 2%, Windows 7 used 0%, Windows 8 used 0%, in Laptop using Windows XP used 0%, Windows 7 used 3% , Windows 8 used 0.3% and in Netbook using Windows XP used 1%, Windows 7 used 0%, Windows 8 used 1.1%. For correlation test shows that SPSS Software used higher amount of CPU usage than R Software.

**Volume Testing Results**

**Table7: Runtime (ms) Comparison of 1 Million Data volume test**

| RUNTIME (MS)      |         |         |        |         |        |         |          |         |         |
|-------------------|---------|---------|--------|---------|--------|---------|----------|---------|---------|
| Hardware Platform | DESKTOP |         |        | LAPTOP  |        |         | NET BOOK |         |         |
| Windows OS        | XP      | 7       | 8      | XP      | 7      | 8       | XP       | 7       | 8       |
| SPSS              | 88.08   | 77.590  | 93.650 | 194.840 | 76.360 | 446.460 | 376.261  | 316.800 | 803.368 |
| R                 | 6.288   | 131.510 | 71.500 | 172.460 | 31.240 | 119.750 | 133.013  | 224.186 | 328.576 |

Table shows the maximum memory usage during the testing using Windows XP, Windows 7 and Windows 8 in different hardware platforms. For the SPSS results in desktop using Windows XP uses 88,08 ms, Windows 7 uses 77,590 ms, Windows 8 uses 93,650 ms, in Laptop using Windows XP uses 194,840 ms, Windows 7 uses 76,360 ms, Windows 8 uses 446,460 ms and in Netbook using Windows XP uses 376,261 ms, Windows 7 uses 316,800 ms, Windows 8 uses 803,368 ms. For the R software results in desktop using Windows XP uses 6,288

ms, Windows 7 uses 131,510 ms, Windows 8 uses 71,500 ms, in laptop using Windows XP uses 172,460 ms, Windows 7 uses 31,240 ms, Windows 8 uses 119,750 ms and in Netbook using Windows XP uses 133,013 ms, Windows 7 uses 224,186 ms, Windows 8 uses 328,576 ms. For the 1 Million Data volume test results of time usage shows the SPSS Software uses larger amount of memory usage than R Software.

**Table 8: Memory usage (Kb)Comparison of 1 Million Data volume test**

| MEMORY USAGE (Kb) |         |         |         |         |         |         |          |         |         |
|-------------------|---------|---------|---------|---------|---------|---------|----------|---------|---------|
| Hardware Platform | DESKTOP |         |         | LAPTOP  |         |         | NET BOOK |         |         |
| Windows OS        | XP      | 7       | 8       | XP      | 7       | 8       | XP       | 7       | 8       |
| SPSS              | 154.444 | 14.660  | 140.700 | 156.972 | 150.792 | 142.000 | 154.172  | 128.364 | 107.000 |
| R                 | 183.388 | 347.560 | 424.900 | 127.760 | 805.784 | 401.500 | 370.656  | 321.740 | 316.400 |

The table above shows the maximum memory usage during the testing using Windows XP, Windows 7 and Windows 8 in different hardware platforms. For the SPSS results in desktop using Windows XP uses 154,444 KB, Windows 7 uses 14,660 KB, Windows 8 uses 140,700 KB, in Laptop using Windows XP uses 156,972 KB, Windows 7 uses 150,792 KB,

Windows 8 uses 142,000 KB and in Netbook using Windows XP uses 154,172 KB, Windows 7 uses 128,364 KB, Windows 8 uses 107,000 KB. For the R software results in desktop using Windows XP uses 183,388 KB, Windows 7 uses 347,560 KB, Windows 8 uses 424,900 KB, in laptop using Windows XP uses 127,760 KB, Windows 7 uses 805,784 KB, Windows 8 uses 401,500 KB and in Netbook using Windows XP uses 370,656 KB, Windows 7 uses 321,740 KB, Windows 8 uses 316,400 KB. For the Startup results of memory usage shows the R Software uses larger amount of memory usage than SPSS Software.

**Table 9: CPU usage ( %)Comparison of 1 Million Data volume test**

| CPU USAGE (%)     |         |    |      |        |    |      |          |    |     |
|-------------------|---------|----|------|--------|----|------|----------|----|-----|
| Hardware Platform | DESKTOP |    |      | LAPTOP |    |      | NET BOOK |    |     |
| Windows OS        | XP      | 7  | 8    | XP     | 7  | 8    | XP       | 7  | 8   |
| SPSS              | 28      | 42 | 36.3 | 20     | 39 | 39   | 37       | 3  | 7.6 |
| R                 | 46      | 45 | 41   | 50     | 50 | 40.3 | 48       | 25 | 0.3 |

Table shows the CPU usage during the testing using Windows XP, Windows 7 and Windows 8 in different hardware platforms. For the SPSS results in desktop using Windows XP uses 28%, Windows 7 uses 42%, Windows 8 uses 36.3%, in Laptop using Windows XP uses 20%, Windows 7 uses 39% , Windows 8 uses 37% and in Netbook using Windows XP uses 37%, Windows 7 uses 3%, Windows 8 uses 7.6%. For the R results in desktop using Windows XP uses

46%, Windows 7 uses 45%, Windows 8 uses 41%, in Laptop using Windows XP uses 50%, Windows 7 uses 50% , Windows 8 uses 40.3% and in Netbook using Windows XP uses 48%, Windows 7 uses 25%, Windows 8 uses 0.3%. For 1 Million Data volume test results of CPU usage figure 32 shows the R Software uses larger amount of CPU usage than SPSS Software.

**Table 10. Runtime (ms) Comparison of 500,000 Data volume test**

| RUNTIME (MS)      |         |       |        |        |       |        |          |        |        |
|-------------------|---------|-------|--------|--------|-------|--------|----------|--------|--------|
| Hardware Platform | DESKTOP |       |        | LAPTOP |       |        | NET BOOK |        |        |
| Windows OS        | XP      | 7     | 8      | XP     | 7     | 8      | XP       | 7      | 8      |
| SPSS              | 30.500  | 7.260 | 15.780 | 18.730 | 9.760 | 14.490 | 73.520   | 84.134 | 87.091 |
| R                 | 20.012  | 6.610 | 6.450  | 5.370  | 5.370 | 6.390  | 41.009   | 21.025 | 28.636 |

Table shows the calculated runtime during the testing using Windows XP, Windows 7 and Windows 8 in different hardware platforms. For the SPSS results in desktop using Windows XP uses 30,500 ms, Windows 7 uses 7,260 ms, Windows 8 uses 15,780

ms, in Laptop using Windows XP uses 18,730 ms, Windows 7 uses 9,760 ms , Windows 8 uses 14,490 ms and in Netbook using Windows XP uses 73,520 ms, Windows 7 uses 84,134 ms, Windows 8 uses 87,091 ms. For the R results in desktop using

Windows XP uses 20,012 ms, Windows 7 uses 6,610 ms, Windows 8 uses 6,450 ms, in Laptop using Windows XP uses 5,370 ms, Windows 7 uses 5,370 ms, Windows 8 uses 6,390 ms and in Netbook using Windows XP uses 41,009 ms, Windows 7 uses

21,025 ms, Windows 8 uses 28,636 ms. For the Startup results of time usage shows that SPSS Software uses larger amount of time usage than R Software.

**Table 11: Memory usage (Kb) Comparison of 500,000 Data volume test**

| MEMORY USAGE (Kb) |         |        |         |         |         |         |          |         |         |
|-------------------|---------|--------|---------|---------|---------|---------|----------|---------|---------|
| Hardware Platform | DESKTOP |        |         | LAPTOP  |         |         | NET BOOK |         |         |
| Windows OS        | XP      | 7      | 8       | XP      | 7       | 8       | XP       | 7       | 8       |
| SPSS              | 153,800 | 29,964 | 140,000 | 159,820 | 152,160 | 137,400 | 154,828  | 124,788 | 121,000 |
| R                 | 29,012  | 58,360 | 55,400  | 95,132  | 95,132  | 51,200  | 65,600   | 321,740 | 44,200  |

Table shows the maximum memory usage during the testing using Windows XP, Windows 7 and Windows 8 in different hardware platforms. For the SPSS results in desktop using Windows XP uses 153,800 KB, Windows 7 uses 29,964 KB, Windows 8 uses 140,000 KB, in Laptop using Windows XP uses 159,820 KB, Windows 7 uses 152,160 KB, Windows 8 uses 137,400 KB and in Netbook using Windows XP uses 154,828 KB, Windows 7 uses 124,788 KB, Windows 8 uses 121,000 KB. For the R software results in desktop using Windows XP uses 29,012

KB, Windows 7 uses 58,360 KB, Windows 8 uses 55,400 KB, in laptop using Windows XP uses 95,132 KB, Windows 7 uses 95,132 KB, Windows 8 uses 51,200 KB and in Netbook using Windows XP uses 65,600 KB, Windows 7 uses 321,740 KB, Windows 8 uses 44,200 KB. For the 500,000 Data volume results of CPU usage shows that SPSS Software uses larger amount of CPU usage than R Software.

**Table 12. CPU usage (%) Comparison of 500,000 Data volume test**

| CPU USAGE (%)     |         |    |      |        |    |      |          |    |      |
|-------------------|---------|----|------|--------|----|------|----------|----|------|
| Hardware Platform | DESKTOP |    |      | LAPTOP |    |      | NET BOOK |    |      |
| Windows OS        | XP      | 7  | 8    | XP     | 7  | 8    | XP       | 7  | 8    |
| SPSS              | 5       | 42 | 2.24 | 6      | 18 | 13   | 3        | 3  | 2.5  |
| R                 | 21      | 41 | 34.9 | 50     | 50 | 36.9 | 1        | 25 | 16.4 |

It can be gleaned from the table above the CPU usage during the testing using Windows XP, Windows 7 and Windows 8 in different hardware platforms. For the SPSS results in desktop using Windows XP uses 5%, Windows 7 uses 42%, Windows 8 uses 2.24%, in Laptop using Windows XP uses 6%, Windows 7 uses 18%, Windows 8 uses 13% and in Netbook using Windows XP uses 3%, Windows 7 uses 3%, Windows 8 uses 2.5%. For

the R results in desktop using Windows XP uses 21%, Windows 7 uses 41%, Windows 8 uses 34.9%, in Laptop using Windows XP uses 50%, Windows 7 uses 50%, Windows 8 uses 36.9% and in Netbook using Windows XP uses 1%, Windows 7 uses 25%, Windows 8 uses 16.4%. For the 500,000 Data volume test results of CPU usage shows the SPSS Software uses larger amount of CPU usage than R Software.

**Stress Testing Results**

**Table 13: Not Responding Cases in Desktop**

| OS        | Tool | case(s) | Duration       |
|-----------|------|---------|----------------|
| Windows 7 | R    | 1       | 00:00:16:100   |
| Windows 7 | R    | 2       | 00:00:26:950   |
| Windows 7 | R    | 3       | 00:00:14:510   |
| Windows 7 | SPSS | 1       | 00:00:03:150   |
| Windows 8 | R    | 1       | 0000:00:01:850 |
| Windows 8 | R    | 2       | 0000:00:19:822 |



Table shows all the Not Responding cases in Desktop hardware platform. In Windows 7 operating system, R software has three numbers of cases of Not Responding and reached a maximum duration of 26 seconds and 950 mille seconds. The SPSS software has only one case and reached three

seconds and 150 mille seconds. In Windows 8 operating system, R has two cases of Not Responding and reaches a maximum duration of 19 seconds and 822 mille seconds. While SPSS has no case of not responding. In Windows XP, both software has no case of not responding.

**Table 14: Not Responding Cases in Laptop**

| OS        | Tool | How many Time(S) | Duration     |
|-----------|------|------------------|--------------|
| Windows 8 | R    | 1                | 00:00:13:980 |
| Windows 8 | R    | 2                | 00:00:58:060 |
| Windows 8 | R    | 3                | 00:00:28:000 |
| Windows 8 | R    | 4                | 00:00:17:200 |
| Windows 8 | R    | 5                | 00:00:02:660 |
| Windows 8 | R    | 6                | 00:00:8:880  |

Table 14 shows all the Not Responding cases in Desktop hardware platform. In Windows 8 there are 6 recorded cases that the R software did not respond to the system and reached a maximum duration of

58 seconds and 60 mille seconds. While SPSS has no case of not responding. In Windows 7 and XP both software has no recorded case of not responding.

**Table 15: Not Responding Case in Net Book**

| OS        | Tool | Case(s) | Duration     |
|-----------|------|---------|--------------|
| Windows 8 | R    | 1       | 00:00:21:150 |
| Windows 8 | R    | 2       | 00:01:50:047 |
| Windows 8 | R    | 3       | 00:01:46:017 |
| Windows 8 | R    | 4       | 00:00:04:069 |
| Windows 8 | R    | 5       | 00:00:10:089 |
| Windows 8 | R    | 6       | 00:01:39:057 |
| Windows 8 | R    | 7       | 00:00:10:111 |
| Windows 8 | R    | 8       | 00:02:25:187 |
| Windows 8 | R    | 9       | 00:00:11:022 |
| Windows 8 | R    | 10      | 00:01:49:028 |
| Windows 8 | R    | 11      | 00:00:13:190 |

Table 15 shows all the Not Responding cases in Desktop hardware platform. In Windows 8 there are 11 recorded cases that the R software did not respond to the system and reached a maximum duration of 2 minutes, 25 seconds and 187 mille seconds. While SPSS has no case of not responding. In Windows 7 and in Windows XP both software has no recorded case of not responding.

warning during the third process of loading the data set until to the 10<sup>th</sup> load of the data set. The same warning message appeared in Windows 7, XP, and 8. In the Laptop and Net Book, R software again showed the same error warning that appeared in the Desktop. However, it occurred during the 4<sup>th</sup> and 5<sup>th</sup> load of the data set and lasted until the 10<sup>th</sup> load of the dataset.

**Not Responding case in Windows 7 (Desktop) ERROR RESULTS**

During the stress testing there was some errors that occur. In Desktop, R software showed an error

**4. CONCLUSION**

From the study and experiment conducted and the results it yielded the study therefore conclude the

following:

- R software was way better than SPSS software in Speed and Responsiveness. It appears on the results that the R software consumes quite a lesser time to complete the process than SPSS software.
- R software was poorer in stability than SPSS software; R software has a several cases of “Not Responding” to the system, specifically in Windows 8 platform.
- Based on the test results, R has poor built in memory (the program itself), R shows an error message during importing large data in the third time. SPSS can import large data that has 1 million observations approximately, 10 times.
  - SPSS software consumes a big part of the CPU than R software.
  - R software consumes a big part of memory (RAM) than SPSS software.
  - R and SPSS are best installed in Windows 7 operating system which is faster than Windows 8.

#### **REFERENCES:**

1. Anmol. Basal and Dr. Satyajee Srivastava, 2018. *Tools Used in Data Analysis: A Comparative Study.* p 16
2. Ceyhun Ozgur, 2017. *Selection of Statistical Software for Data Scientist and Teachers.* p. 770